

"Assembly of Japanese bicycle require great peace of mind!" –Robert M. Pirsig: Zen and the Art of Motorcycle Maintenance Blank page

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## 1 Introduction

Assembly of a processing plant model in Sumo require great peace of mind, to extend Mr. Pirsig's observation. This documentation contains the elements of the Sumo modeling language. Although it is not simple, once mastered, wonderful models can be created in a well-organized and documented fashion. From now on the modeling language will be referenced as SumoSlang.

## 1.1 What is SumoSlang?

SumoSlang is the modeling language used in the Sumo process modeling software. It was developed with modeling very large systems in mind: containing process units and process models. It was developed also with engineers in mind: write your equations in a familiar environment namely Microsoft Excel.

The naming, organization of tables and their content on various Excel worksheets and the keywords used is known as SumoSlang. Some of the main features of the language are:

- assignment oriented
  - assignment: only one variable is allowed at the left-hand side of the equation
  - formatted equation: symbols with arbitrary formatting (subscript, superscript, Greek characters) are allowed on both sides of the equation
- easy to comment and add notes
- documentation and code are at the same place
- algebraic calculations
- dynamic calculations

## 2 Structure

The Sumo process modeling software contains a standard library of process code. The elements of this library are process code files in the above-mentioned Excel document format which represents the source code of the library. There are three process code types:

- general settings—with the fixed file name systemcode.xlsx
- **process model**—with arbitrary file name, e.g. Sumo1.xlsm (the model files usually contain macros for validation, hence the .xlsm extension)
- process unit—with arbitrary file name, e.g. CSTR with diffused aeration and input DO.xlsx

SumoSlang is processed by the so-called Sumo Model Translator (SMT) first, which understands SumoSlang and converts it to an intermediate XML format for further processing. This documentation will discuss the SumoSlang features and rules from the SMT point of view. The graphical user interface of the Sumo modeling software may impose other requirements on the process code e.g. various worksheets containing irrelevant data for the SMT.

The standard library source code is placed in a specific folder structure shown on the following picture, where the Sumo install folder is open in Windows Explorer.



Figure 1 Sumo process code structure

The red highlighted folders are used by the SMT to lookup for process code files mentioned at the beginning of the chapter (settings, models, process units).

It is considered a good practice to not modify the standard library, but place user code in the *My Process Code* folder which has the same inner structure as *Process Code*.

The following sections will explain the structure of the different process code files, what are their mandatory elements and what can be freely chosen by process code authors.

## 2.1 General settings

Sumo settings are stored in a special Excel file named systemcode.xlsx. The name of this file is mandatory.

Figure 2 shows the first worksheet of the system code with other worksheets expected by the SMT highlighted in red:

- System settings various system wide settings and constants
- Functions function declarations recognized by the SMT
- **Constants**—scientific constants used in calculations
- **Sumoconv**-dictionary of special (Greek) character conversions to C++ code
- **Species**—dictionary of chemical species

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					-						
		General indicators									
	Symbol	Name		Value	Low limit	High limit	Unit	Decimals	Rule	Principle/comment	
	Mode	General mode indicator		0	0	3			Integer		
	InSteady	Steady state mode indicator		FALSE					Boolean		
)[	DE solver settings										
	Valid options for SolverAlg										
		1 Fixed step Euler									
		2 Adaptive Euler									
		3 Heun									
		4 Dunne Kutte Delage Democrat									
		4 Runge-Rutta-Prince-Dormand									
		4 Runge-Rutta-Prince-Dormand 5 BDF									
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		Kunge-Kutta-Prince-Dormand     BDF     Adams-Moulton     Radau									
		Kunge-Kutta-Prince-Dormand     S BDF     6 Adams-Moulton     7 Radau     General ODE solver settings									
	Symbol	4 Runge-Kutta-Prince-Dormand 5 BDF 6 Adams-Moulton 7 Radau General ODE solver settings Name		Value	Low limit	High limit	Unit	Decimals	Rule	Principle/comment	
	Symbol SolverAlg	Kinge-kutta-Prince-Dormand     BDF     6 Adams-Moulton     7 Radau     General ODE solver settings     Name     ODE solver algorithm		Value 5	Low limit	High limit	Unit -	Decimals	Rule Integer	Principle/comment	
	Symbol SolverAlg StopTime	Kunge-kutta-Prince-Dormano     SBDF     Adams-Moulton     Radau     General ODE solver settings     Name     ODE solver algorithm     Stopping time		Value 5 0	Low limit	High limit 7 1E+12	Unit - ms	Decimals	Rule Integer Integer	Principle/comment	
	Symbol SolverAlg StopTime DataComm	Kurge-Auta-Prince-Jormano     ShoF     Adams-Moulton     Radau     General ODE solver settings     Name     ODE solver algorithm     Stopping time     Data I/O interval		Value 5 0 3600000	Low limit 1 0 1	High limit 7 1E+12 1E+12	Unit - ms ms	Decimals	Rule Integer Integer Integer	Principle/comment	
	Symbol SolverAlg StopTime DataComm ReIODETolerance	A Runge-Autta-Prince-Johnand S BDF 6 Adams-Moulton 7 Radau <u>General ODE solver settings</u> <u>Name</u> ODE solver algorithm ODE solver algorithm Data I/O interval Relative ODE tolerance		Value 5 0 360000 0.00001	Low limit 1 0 1 1E-20	High limit 7 1E+12 1E+12 0.1	Unit - ms ms conc	Decimals	Rule Integer Integer Integer	Principle/comment	

*Figure 2 The* systemcode.xlsx *file containing systemwide settings. The worksheets highlighted in red are expected by the SMT.* 

## 2.2 Process model

The model files contain various scientific equations, matrices and parameter values used in simulations. Process units may reference one or more models thus, the variables and equations of the included model(s) are available in process unit calculations.

Figure 3 shows a model file example with frequently used worksheets highlighted.

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	Check p	arameters							
		Ordinary heterotrophic organisms kinetics (OHO)	Type(Kinetic)						
	Symbol	Name	Default	Low limit	High limit	Unit	Decimals	Rule	Principle/comment
	µ <sub>оно</sub>	Maximum specific growth rate of OHOs	4.0	0	BigNumber	ď	1	Key(980)	
	HFERM, OHO	Fermentation growth rate of OHOs	0.3	0	BigNumber	ď	1		
	ь <sub>оно</sub>	Decay rate of OHOs	0.62	0	BigNumber	ď	2		
	η <sub>OHO,anox</sub>	Reduction factor for anoxic growth of OHOs	0.60	0	BigNumber	unitless	2		
	K <sub>SB,AS</sub>	Half-saturation of readily biodegradable substrate for OHOs (AS)	5.0	0	BigNumber	g COD.m <sup>-3</sup>	1	Key(970)	
	K <sub>02,0H0,AS</sub>	Half-saturation of O2 for OHOs (AS)	0.05	0	BigNumber	g O <sub>2</sub> .m <sup>-3</sup>	2	Key(960)	
	K <sub>vfa,as</sub>	Half-saturation of VFAs for OHOs (AS)	0.5	0	BigNumber	g COD.m <sup>-3</sup>	1		
	K <sub>MEOL,OHO,AS</sub>	Half-saturation of methanol for OHOs (AS)	0.1	0	BigNumber	g COD.m <sup>-3</sup>	1		
	K <sub>NOX,OHO,AS</sub>	Half-saturation of NOx for OHOs (AS)	0.03	0	BigNumber	g N.m <sup>-3</sup>	2		
	K <sub>vfa,ferm,as</sub>	Half-saturation of VFAs in fermentation of OHOs (AS)	50.0	0	BigNumber	g COD.m <sup>-3</sup>	1		
	K <sub>SB,ana,AS</sub>	Half-saturation of readily biodegradable substrate in fermentation by OHOs (AS)	5.0	0	BigNumber	g COD.m <sup>-3</sup>	1		
-									
		Methylotroph kinetics (MEOLO)	Type(Kinetic)						
	Symbol	Name	Default	Low limit	High limit	Unit	Decimals	Rule	Principle/comment
	μ <sub>MEOLD</sub>	Maximum specific growth rate of MEOLOs	1.3	0	BigNumber	ď	1		
	<b>b</b> <sub>MEOLO</sub>	Decay rate of MEOLOS	0.05	0	BigNumber	ď	2		
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*Figure 3 Excel file containing model code. The worksheets highlighted in red are usually used in process unit calculations.* 

Some of the worksheet names are mandatory others are arbitrary. The mandatory names are expected by the SMT when a shorthand symbol is evaluated (see subsections of 5.1 Expandable symbols).

The fixed names are:

- **Parameters**—is a list of parameters having fixed numerical values used in calculations
- **Species**—a dictionary of equilibrium species used in pH calculations
- **Components**—contains state variables in dynamic systems, or model components in algebraic systems (e.g. chemical species that determine the chemical composition of the investigated solution: Ca2+, Mg2+, etc.)
- **Calculated variables**—contains equations calculating variables dependent on other variables

Other worksheets with arbitrary names are:

- **Model**—contains the so-called Gujer or kinetic matrix, which is a table used by process units to calculate biokinetic reactions.
- **pH**—contains all the information to calculate the equilibrium species in reactions that are considered during pH calculations

The model may contain other, user defined worksheets which can be referenced in process unit code. The referencing methods are discussed in section 5.1 Expandable symbols.

#### 2.3 Process units

The process code contained in process units describe the behavior of bioreactors, flow elements separators and other modeled elements. As mentioned above the process units may "pull in" variables and equations from one or more model files and use them in their calculations.

The process units should be able to work with different models which means that they cannot reference models by name, but some other mechanism. See again section 5.1 Expandable symbols for more information.

Figure 4 shows the code of a process unit with the commonly used worksheets highlighted. The names of these worksheets are mandatory.

- **Unit**—a dictionary of attributes and component handlings valid in the process unit (see sections 5.2.1 Attributes and 5.2.2 Handlings)
- **Parameters** contains the simulation parameters modifiable by the user in the Sumo process modeling software. These are valid only in the process unit, but model parameters can be "pulled in".
- **Code**—contains the process code of the process unit grouped in so-called code locations (see section 3.2.1 Table )

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nment
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Figure 4 Process unit file with the commonly-used worksheets highlighted in red.

Other, optional worksheets usable by the SMT can be added to the process unit. These worksheets also have mandatory names and they are the following:

- **Components**—it is like the *Components* in the model but valid only in the process unit. They may overwrite model components.
- **Functions**—it is like the *Functions* in the systemcode.xlsx but valid only in the process unit.
- **Structure**—it is present in composite process units. Contains the list of components and connections between them, as well as connections to the outside world.

#### 2.3.1 Composite process units

A process unit may consist of several subunits. The components are separate process units with their own process code files. Grouping them in a single process unit hides the internal complexity, the group behaving like a black box with few connections to the outside world.

The *Structure* worksheet introduced in the previous section contains this grouping information. Figure 5 shows an example of the *Structure* sheet of a composite unit.

Columns of the component table play an essential role in how the composite unit controls its components (see section 2.4 Process unit hierarchy).

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	TtoMpipe	Liquid	Topoutp	Middleinp	_											
J	MtoBpipe	Liquid	Middleoutp	Bottominp												
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1	External connection	External														
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*Figure 5 Structure worksheet of a composite process unit showing three components, their internal connections and the external connections of the whole composite unit.* 

## 2.4 Process unit hierarchy

In the Sumo software the modeled plant is organized in a process unit hierarchy. The root element is (an artificial) composite process unit which lists the participating process units as components. These process units may be simple or composite too.

In the previous section it was mentioned that composite process units (parents) controls its components (children). This control is represented by passing so-called attributes, handlings and parameters from the parent to the children (see sections 5.2.1 Attributes and 5.2.2 Handlings).

The artificial root element is provided for the user by the Sumo software to be able to set plantwide simulation properties and parameters. The *Unit* and *Parameters* worksheets of a process unit contains attributes, handlings and parameters valid in that process unit, but these values can be overwritten by the root element or by a parent composite unit (if the process unit is part of one).

The intention of overwriting can be declared in the columns of the component table present on the *Structure* sheet of the parent process unit. On Figure 5 the *Unit component* table has columns between *Label* and *Models*. Those are attribute names and the values in the different rows are passed to the corresponding process unit.

In a similar manner, columns after the *Models* column represent handling names and the values in the different rows are passed to the corresponding component (the example does not contain such columns).

Where a cell in a given column is empty no value is passed to the component unit thus the value defined in the component unit prevails.

Figure 6 shows the hierarchy of four modeled process units (PU<sub>1</sub>, PU<sub>2</sub>, PU<sub>3</sub>, PU<sub>4</sub>) where PU<sub>1</sub> and PU<sub>4</sub> are composite units consisting of two process units: PU<sub>1,1</sub>, PU<sub>1,2</sub> and PU<sub>4,1</sub>, PU<sub>4,2</sub> respectively. The example shows on the left side of the hierarchy how attributes and handlings can be passed from parent to children, while the right side shows two methods for passing model parameters from parent to children.



*Figure 6 Simple process unit hierarchy. The dashed line between the Root and the Model means that the Root is not the parent of the Model, only uses it.* 

Parameter passing has a special name in SumoSlang: parameter inheritance. It is explained in section 5.2.1 Attributes in more detail. Here it is enough that when inheritance is ON the parameters come from the parent of the process unit, otherwise from the model. The root process unit always takes its parameters from the model.

#### 2.4.1 Plantwide code

Global settings and properties can be given in the so-called plantwide code file. This is provided by the Sumo software per modeled plant and it is not part of the process unit library accompanying the software.

One can think of the plantwide code as if the software would give access to some elements of the artificial root process unit. The plantwide code file looks like a normal process unit, it has *Unit, Parameters* and *Code* worksheets and the data given on these worksheets will be incorporated in the root element. However, the user cannot reach the *Structure* sheet of the root element through plantwide code.

Composite process units can reach parameters and other variables of their **direct** children by prefixing the variables with the child unit name like this:

```
ChildName..variable
```

The plantwide code is an exception at the moment of this reference rule. When a variable from a child unit (direct or deep in the hierarchy) is needed in plantwide calculations it should be qualified with its full namespace prefix (see chapter 7 Namespaces).

# 3 Process code layout

Figure 2 shows a worksheet containing typical process code. The process code rows are placed in neat tables which gives an organized look and feel to the code. The tables are separated by at least one blank row. Note that the pretty formatting, coloring of the tables does not influence how they are perceived by the SMT. For example, if the user would insert some text in cell B10, the SMT would include it in the first table. The tables contain the process code and anything outside of them is considered as comment and ignored.

## 3.1 Table structure

Every table should have a

- **descriptor**—a 3-segment cell range B2:D2 in the example mentioned above
  - **table type**—cell B2, it can be empty or may contain one of the following keywords
    - Array
    - if block
    - C++ code
    - Newton-Raphson—used in model code on the Calculated variables worksheet
    - Port, Attribute, Model, Handling—used on the Unit worksheet of process units
    - SolverConfiguration meant to replace Newton-Raphson table types in tandem with Equilibrium code locations (see 9 Advanced topics)
  - **table name**—cell C2, contains a meaningful grouping name of the table content
  - **table tag**—cell D2, like table type it can be empty or may contain one of the following keywords
    - Pure—used only on the Functions worksheet of system settings
    - Type(arg)—used in model code (*Parameters*, *pH*, *Calculated variables*) for further grouping tables
    - Codelocation(arg)—used on *Code* worksheet of process units. The argument may be one or more of the following keywords
      - ZeroTime
      - DataComm
      - Integrated
      - Equilibrium
    - Scope(arg)—used on *Unit* worksheet of process units
- **header**—the range B3:J3 in the example. The number of columns is arbitrary. Some of the column header names are fixed (e.g. *Symbol, Name, Value, Rule*) others are arbitrary.
- **body**—the code lines grouped in the table (the body can be empty). Its range is B4: J9 in the first table of the example.

#### 3.1.1 Simple table

Usually the range of a table is determined by the content of the *Symbol* column and the header row as shown on the following picture.

				E.	F	G	н	1	1	
		Connect	1							
mbol		Name	Value	Low limit	High limit	Unit	Decimals	Rule	Principle/comment	
intName		Name of plant instance	InitialString					String		
ne		Sumo system time (passed from core)	0	0	1E+12	ms		Integer		7
eed		TRUE: Fast, approximate FALSE: slower, exact	FALSE					Boolean		7
bug		Debug build/messages	FALSE					Boolean		
gging		Logging on	FALSE					Boolean		1
rminate		Solver termination flag	FALSE					Boolean		1
	abol ItName e ed ug ging minate	bol bol tName e e e e e e e e e e e e e e e e e e	General           bol         Name           Name of plant instance            e         Sumo system time (passed from core)           ed         TRUE: Fast, approximate FALSE: slower, exact           ug         Debug build/messages           ging         Logging on           minate         Solver termination flag	General           bol         Name         Value           tName         Name of plant instance         InitialString           e         Sumo system time (passed from core)         0           ed         TRUE: Fast, approximate FALSE: slower, exact         FALSE           ug         Debug build/messages         FALSE           ging         Logging on         FALSE           minate         Solver termination flag         FALSE	General           bol         Name         Value         Low limit           tName         Name of plant instance         InitialString            e         Sumo system time (passed from core)         0         0         0           ed         TRUE: Fast, approximate FALSE: slower, exact         FALSE            ug         Debug build/messages         FALSE            ging         Logging on         FALSE            minate         Solver termination flag         FALSE	General           bol         Name         Value         Low limit         High limit           tName         Name of plant instance         Initial String             e         Sumo system time (passed from core)         0         0         1E+12           ed         TRUE: Fast, approximate FALSE: slower, exact         FALSE             ug         Debug build/messages         FALSE             ging         Logging on         FALSE             minate         Solver termination flag         FALSE	General           bol         Name         Value         Low limit         High limit         Unit           tName of plant instance         InitialString <td< td=""><td>General           bol         Name         Value         Low limit         High limit         Unit         Decimals           tName         Name of plant instance         Initialistring   </td></td<> <td>General         Value         Low limit         High limit         Unit         Decimals         Rule           tblane         Name of plant instance         InitialString           String           e         Sumo system time (passed from core)         0         0         11£12         ms         Integer           ed         TRUE: Fast, approximate FALSE: slower, exact         FALSE           Boolean           ug         Debug build/messages         FALSE           Boolean           ging         Logging on         FALSE           Boolean           minate         Solver termination flag         FALSE           Boolean</td> <td>General           bol         Name         Value         Low limit         High limit         Unit         Decimals         Rule         Principle/comment           tName         Name of plant instance         InitialString           String            e         Sumo system time (passed from core)         0         0         1£+12         ms         Initiager            ed         TRUE: Fast, approximate FALSE: slower, exact         FALSE           Boolean           Boolean            Boolean           Boolean            Boolean           Boolean             Boolean   <!--</td--></td>	General           bol         Name         Value         Low limit         High limit         Unit         Decimals           tName         Name of plant instance         Initialistring	General         Value         Low limit         High limit         Unit         Decimals         Rule           tblane         Name of plant instance         InitialString           String           e         Sumo system time (passed from core)         0         0         11£12         ms         Integer           ed         TRUE: Fast, approximate FALSE: slower, exact         FALSE           Boolean           ug         Debug build/messages         FALSE           Boolean           ging         Logging on         FALSE           Boolean           minate         Solver termination flag         FALSE           Boolean	General           bol         Name         Value         Low limit         High limit         Unit         Decimals         Rule         Principle/comment           tName         Name of plant instance         InitialString           String            e         Sumo system time (passed from core)         0         0         1£+12         ms         Initiager            ed         TRUE: Fast, approximate FALSE: slower, exact         FALSE           Boolean           Boolean            Boolean           Boolean            Boolean           Boolean             Boolean </td

#### Figure 7 Table boundaries.

The key elements like descriptor, header and body described in the previous section are determined relative to the *Symbol* cell. The table extends to the right and down while the *Symbol* row and column contains non-empty cells.

Some table types do not follow this structure but should comply to some different structure nevertheless. Such table types are the *Array, if block* and *C++ code*.

The rows of a code table represent assignments in the form of a = b, or more precisely  $a \leftarrow b$  (b goes to a). The left-hand side of the assignment is in the *Symbol* column of the table, while the right-hand side is in one of the *Value* or *Default* or *Expression* columns. In some cases, the *Expression* column may break in several parts (see 3.1.2 Array).

#### 3.1.2 Arrays

Arrays are fundamental in every programming language. In SumoSlang they can be specified in three ways. The first is a simple table containing a row with its symbol in array notation e.g. var[]. SumoSlang require a so-called array rule in the *Rule* column of the array row, like [n], where n is the size of the array and it is declared on the *Parameters* sheet of a process unit file. The examples were taken from the Layered SBR with calculated DO.xlsx.

Figure 8 shows an example of array size definition. On the *Parameters* worksheet the righthand side of the assignments is contained in the *Default* or *Value* column.

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Α	В	c	D	E	F	G	н	I.	J
	X <sub>TSS,min.max</sub>	Non-settleable TSS	20	Zero	MaxStateVar	g.m <sup>-3</sup>	1		
	compr <sub>on</sub>	Boundary compression concentration	6000	Zero	BigNumber	g.m <sup>-3</sup>	0		Compression is taken into a
	X <sub>TSS,min.blanket</sub>	Concentration at top of sludge blanket	2500	Zero	MaxStateVar	g.m <sup>-3</sup>	0		
		Layer number							
	Symbol	Name	Default	Low limit	High limit	Unit	Decimals	Rule	Principle/comment
	n	Number of layers in vertical direction	9	3	BigNumber	-	0	Dimension	
			_						
	Array	Layered clarifier parameters							
	Symbol	Name	Default 1	Default i(2 to 4)	Default 5	Default i(6 to n-1)	Default n	Low limit	High limit
	inpf <sub>q</sub> []	Fraction of influent flow to the layers	0	0	1	0	0	Zero	One
	efffq[]	Fraction of effluent flow from the layers	1	0	0	0	0	Zero	One
	sludgef <sub>q</sub> []	Fraction of sludge flow from the layers	0	0	0	0	1	Zero	One
[ ] ]	Help	Unit Parameters Components C	Code Display	Popup -	+				
								m	

Figure 8 Dimension type variable definition in row 51.

An array size definition requires a **Dimension** rule specifying that it is an array dimension type variable. It is worth mentioning that SumoSlang handles only one-dimensional, real number arrays for now.

Figure 9 shows an example of simple arrays in various code tables.

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15	$  \cdot   \times \checkmark f$	c						
A	В	С	D	E	F	G	н	
In	itialization							
		SV Initialization	Codelocation(ZeroTime)					
	Symbol	Name	Expression	Unit	Decimals	Rule	Principle/comment	
	SV[]	MODEL.SV.Name concentration	SV_0[]	MODEL.SV.Unit		[n]; Handling(Integrated)	Initialize state variables	
			_					
		Operational parameter initialization	Codelocation(ZeroTime)					
	Symbol	Name	Expression	Unit	Decimals	Rule	Principle/comment	
	h <sub>L,max</sub>	Maximum depth of one layer	h <sub>tank,max</sub> /n	m				
	A <sub>layer</sub> []	Layer surface	A <sub>tank</sub>	m <sup>2</sup>		[n]		
	LV <sub>layer</sub> []	Layer volume (variable)	A <sub>tank</sub> * h <sub>decant</sub> / n	m <sup>3</sup>		[n]		
2	LV	Current volume of reactor	L.V <sub>layer</sub> []	m <sup>3</sup>	1	[n]; sum		
3	LV <sub>max</sub>	Maximum liquid volume	A <sub>tank</sub> * h <sub>tank,max</sub>	m <sup>3</sup>				
	Help	Unit Parameters Cor	nnonents Code (	Display Popun	4	i		
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*Figure 9 Array rows in two tables: rows 5, 10, 11 contain arrays with their symbol ending in brackets and with* [n] *in their Rule column.* 

The SMT will unwind an array row to a loop where the elements of the array will be assigned to the right-hand side contained in the *Expression* column. In our example **n** is defined as 9 meaning that all arrays with rule [n] have 9 elements. Row 5 for example will be unwound as follows:

```
SV[1] = SV_0[1]
SV[2] = SV_0[2]
...
SV[9] = SV_0[9]
```

or more precisely to an equivalent loop. Note that the expression is also in array notation, i.e. ending in brackets. Row 10 contains an example where every element of the array is assigned the same variable (no array notation in the expression). As an exercise try to unwind the array in row 11.

The second option to define an array is to set the table type to Array in the table descriptor. The SMT is prepared that the *Expression* column may be broken in several parts. Figure 10 shows an example of this array type.

	- Matosa		* W	Layered SBR with calculated L	0.151			_	C Dearen oncer	9
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15	- ‡ × ·	$\checkmark f_x$								
А	В	с	D	E	F	G	н	1	J	
	Q <sub>mix</sub>	Mixing flow out of bottom layer	V <sub>mix</sub> * A <sub>tank</sub>	m <sup>3</sup> .d <sup>-1</sup>						
;								_		
1	Array	Flux originating from settling	Codelocation(Integrated)							
3	Symbol	Name	Expression 1	Expression i(2 to n-1)	Expression n	Unit	Decimals	Rule	Principle/comment	
	J <sub>s.xtss</sub> []	Settling flux of suspended solids	$\begin{split} & \text{If}\{X_{\text{TSS}}[1] > X_{\text{TSS}}[2]; \\ & (v_s[1]^*X_{\text{TSS}}[1] + v_s[2]^*X_{\text{TSS}}[2])/2.0; \\ & \text{min}(v_s[1]^*X_{\text{TSS}}[1]; \\ & Total is a standard or equation of a standard or equation or equ$	$\begin{split} &If(X_{TSS}[i] > X_{TSS}[i+1]; \\ &(v_s[i]^*X_{TSS}[i]+v_s[i+1]^*X_{TSS}[i+1])/2 \\ &.0; \min(v_s[i]^*X_{TSS}[i]; \\ &.0; \min(v_s[i]^*X_$	0.0	g.d <sup>-1</sup>		[n]		
			v <sub>s</sub> [2]*X <sub>TSS</sub> [2]))*A <sub>layer</sub> [1]	vs[i+1]*XTSS[i+1]))*Alayer[i]						
		Continuous flows	Codelocation(Integrated)							
	Symbol	Name	Expression	Unit	Decimals	Rule	Principle/comment			
	decantQ	Decant flow	Q <sub>decant</sub> + Q <sub>overflow</sub>	m <sup>3</sup> .d <sup>-1</sup>				1		
•	uflowQ Help	RAS flow Unit Parameters	Components Code	m <sup>3</sup> .d <sup>-1</sup> Display Popup +	0			1		
Deed								ரை ப		12.0%

Figure 10 Array table type beginning in row 137 ending in 139.

In this array type a more fine-grained unwinding process can be specified; for example, the first and the last element will be assigned different values compared to the rest of the array:

```
J<sub>s.XTSS</sub>[1] = content of the Expression 1 column
J<sub>s.XTSS</sub>[2] = content of the Expression i(2 to n-1) column where i is 2
...
J<sub>s.XTSS</sub>[8] = content of the Expression i(2 to n-1) column where i is 8
J<sub>s.XTSS</sub>[9] = 0.0
```

Please note that indexer variables (i in the second *Expression* column) can be used only in their column, constant indexers can be used in all *Expression* columns (for example the first *Expression* column contains  $X_{TSS}$ [1] and  $X_{TSS}$ [2] but  $X_{TSS}$ [n] could be used as well).

The third option is the so-called composite array. It is like the previous one, but the unwinding process is even more sophisticated. Figure 11 shows an example of a composite array table taken from the MBBR with fixed film thicknes.xlsx.

3	$  \rightarrow \rangle$	/ fx							
A	В	c	D	E	F	G	н	1	J
38	Array	Reactor compartment mass balances	Codelocation(Integrat	ed)					
39	Symbol	Name	Expression 1	Expression 2	Expression i(3 to n)	Unit	Decimals	Rule	Principle/comment
40		Influent	inpF_SV			g.d <sup>-1</sup>			
41		Effluent	-outpF_SV			g.d <sup>-1</sup>			
42		MODEL.SV.Name diffusion	dM,diff,SV[1]	dM,diff,SV[2]	dM,diff,SV[i]	g.d <sup>-1</sup>		Exempt(H)	
43		MODEL.SV.Name conduction	dM,cond,SV[1]	dM,cond,SV[2]	dM,cond,SV[i]	g.d <sup>-1</sup>		Only(H)	
44		MODEL.SV.Name transfer	0	0	0	g.d <sup>-1</sup>			
45		Biological reaction rate	rateF_SV[1]	rateF_SV[2]	rateF_SV[i]	g.d <sup>-1</sup>		Reactive	
46	dM,SV[]	MODEL.SV.Name mass balance in compartments				g.d <sup>.1</sup>		[n]; Phase(L); Particle size(S)	
47		Influent	inpF_SV			g.d <sup>-1</sup>			
48		Effluent	-outpF_SV			g.d <sup>-1</sup>			
49		MODEL.SV.Name diffusion	dM,diff,SV[1]	dM,diff,SV[2]	dM,diff,SV[i]	g.d <sup>-1</sup>			
50		Biological reaction rate	rateF_SV[1]	rateF_SV[2]	rateF_SV[i]	g.d <sup>-1</sup>		Reactive	
51	dM,SV[]	MODEL.SV.Name mass balance in compartments				g.d <sup>-1</sup>		[n]; Phase(L); Particle size(C)	
52		Influent	inpF_SV			g.d <sup>-1</sup>			
53		Effluent	-outpF_SV			g.d <sup>-1</sup>			
54		Attachment from bulk phase	-F,att,SV[1]	F,att,SV[1]		g.d <sup>-1</sup>			
55		Detachment to bulk phase	F,det,SV[1]	-F,det,SV[1]		g.d <sup>-1</sup>			
56		Internal solids transfer	dM,str,SV[1]	dM,str,SV[2]	dM,str,SV[i]	g.d <sup>-1</sup>			
57		Displacement of particulate components	dM,dpm,SV[1]	dM,dpm,SV[2]	dM,dpm,SV[i]	g.d <sup>-1</sup>			
58		Biological reaction rate	rateF_SV[1]	rateF_SV[2]	rateF_SV[i]	g.d <sup>-1</sup>		Reactive	
59	dM,SV[]	MODEL.SV.Name mass balance in compartments				g.d <sup>-1</sup>		[n]; Phase(L); Particle size(X)	

Figure 11 Composite array, the terms in the rows without symbol are summed by Expression columns.

The rows with empty symbol define summation terms for all elements of the array. The array variables are identified by a non-empty symbol and a [n] rule in rows 146, 151, 159 respectively. The result of unwinding the first array is as follows:

```
dM,SV[1] = (inp..F_SV + (-outp..F_SV) + ... + rateF_SV[1])
dM,SV[2] = (dM,diff,SV[2] + 0 + rateF_SV[2])
...
dM,SV[4] = (dM,diff,SV[4] + 0 + rateF_SV[4])
```

if the array size **n** is 4 in the example and the summation terms of the first array are taken from rows 140 to 145. As the example shows, multiple composite arrays can be defined in a single table. Sometimes it is worth to split the arrays in separate tables, for example the last array could be extracted in its own table, resulting in an opportunity to simplify the original one. It is obvious that *Expression 2* and *Expression i*(*3 to n*) columns have the same terms for the first two arrays, so they could be combined in a single *Expression i*(*2 to n*).

Every summation term row may contain filtering rules influencing the resulting sum (see section 5.2.1 Attributes to learn about attribute filtering). In the example the last term, rateF\_L.SV[i] is included only in case of *Reactive* process units.

#### 3.1.3 if block

Conditional execution of program code is another important element of a programming language. In SumoSlang condition execution is declared in tables with type *if block*. Figure 12 shows an example of if block taken from PID controller.xlsx.

16	\$ ×	( √ fx								
1	АВ	с	D	E	F	G	н	1		J
	if block			Controller code in steady state mode	Codelocation(Integrated)					
	Operator	Condition	Symbol	Name	Expression	Unit	Decimals	Rule	Principle/comment	
	if	InSteady && control == 1								
			CVerr	Controlled variable error	CV <sub>setp</sub> - CV	CVunit				
			dMV_dt	Manipulated variable unbound change	direction * K <sub>P.PID</sub> * CV <sub>err</sub>	MVunit.d <sup>-1</sup>				
			MV	Manipulated variable	Hardbound(MV + dMV_dt; MV <sub>min</sub> ; MV <sub>max</sub> )	MVunit				
	else									
			CVerr	Controlled variable error	CVerr	CVunit				
			dMV_dt	Manipulated variable unbound change	dMV_dt	MVunit.d <sup>-1</sup>				
•			MV	Manipulated variable	MV	MVunit				
)										
	Help	p Unit Par	ameters	Code Display Popup	+					



This table type has some additional columns before *Symbol*, namely *Operator* and *Condition*. The *Operator* column may contain only the keywords if, else if, or else. An if operator always should have a matching else or else if pair and the symbols in their code rows should be the same (see the symbols in rows 23-25 and rows 27-29).

The *Condition* column contains relational operators similar to the C language with one exception: the assignment symbol = is recognized as the equality operator ==, meaning that in the example control = 1 would be the same as control == 1.

Nested if blocks are supported too, in that case there are many numbered *Operator* columns before the *Condition* column.

#### 3.1.4 C++ code

Process code may include blocks of raw C++ code to perform calculations that are clumsy or impossible in SumoSlang. The Sumo variables used as input arguments by the C++ code are listed in the *Inputs* column, while the generated output variables are listed in the *Outputs* column.

The range of a C++ code table type is determined with help of the *Inputs* keyword (used like *Symbol* in simple tables) and the *Expression* keyword. The table ends at the row of the last non-empty cell in the *Expression* column.

The code in the *Expression* column may contain variables with a NAMESPACE\_\_\_ prefix. This prefix will be replaced by the SMT with the namespace of the process unit (see chapter 7 Namespaces).



*Figure 13 C++ code example. The code lines in the Expression column are included in the generated XML after proper namespacing.* 

## 3.2 Table descriptor

Table names are part of the table descriptor range and on the *Parameters* worksheet (model or process unit) they should be unique. This is also true for tables with the same table type (if block, Array etc.) on the *Code* worksheet.

#### 3.2.1 Table tag

This is the third section of the table descriptor right after the table name. It may contain table grouping information like Codelocation (which is a keyword) or code filtering information. The latter is an arbitrary text that can be used in the *Rule* column of an expandable code line to restrict the expansion from tables with that text in their table tag (see 5.3 Mechanism of expansion).

In the process code library provided by the Sumo software the most used table tag is Codelocation and Type(...).

**Type** is used in model files for example to group different equation types (kinetic, stoichiometric, equilibrium, energy) on the *Calculated variables* worksheet. Type and its arguments are not keywords; the process code author can define arbitrary grouping texts which can be used in process units.

Figure 14 shows the *Calculated variables* worksheet of a model file with Type(Kinetic) groups. This group identifier is then referenced in the *Rule* column of a code line in a process

unit meaning that the equations from all Type(Kinetic) tables will be included from the model (see also 5.2.3 Non-keyword rules).

ome Insert	t Page Layo	ut Formulas	Data Review View						L⊄ S	hare
	√ ƒx Sym	bol								
A 1	В		c		D		E	F	G	
		xidation-reduction pote	ntial	Type(Kinetic)						
Syn	mbol N	ame		Expression	<hr/>		Value	Unit	Decimals	Ru
ORP <sub>02</sub>	0	xidation-reduction pote	ntial due to dissolved oxygen	ORPbase+(ORPmax, 502-ORP	base *So2/(KORP.SO	2+S02)	285.4	mV		
ORP <sub>NOx</sub>	0	xidation-reduction pote	ntial due to dissolved nitrate	ORPbase+(ORPmax, SNOx-OR	Pbase)*\$NOw/(KORP.S	snox+S <sub>NOx</sub> )	62.7	mV		
ORP <sub>CH4</sub>	0	xidation-reduction pote	ntial due to dissolved methane	ORPbase*ScH4/(KORP.OH4 + S	io14)		-2.0	mV		
ORP	0	xidation-reduction pote	ntial	Max(ORPoz.ORPNocORPc			285.4	mV		
	I						1	I		
	P	recipitation/redissolutio	n rates	Type(Kinetic)						
Symbol	N	ame		Expression			Value	Unit	Decimals	Ru
PrecipDrivingFo	orce <sub>str</sub> R	ate expression of struvit	e precipitation (driving force)	(([Mg <sup>2+</sup> ] <sup>*(1/3)</sup> *[NH <sub>4</sub> <sup>+</sup> ] <sup>*(1/3)</sup>	• [RO4 ]^[1/3] - K	<sub>p,STR</sub> ^(1/3))/ K <sub>sp,STR</sub> ^(1/3)	-0.95	Unitless	2	pH;
PrecipDrivingFo	orce <sub>stR</sub> R	ate expression of struvit	e precipitation (driving force)	0			0	Unitless	0	pH;
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Figure 14 Type(...) table groups in a model file and referencing them in the Rule column of a process unit

**Codelocation** is used for grouping process unit code in groups (ZeroTime, DataComm etc.) described in section 3.1 Table structure. The previous example shows two Integrated and one DataComm code location in column D of the visible tables. The grouping, which becomes important in simulations, will be reflected in the generated XML file.



Figure 15 The generated XML file with collapsed nodes for better overview.

Figure 15 shows an overview of the generated XML file with collapsed nodes except the main <model> node and <codeblocks> where the code locations start in row 10759. Code locations with content inside are collapsed in the example.

The Codelocation may specify multiple code blocks together with code sections. The syntax is as follows:

```
Codelocation(block[,section] ... [;block[,section]])
```

where

- block—is the code block name
- section—is the code section name under the block node
- , —is the section separator
- ; —is the block separator

Elements in brackets are optional. If section is not specified, the default "1" to "n" is used. If multiple distinct blocks are listed as arguments, the code lines in that table will be repeated in the XML within those blocks.

## 3.3 Generating the intermediate XML file

The project assembled in the Sumo modeling software contains the model, the process units and other settings. The Excel file format representing the process code is just a convenient, user-friendly format to store everything needed by the software.

The equations contained in the Excel files are translated by the SMT to an intermediate XML format which contains the instructions for the Sumo numerical engine to perform the simulation. The XML file then is transformed to an actual executable file usable by the Sumo numerical engine.

The SMT is used by Sumo automatically, but it can also be used manually. In the latter case the user should provide the *Root* element, discussed in section 2.4 Process unit hierarchy, of the project which contains the structure of the modeled plant.

# 4 Basic language elements

The following subsections contain the various SumoSlang elements in greater detail with examples.

## 4.1 Assignments

The most fundamental element of the SumoSlang is the assignment. Section 3.1.1 Simple table presented how an assignment is specified in a simple table. Figure 16 shows the table *Gujer matrix* on the *Code* sheet of a process unit.

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Figure 16 Table containing assignments on the Code worksheet.

From the example the following information can be extracted:

- it is a simple table (no table type)
- the table represents the group of assignments named Gujer matrix
- the assignments will end up in the *Integrated* code location in the generated XML file
- the elements of the assignments are contained in the *Symbol* and the *Expression* columns. The three assignments in the example are:

o r<sub>MODEL.Model.j</sub>[] = MODEL.Model.Rate[]

- the Unit of the left-hand side variable is coming from MODEL.Model.Unit (see 5.1 Expandable symbols)
- it has two rules: Reactive and [n] (see 5.2 Rules)

```
o VMODEL.Model.j,SV[] = MODEL.Model.SV[]
```

it has two rules: Reactive and [n]

```
\circ rate_SV[] = v<sub>MODEL.Model.j,SV</sub>[] * r<sub>MODEL.Model.j</sub>[]
```

- the *Unit* of the left-hand side variable is explicitly given: g.m-3.d-1
- it has three rules: sum(MODEL.Model.j), Reactive and [n]

The most important columns of the table from the point of view of an assignment are *Symbol* and *Expression*. They contain the left-hand side and the right-hand side of the assignment; the other columns contain auxiliary information (e.g. the unit or the different filtering rules) used by the Sumo software.

The symbol on the left-hand side of the assignment is a variable while the right-hand side may contain variables, numerical values or constants, string constants (literals), functions and operators. Variable names should start with a letter, may contain numbers, comma characters (,), single dot characters (.) or single underscore characters (\_) and may have subscript or superscript parts. The following variable name contains all the mentioned features:

Tlocal,max\_P<sup>12.V1.0</sup>\_x

Double dot (...) and double underscore (\_\_\_) are not allowed in variable names as they are namespacing keywords (see 7 Namespaces).

#### 4.1.1 Operators

The assignments may use the following arithmetical, logical and relational operators:

Symbol	Meaning
+	addition
-	subtraction
*	multiplication
/	division
^	exponentiation
&&	logical AND
	logical OR
!	logical NOT
==	relational Equal
!=	relational Not Equal
<	relational Less than
>	relational Greater than
<=	relational Less than or Equal
>=	relational Greater than or Equal

Table 1 Operators of SumoSlang

It is worth noting that the SMT automatically provides protection against division by zero errors by adding a very small number to every quotient.

## 4.2 Data types

The following data types are used in SumoSlang:

- Integer
- Real
- Boolean
- String
- Dimension—array size by a given dimension (only one at the moment)

The data type of a variable by default is Real. There is no type inference from the right-hand side (i.e. the SMT cannot determine the type of the left-hand side variable). The correct type

should be specified by the process code author in the *Rule* column of a given code line, using one of the type names from the previous list.

## 4.3 Symbol roles

SumoSlang fits the symbols it finds in one of the following roles:

- **Constant**—various numerical constants (physical, chemical) used in calculations contained on the *Constants* worksheet of the systemcode.xlsx
- **Parameter**—simulation parameters modifiable by the user of the Sumo software; everything on *Parameters* worksheets except dimensions.
- **State variable (SV)**—dynamic simulation state variables; every variable matching a symbol found on the *Components* worksheet of either a process unit or a model. The following conditions should be met also:
  - the matching symbol on the *Components* worksheet of the model should have Integrated handling (see 5.2.2 Handlings)
  - a corresponding derivative of the symbol should be present in the process unit code
- **Derivative** derivatives of state variables; every variable with the symbol equal to d<state variable>\_dt where <state variable> is the place holder for a symbol with SV role
- **SystemState**—every other variable has this role (a better role name should be found).

The role of the various symbols is carried on to the XML file and is used by the simulation core of the Sumo software.

## 4.4 Functions

The *Functions* worksheet in systemcode.xlsx contains the function declarations used in process code. The usual mathematical functions (more precisely their C++ name) are listed in a separate table tagged as *Pure*. Functions in other tables are Sumo functions expressed in C++ code.

The function declaration (name and arguments) is in the *Symbol* column, its body is in the *Expression* column. The syntax is the following:

```
[type][array_sign] name(
    [type][array_sign] [name][;]
```

[type][array\_sign] [name][; [type][array\_sign] [name]...)

where

- type is one of the following keywords
  - REAL—this is the default if type is omitted
  - INT—Integer type
  - BOOL—Boolean type
  - STRING—String type
- array\_sign is the [] character pair
- name any name starting with a letter and containing letters, numbers or underscores
- ; argument delimiter

The elements in brackets are optional. Where type is missing REAL will be used. The following example shows the Average function declaration:

Average([] x; INT start; INT end)

where Average is the function name. The return type and array sign are missing which means that the function will return a REAL number. The missing type specification and the given array sign of the first argument x means that it is an array of REAL numbers. Both start and end are integer numbers.

# 5 Advanced language elements

The following sections describe how process code can be written in a very terse form. Terseness is achieved by the introduction of so-called expandables and filtering rules. Without these the process code would be much larger and more verbose. To see the difference, one can compare the *Code* worksheet of a process unit with the generated XML file which contains the fully expanded version of the process code.

## 5.1 Expandable symbols

The SMT recognizes variables written in a special, abbreviated or shorthand notation. During translation, these are replaced with a set of symbols contained in the process model. This means that instead of one code line there will be n code lines where n is the number of symbols included by the process called expansion.

The process code shipped with the Sumo software provides syntax highlighting of expandables as Figure 16 shows SV and the triplet of symbols starting with MODEL are colored blue.

#### 5.1.1 SV

SV stands for state variable. A symbol containing this shorthand will be replaced with a set of symbols from the *Components* worksheet of the model. This set may contain all symbols from the model or a subset of them. Various filtering methods are available to specify which state variables are needed (see 5.2 Rules).

For state variables, besides rules, an alternative filtering method is available to write terser process code. These shorthand notations are also recognized by the SMT:

- L.SV—selects liquid phase state variables
- G.SV—selects gas phase state variables
- S.SV—selects solid phase state variables
- ssv—selects dissolved components (or small particle size state variables)
- cSV—selects colloidal components
- xSV—selects particulate components

The phase and particle size shorthand are composable (in this order). L.sSV for example means liquid dissolved components. These are keywords and the L, G, S, s, c, x prefixes are **not** taken from the content of the *Phase* and *Particle size* columns (please note the case difference of s, c, x).

The SV expandable is a shorthand of the MODEL.SV.Symbol notation (see 5.1.5 Triplet notation). Note that L.SV can be replaced with the rule Phase(L) and xSV with the rule Particle size(X), (see section 5.2.3 Non-keyword rules) while the *Symbol* column would simply contain SV. In case of rule filtering, the argument of the rule should match the content of the *Phase* and *Particle size* columns (L, G, S in case of phase and S, C, X in case of particle size). If the column

*Phase* would contain solid, the rule would be Phase(solid) while the shorthand filtering method still would be S.SV.

It is important to mention that this alternative SV filtering method (L.SV, xSV etc.) works only with default models i.e., the first model attached to the process unit (see 8.1 Default model). If more than one models are attached to the process unit and the process code author wants to reference state variables from the second (third etc.) model, the full triplet syntax should be used, and the filtering should be implemented with rules instead of a shorthand. For example, L.SV in MODEL\_2 should be written as MODEL\_2.SV.Symbol with Phase(L) rule.

#### 5.1.2 PAR

PAR stands for parameters. This shorthand is replaced by symbols found on the *Parameters* worksheet of a model file like in the case of state variables. These are simulation parameters available to the user of the Sumo software for modification.

Filtering is possible by specifying a *Type*(...) selector in the *Rule* column in the process unit because the tables on the *Parameters* worksheet are grouped in *Type* groups.

PAR is a shorthand of the MODEL.PAR.Symbol triplet notation.

## 5.1.3 CVAR

**CVAR** stands for calculated variables. This shorthand is replaced by symbols found on the *Calculated variables* worksheet of a model file. Filtering is the same as in case of PAR shorthand: use a *Type*(...) selector in the Rule column in the process unit.

CVAR is a shorthand of the MODEL.CVAR.Symbol triplet notation.

#### 5.1.4 SPC

**SPC** stands for species. This shorthand is replaced by symbols found on the *Species* worksheet of a model file. As *Species* contains a simple table without any grouping, the whole list of symbols is "pulled in" during expansion.

SPC is a shorthand of the MODEL.SPC.Symbol triplet notation.

## 5.1.5 Triplet notation

The triplet syntax allows a **general** way of referencing model parts in process code. This notation always has three elements:

- model identifier—represents the model ID or model variable name used on the *Unit* sheet of a process unit. This allows a name-independent reference to the model used by a process unit. Note that MODEL is not a keyword, it can be PANCAKE for example, if that ID is used on the *Unit* worksheet of the process unit to identify a model.
- worksheet name—selects a worksheet in the model file. Shorthand notation (SV, PAR, CVAR, SPC) or explicit names are allowed. The worksheet name may contain whitespaces.
- column name—selects a column in a code table. Shorthand notation or explicit names are allowed. If the column name contains white spaces the whole triplet should be placed in quotation marks (e.g. "MODEL.PAR.Low limit").

Figure 16 contains various examples of the triplet syntax usage. These are:

- r<sub>MODEL.Model.j</sub>[]—where the subscript index of the variable r will be replaced with symbols taken from the default model file, worksheet *Model* and column *j*.
- MODEL.Model.Rate[] where the expression will be replaced with symbols taken from the model file, worksheet *Model*, column *Rate*.

- MODEL.SV.Name where the expression will be replaced by symbols taken from the default model file, worksheet *Components*, column *Name*. Note that the context of the SV shorthand is recognized, it represents a worksheet name, and it is replaced accordingly.
- MODEL.Model.SV[] where the expression will be replaced with symbols taken from the default model file, worksheet *Model*, column name equal to symbols from the *Components* worksheet. This is a tricky expansion (see more in 5.3 Mechanism of expansion).

As the introduction of section 5.1 explained: the expansion means replacing one code line with many code lines.

#### 5.2 Rules

The predominant usage of rules in process code lines is filtering equations "pulled in" from the model or other process units. Data types may also be specified in rules (see 4.2 Data types).

Filtering capabilities are related to attributes and handlings specified in process units (model files do not contain a *Unit* worksheet with attribute and handling specifications).

The evaluation of the *Rule* column results in a single Boolean value. If true, the code line (or its expansion) will be passed otherwise not.

The *Rule* column may contain several distinct rule elements separated by a semicolon. The rule result will be the composition of the partial results with the AND relational operator.

#### 5.2.1 Attributes

Attributes are user defined symbols on the *Unit* worksheet of process units, or columns of the *Unit component* table on the *Structure* worksheet of a composite process unit. The attributes can be used in the *Rule* column of code lines (process unit or model) to skip some of them during expansion.

Attributes have an implicit Boolean data type. The SMT takes their value, or their negated value if they have a Non- prefix, to evaluate the rule in a given code line.

Section 2.4 Process unit hierarchy described parameter inheritance in a nutshell. Figure 17 shows how it is implemented with the help of attributes. Parameter inheritance means model parameter inheritance (there are other parameters defined in process units). Model parameters can be altered by process units and their children (if any) may want to specify which model parameters they need, hence the need of the two different inheritance methods.

The *Rule* column of row 117 on the *Parameters* worksheet contains a Non-InheritkinPAR attribute while row 468 on the *Code* worksheet contains its counterpart, InheritkinPAR. The *Unit* worksheet of the process unit contains the definition of the InheritkinPAR attribute defaulting to TRUE.

Please note that the *Default* column of the inheritance table on the *Parameters* worksheet contains a reference to the model: MODEL.PAR.Default which means that model parameters in the process unit will be equal to values coming from the model. (This is shown with the dark green line on Figure 6.)

On the other hand, the *Expression* column on the *Code* worksheet contains a reference to the parent process unit: Parent..PAR which means that model parameters in the process unit will be equal to values coming from the parent. (This is shown with the light green line on Figure 6.)

When InheritkinPAR is TRUE (inheritance ON) the code lines from the *Code* sheet prevail, otherwise the code lines from the *Parameters* sheet (the Non- prefix means negation as described before). Quite simple.

It is worth noting how with a few lines of code the process code author can refer to a large number of code lines from the model, tailoring them as he or she sees fit.



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Figure 17 Parameter inheritance implemented with attributes on the Parameters and Code worksheets.

#### 5.2.2 Handlings

Handlings specify how state variables should be treated during dynamic simulations. This is a filtering method of code lines in process units. They are defined in the *Handling* column on the *Components* worksheet of models.

Handlings may have one of the following values:

- Integrated
  - The Component marked as "Integrated" will be declared as a true State Variable and will have a derivative. This is the default for most components in a dynamic model.
- Set
  - The Component marked as "Set" will become a parameter, will not have a derivative. An example is DO – when just an input value is desired (e.g. 2 mg/L), it is not necessary to design and tune a controller, but change this Component to Set and assign a value.
- Algebraic
  - The total rate  $(v_{ij}*r_j)$  will be calculated (e.g. total CO2 production rate) without integrating the variable itself, so it is not present in the code.
- Balancing

 State variables with this handling are not taken in consideration during expansion, they are simply used to mass balance the model components in the model Excel sheet. An example is N2 – if dissolved and gaseous nitrogen is not important from the process standpoint but it is important to see that the N balance closes, Balancing rule can be used. The variable will not be present in the final compiled code.

These are the default handling values of state variables. The default values can be changed on the *Unit* and *Structure* worksheets of process units. The handling symbols specified in the process unit refer to state variables present in the model.

#### 5.2.3 Non-keyword rules

Section 3.2.1 Table explains the usage of *Type*(...) table grouping info in tandem with a Type(...) rule. The rule is an example of the more general table descriptor rules, namely the Type(arg1; ... argn) construct. This kind of rule allows code lines to be included from all tables matching the arguments. The source of the inclusion is usually the model, but it can be the parent or other direct child process units.

The Handling(...) rule is an example of the more general table header rules. A table header rule consists of a column name and an argument list representing distinct values from that column. The context, i.e. the worksheet where the column should be present, is determined by the SMT from the *Symbol* column of the process unit code line.

Figure 18 shows an example of table header rule in row 5 of the *Code* worksheet of a process unit.

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#### Figure 18 Handling(...) rule in row 5 of the Code worksheet.

The worksheet referred is *Components* of the model file because the *Symbol* column contains an SV (see 5.1.1 SV). The column name in the table header should be *Handling* and its content Integrated. The SMT will include only the rows where *Handling* contains the value Integrated.

It should be mentioned that in case of the worksheet contains multiple tables, all tables would be parsed by the rule, but only rows from matching tables (having *Handling* column) will be allowed.

If the Handling(...) rule contains more than one argument, all model rows with a matching *Handling* value would be allowed in the expansion. This means an OR relationship between the rule arguments.

The SumoSlang is flexible enough to let the user define arbitrary table descriptor (mostly table tags) or table header rules. It is important to mention that *Type* and *Handling* are not keywords

in SumoSlang (note, however, that *Handling* appears as table type keyword on the *Unit* worksheet of process units). Any rule written in a function syntax, i.e. name(arg<sub>1</sub>; ... arg<sub>n</sub>), is tried to be interpreted as a table descriptor rule then a table header rule. This allows the user to introduce other grouping and filtering names than those supplied with the Sumo process code.

## 5.2.4 Exempt, Only

These two keywords are explicit symbol filters during expansion. They take a list of symbols as arguments and may contain expandables.

**Exempt** excludes the assignments resulting after expansion which have a left-hand side symbol listed in the arguments.

**Only** includes the assignments resulting after expansion which have left-hand side symbol listed in the arguments.

The following example shows a model which has some gas phase state variables and a hypothetical process unit using Exempt(...) and Only(...) rules to skip or include some of these state variables.

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2	Constant	Components	Influent		Antipoted sludge	Disector	Disfilm	<b>6</b> 14 - 14 - 14	6	t and the te	It'sh Parts	11-11
- 1	SVMDOI	Name	innuent	initial concentration	Activated studge	Digester	Bioliim	Sidestream	Separators	Low limit	High limit	Unit
59	G <sub>CD2</sub>	Carbon dioxide gas (CO <sub>2</sub> )	0.025	0.100	0.054	0.800	0.100	0.100	0.100	MinStateVar	MaxStateVar	g ric.m
60	G <sub>CH4</sub>	Methane gas (CH <sub>4</sub> )	NonDetect	1.00E-50	0.001	4.300	NonDetect	NonDetect	NonDetect	MinStateVar	MaxStateVar	g COD.m
61	G <sub>H2</sub>	Hydrogen gas (H <sub>2</sub> )	NonDetect	1.00E-50	0.050	1.100	NonDetect	NonDetect	NonDetect	MinStateVar	MaxStateVar	g COD.m <sup>-3</sup>
62	G <sub>02</sub>	Oxygen gas (O <sub>2</sub> )	1.500	1.320	1.300	NonDetect	1.320	1.320	1.320	MinStateVar	MaxStateVar	g O <sub>2</sub> .m <sup>-3</sup>
63	G <sub>NH3</sub>	Ammonia gas (NH3)	NonDetect	1.00E-50	NonDetect	0.150	NonDetect	NonDetect	NonDetect	MinStateVar	MaxStateVar	g N.m <sup>-3</sup>
64	G <sub>N2</sub>	Nitrogen gas (N <sub>2</sub> )	4.880	4.880	4.900	0.300	4.880	4.880	4.880	MinStateVar	MaxStateVar	g N.m <sup>-3</sup>
65	G <sub>CD2,atm</sub>	Carbon dioxide gas (CO <sub>2</sub> )	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0	100	%v/v
	He	Ip Concepts Parameters	Model	pH Spe	cies Compon	ents Calc	ulated variables	+				

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51		Saturation concentrations for bubbles	Codelocation(Integrated)					
52	Symbol	Name	Expression	Unit	Decimals	Rule	Principle/comment	
53	S <sub>G.SV,bub,sat</sub> []	MODELSV.Name saturation concentration at gas bubble interface @ field conditions	$\beta * p_{partial,bub, d. SV}[]/q_{P_{R,bar}} * Henry_{d.SV}(T_{\kappa}[]) * MM_{\ell Q_{\ell} d. SV} * q_{\nu m3}$	g.m <sup>-3</sup>	2	[n]; Reactive; Handling(Integrated; Algebraic; Set); Exempt(G <sub>CO2</sub> ; G <sub>NH3</sub> )		
54	S <sub>G.SV,bub,sat,st</sub> []	MODELSV.Name saturation concentration at gas bubble interface @ standard (NTP) conditions	$\beta * p_{partial,bub,6.5.V,STP}[]/c_{Pa,bar} * Henry_{G,SV}(T_{NTP,K}) * MM_{EQ,6.5V} * c_{L,m3}$	g.m <sup>-3</sup>	2	[n]; Reactive; Handling(Integrated; Algebraic; Set); Only(G <sub>CO2</sub> ; G <sub>NH3</sub> )		
in6 ■ ► Read	For the atmose Help	oneric saturation concentration calculations were used to the saturation of the satu	e aread the composition of the atmosphere around the water surface onents Code Display Popup +				▣ 땐●	+ 120%

#### Figure 19 Exempt and Only rules in action.

The model in the example contains 6 gas phase state variables (in rows 59-64). The Exempt(GCO2; GNH3) rule in row 363 results in the following expansion of the symbol:

S <sub>GCH4,bub,sat</sub> []	
S <sub>GH2,bub,sat</sub> []	
S <sub>G02,bub,sat</sub> []	
S <sub>GN2,bub,sat</sub> []	

while the symbol in row 364 will be expanded in the following variables:

S<sub>GCO2,bub,sat</sub>[] S<sub>GNH3,bub,sat</sub>[]

#### 5.2.5 Other rules

Other less commonly used rules are:

- Step(arg) in case of array assignments it specifies the incrementation step of the loop variable (as in section 3.1.2 Arrays was described, the elements of the array are assigned in a loop). The step can be positive or negative.
- Call—used in event handling (see 6.4 Event handling)
- sum—array summation. The following example shows how to calculate the sum of array elements given in the *Expression* column into scalar variables given in the *Symbol* column.

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		Total masses		Codelocation(I	ntegrated)					
3	Symbol	Name		Expression		Unit	Decimals	Rule	Principle/comment	
,	M,L.SV,total	Total MODELSV.Name mass		M_LSV[]		g	1	[n]; sum		
C	M <sub>,CVAR,total</sub>	Total MODELCVAR.Name mass		M_CVAR[]		g		[n]; sum; Type(Stoichiometric)		
М	ass flows a	and rates								
Μ	ass flows a	and rates								
Μ	ass flows a	And rates Mass flows in decant output		Codelocation(I	ntegrated)					
Μ	ass flows a	Mass flows in decant output		Codelocation(I Expression	ntegrated)	Unit	Decimals	Rule	Principle/comment	
Μ	Symbol decantF.SV	and rates Mass flows in decant output Name MODELSV.Name mass flow in decar	nt output	Codelocation(I Expression efff <sub>Q</sub> [] * decant	ntegrated) Q * SV[]	Unit g.d <sup>-1</sup>	Decimals	Rule [n]; sum; Phase(L)	Principle/comment	
Μ	Symbol decantF.SV	Mass flows in decant output Name MODELSV.Name mass flow in decan	nt output	Codelocation(I Expression efff <sub>Q</sub> [] * decant	ntegrated) Q * SV[]	Unit g.d <sup>-1</sup>	Decimals	Rule [n]; sum; Phase(L)	Principle/comment	
M	Symbol decant.F.SV	Mass flows in decant output Name MODELSV.Name mass flow in decan Unit Parameters C	nt output	Codelocation(I Expression efff <sub>Q</sub> [] * decant Code	ntegrated) Q * SV[] Display	Unit g.d <sup>-1</sup> Popup +	Decimals	Rule [n]; sum; Phase(L)	Principle/comment	

*Figure 20 Code lines with sum rule stating that all elements of the arrays given in the* Expression *column should be added. The symbol in these cases represents a scalar variable.* 

- sum(arg), mul(arg) summation, multiplication of expansion terms (see section 6.1
  Summation, multiplication)
- sum(<number>) array initialization rule with additional distribution handlings. This rule distributes the values of the array so that their sum will be equal to the specified <number>. This rule is meant for the simulation engine and instructs it how to set the initial values of array elements. There are four auxiliary keywords to this sum(n) rule known as handlings:
  - Free specifies that the elements of the array can be distributed freely to obtain the desired sum
  - Head—specifies that the first element should be equal to the sum (the remaining elements will be 0)
  - Tail—specifies that the last element should be equal to the sum (the remaining elements will be 0)
  - Equal—specifies that the elements should be distributed evenly to give the desired sum
- For example an array may have the following rules: [n]; sum(1); Equal. The sum(1) and the Equal parts instructs the simulation engine to distribute the array elements evenly so that their sum will be 1. If n is 4 the elements of the array will be [.25, .25]. The array initialization and distribution rule are handy shortcuts.

## 5.3 Mechanism of expansion

Section 5.1 Expandable symbols listed the available expandable shorthand and triplet notations and discussed how with the help of these symbols shorter and terser process code can be written. This section describes how the shorthand symbol replacement works, the rules governing the process, giving detailed examples. The transformation of expandable symbols to the final variable names needed in calculations is called expansion.

#### 5.3.1 Simple expansion

The expansion is always driven by the content of the *Symbol* column of code tables, meaning that it selects the set of symbols used in expansion from a model worksheet. These symbols then will be the base of expansion for other columns which effectively means that expandables in other columns should match the *Symbol* column.

Figure 21 shows a simple case, where row 5 contains various state variable shorthand elements.

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In	itializatio	on								
		SV Initialization	Codelocation(ZeroTime)							
	Symbol	Name	Expression	Unit	Decimals	Rule	Principle/comment			
	<b>SV</b> []	MODEL.SV.Name concentration	SV_0[]	MODEL.SV.Unit		[n]; Handling(Integrated)	Initialize state variables			
		Operational parameter initialization	Codelocation(ZeroTime)							
	Symbol	Name	Expression	Unit	Decimals	Rule	Principle/comment			
	h <sub>Lmax</sub>	Maximum depth of one layer	h <sub>tank,max</sub> /n	m						
	A <sub>layer</sub> []	Layer surface	A <sub>tank</sub>	m <sup>2</sup>		[n]				
	L.V <sub>layer</sub> []	Layer volume (variable)	A <sub>tank</sub> * h <sub>decant</sub> / n	m <sup>3</sup>		[n]				
	Help	Unit Parameter	s Components	Code Dis	splay Pop	up + que				
1										

Figure 21 SV shorthand example in row 5.

Taken Sumo1 as model, SV[] will be expanded by replacing it with all symbols taken from the *Components* worksheet of Sumo1, transforming that single row into the following table:

Nr.	Symbol	Name	Expression	Unit
1	S <sub>VFA</sub> []	Volatile fatty acids (VFA) concentration	S <sub>VFA</sub> 0[]	g COD.m-3
55	H[]	Enthalpy concentration	H_0[]	MJ.m-3

Table 2 State variables after simple expansion.

As mentioned before, the expandables in columns other than *Symbol* should match, because values are taken from the same worksheet and the same row as *Symbol* specifies. In the example this condition is met because:

- the *Name* column contains a triplet expandable which instructs the SMT to take a value from the model file, worksheet *Components*, column *Name*, and the row specified by the current symbol (S<sub>VFA</sub> through H)
- the *Expression* column contains an SV expandable which instructs the SMT to take a value from the model file, worksheet *Components*, column *Symbol*
- the *Unit* column is like *Name*, but using the *Unit* column from the model

This simple case is spiced a bit with a Handling(Integrated) rule which tells the SMT to include only those rows from the model that have Integrated in their *Handling* column. These are the state variables from S<sub>VFA</sub> to H. The replacement content is shown in blue.

The expansion would be impossible if a non-Symbol column would contain a non-matching expandable, for example if *Name* would contain MODEL.CVAR.Name where CVAR would instruct the SMT to take values from the *Calculated variables* worksheet and the row specified by the current symbol. But the symbols S<sub>VFA</sub> through H are not present among the symbols of the *Calculated variables* worksheet.

Using expandables in the *Name* and *Unit* columns has the important benefit of easy maintainability. If something changes in the model nothing has to be changed in process units.

#### 5.3.2 Advanced expansion

The *Symbol* column contains more than one expandable. In this case the other columns should contain matching expandables to those in the *Symbol* column.

The expandables in the *Symbol* column are expanded one by one producing a set of assignments that has the cardinality equal to the Cartesian product of the symbol count on model worksheets participating in the expansion. Too many expandables would produce a huge number of assignments (the process code shipped with Sumo has no more than two expandables per symbol). See example in section 6.2 Gujer matrix calculations and 6.3pH calculation without summation.

#### 5.3.3 Even more advanced expansion

The *Symbol* column contains one or more expandables but *Expression* contains matching and non-matching expandables. In this case the non-matching expandables should be preprocessed with rules before expansion, eliminating the non-matching expandables. After that the procedure described in the previous subsection can be started. See the example in section 6.1 Summation, multiplication.

## 6 Special calculations

This chapter contains examples of advanced expansion. The examples are taken from a real process unit, Layered SBR with calculated D0.xlsx, and Sumo1.xlsm is used as model.

## 6.1 Summation, multiplication

Row 124 of the following process code table shows an example of 5.3.3 Even more advanced expansion. *Symbol* contains an expandable (SV) and *Expression* contains a matching SV and a non-matching MODEL.Model.j expandable.

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	A B	с	D	E	F	G	н
117							
118	Biokinetic re	actions					
119							
120		Gujer matrix	Codelocation(Integrated)				
121	Symbol	Name	Expression	Unit	Decimals	Rule	Principle/comment
122	MODEL.Model.j[]	MODEL.Model.Name	MODEL.Model.Rate[]	MODEL.Model.Unit		Reactive;[n]; Non-Polymer	
123	VMODEL.Model.j.SV	Stoichiometry coefficient	MODEL.Model.SV[]			Reactive;[n]	
124	rate_SV[]	MODELSV.Name rate	VMODEL.Model.j.SV[] * rMODEL.Model.j[]	g.m <sup>-3</sup> .d <sup>-1</sup>		sum(MODEL.Model.j); Reactive; [n]; Non-Polymer	
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Figure 22 Advanced expansion examples in the Gujer matrix table.

In the example the non-matching expandable should be eliminated before expansion. This is done by the sum(MODEL.Model.j) rule, which instructs the SMT to unwind the expression in a sum by the MODEL.Model.j index as follows:

```
rate_SV[] = v_{1,SV}[]*r_1[] + v_{2,SV}[]*r_2[] + ... + v_{79,SV}[]*r_{79}[]
```

The index MODEL.Model.j is taken from the *Model* worksheet, column *j* of the default model containing numbers from 1 to 79 which are substituted in the summation.



Figure 23 The indexer column j on the Model sheet of Sumo1.xlsx.

After this step a simple expansion can be executed because the expression contains only matching **SV** expandables (same is true for the *Name*) column. The result of the expansion is shown in the following table:

Nr.	Symbol	Name	Expression	Unit
1	rate_S <sub>VFA</sub> []	VFAs concentration	V <sub>1,SVFA</sub> []*r <sub>1</sub> [] + +	g.m-3.d-1
			V <sub>79,SVFA</sub> []*r <sub>79</sub> []	
64	rate_G <sub>N2</sub> []	Nitrogen gas concentration	v <sub>1,GN2</sub> []*r <sub>1</sub> [] + +	g.m-3.d-1
			V79,GN2[]*r79[]	0

Table 3 Result of expansion of row 124.

The *Unit* sheet does not contain an expandable, it's content will be preserved. Please note, that only the blue colored symbols were the result of the expansion.

## 6.2 Gujer matrix calculations

In the previous example the expandable summation was taken out of context. If the whole code table is taken in consideration it reveals calculation involving the so-called Gujer matrix.

The result of expanding rows 122-124 is the following set of assignments:

• in row 122 the columns contain one matching expandable represented by the MODEL.Model.<column name> notation, meaning that the SMT can take values from columns of the *Model* worksheet. In this case *Symbol* takes values from the *j* column while *Expression* from the *Rate* column of the worksheet *Model*.

Nr.	Symbol	Name	Expression	Unit
1	r <sub>1</sub> []	OHO growth on VFAs, O2	{µоно,т * Хоно * Msat <sub>svFA,KvFA</sub> * Msat <sub>so2,Ko2,OHO</sub> * Msat <sub>sNHx,KNHx,BIO</sub> * Msat <sub>sPO4,KPO4,BIO</sub> * Msat <sub>sCAT,KCAT</sub> * Msat <sub>sAN,KAN</sub> * Bellinh <sub>pH</sub> }[]	g.m-3.d-1
79	r <sub>79</sub> []	Nitrogen gas transfer - surface	{k <sub>L</sub> a <sub>GN2,sur</sub> * (S <sub>GN2sur,sat</sub> - S <sub>N2</sub> )}[]	g.m-3.d-1

 Table 4 Result of expanding row 122. The curly braces in Expression indicate that the array sign is applied to the whole expression where it is the case.

in row 123 Symbol contains two expandables. Expression contains two expandables as well but in a tricky way: there is the matching triplet syntax expandable and, embedded in it, the SV column expandable. This is OK because Symbol specifies the same two worksheets: Model and Components to work with. The column part of the triplet syntax will be expanded according to its matching Symbol expandable (i.e. to MODEL.Model.SVFA when the Symbol expansion is v<sub>1,SVFA</sub>[] and so on). The result of the expansion is (taking only the columns with expandables):

Nr.	Symbol	Expression	Unit
1	V <sub>1,SVFA</sub> []	-1/Y <sub>OHO,VFA,ox</sub>	g.m-3.d-1
79	V <sub>79,SVFA</sub> []		g.m-3.d-1
80	V <sub>1,SB</sub> []		g.m-3.d-1
158	V <sub>79,SB</sub> []		g.m-3.d-1
5056	<b>V</b> 79,GN2[]		g.m-3.d-1

Table 5 The result of expanding row 123.

• for row 124 see section 6.1 Summation, multiplication.

## 6.3 pH calculation

In pH calculations the relevant worksheets of the model are *pH* and *Species* shown on the next picture:

B       C       D       L       P       C       N       I         Equilibrium matrix       Type(Equilibrium)       INH_1       [NH_2]       [NO_1]       [H+CO_1]         Idission       Discation of water       10/(-pH)       Kw/(H')       INH_1       [NH_2]       [NO_1]       [H+CO_1]         Idission       Ionication of ammonia       Ionic	B       C       D       L       P       G       N       I         Equilibrium matrix       Type(Equilibrium)         Symbol       Name       [M]       (0H)       [NH4]       [NH4] <th>B         C         D         L         F         N         I           Symbol         Name         Type(Equilibrium)         [N0,1]         [N0,1]</th> <th>Type         Type         <t< th=""><th>Symbol         Name         L         Participation           Symbol         Name         10% (pil)         [N%1]         [N%2]         [NO2]         [N/2]           Singo         Dissociation of water         10% (pil)         [K/2]         [N/2]         [NO2]         [M/2]           Singo         Dissociation of water         10% (pil)         [K/2]         [K/2]         [N/2]         [N/2]           Singo         Dissociation         Singolia         Inscription         [Sus/(MA,*1000)]*Kur/(IF/1/Kur)         Inscription         Inscrip</th><th>Symbol         Name         L         P         K         N         I           Symbol         Usscalation of water         100°(pi0)         Ku/(N1)         [No.]         [</th><th>Symbol         Name         Itype[Equilibrium]           Symbol         Name         [H]         [DH]         [NH]         [NH]</th></t<></th>	B         C         D         L         F         N         I           Symbol         Name         Type(Equilibrium)         [N0,1]	Type         Type <t< th=""><th>Symbol         Name         L         Participation           Symbol         Name         10% (pil)         [N%1]         [N%2]         [NO2]         [N/2]           Singo         Dissociation of water         10% (pil)         [K/2]         [N/2]         [NO2]         [M/2]           Singo         Dissociation of water         10% (pil)         [K/2]         [K/2]         [N/2]         [N/2]           Singo         Dissociation         Singolia         Inscription         [Sus/(MA,*1000)]*Kur/(IF/1/Kur)         Inscription         Inscrip</th><th>Symbol         Name         L         P         K         N         I           Symbol         Usscalation of water         100°(pi0)         Ku/(N1)         [No.]         [</th><th>Symbol         Name         Itype[Equilibrium]           Symbol         Name         [H]         [DH]         [NH]         [NH]</th></t<>	Symbol         Name         L         Participation           Symbol         Name         10% (pil)         [N%1]         [N%2]         [NO2]         [N/2]           Singo         Dissociation of water         10% (pil)         [K/2]         [N/2]         [NO2]         [M/2]           Singo         Dissociation of water         10% (pil)         [K/2]         [K/2]         [N/2]         [N/2]           Singo         Dissociation         Singolia         Inscription         [Sus/(MA,*1000)]*Kur/(IF/1/Kur)         Inscription         Inscrip	Symbol         Name         L         P         K         N         I           Symbol         Usscalation of water         100°(pi0)         Ku/(N1)         [No.]         [	Symbol         Name         Itype[Equilibrium]           Symbol         Name         [H]         [DH]         [NH]
Equilibrium matrix         Type[Equilibrium]           Symbol         Name         (h')         (OH)         (NH_1)         (NH_2)         (NO_1)         (HQ,0)         (HQ,0)           dissoal         Dissociation of water         J0P(-pH)         Kug/(H')         Image and the second of animolia in the second of anim	Type(Equilibrium)         Symbol       Name       (H <sup>1</sup> )       (OH)       [NH4]       (NH4]       (NO1)       (HAC0)         distage       Objectation of water       10°(-pH)       Kw/(K <sup>1</sup> )	Equilibrium natrix         Type[Equilibrium]           Symbol         Name         (µ')         (Dot)         (M/A)         (	Equilibrium matrix         Type[Equilibrium]           Symbol         Name         (μ')         (Dot)         (NM-)         (NM-)         (NM-)         (MA-)           diskup         bisscalation of watter         30° (40)         Ku/(MA,*1000)*Ku/(H')+Kup)         (Sup/(AM,*1000)*Ku/(H')+Kup)         Image	Equilibrium matrix         Type[Equilibrium]           Symbol         Name         (μ')         (Dot)         (NM-)         (NM-)         (NM-)         (MA-)           diskup         bisscolation of water         30° (d)         Ku/(AM,*1000)*Kup/(t)*Kup)         (Sup/(AM,*1000)*Kup/(t)*I)*(t)/(t)*I         0	Equilibrium matrix         Type[Equilibrium]           Symbol         Name         (μ')         (Dot)         (Nh/a)	Equilibrium matrix         Type[Equilibrium]           Symbol         Name         (h')         (Dot)         (NM-)         (NA-)         (NA-)           distago         Dissociation d'ammonia         - <t< th=""></t<>
Symbol         Name         (µ1)         (OH)         [NH <sub>2</sub> )         (NA <sub>2</sub> )         (NO <sub>2</sub> )         (H <sub>2</sub> O <sub>3</sub> )           dB3seco         DBissociation of water         10 <sup>A</sup> (-pH)         K <sub>4</sub> /[1 <sup>A</sup> ]         Image: Comparison of a monomic of a m	Symbol         Name         [H]*         [OH         [NH-3]         [NH-4]*         [NH-3]	Symbol         Name         (µ')         (µu)         (Pu)	Symbol       Name       (µ')       (µu)       (Pu)	Symbol         Name         (µ')         (µu)         (№)	Symbol       Name       (µ')	Symbol         Name         (Pi)
dissol         Dissolution of water         10^(-pH)         K <sub>W</sub> /(H <sup>1</sup> )         Mark	dissolation of water         10 <sup>4</sup> (pi)         K <sub>w</sub> /(l <sup>1</sup> )         map	dists_op dists_op map_c       Discotation of water       10°(rpH)       K_p[(H)       Image: constraints       Image: constraints <td>distage       Discolation of water       10°(-pH)       K_u/(H)       Sum(1AM,*1000)*(M/(H)*K_w)       Sum(1AM,*1000)*(M/(H)*K_w)         maper       Chorde fully dissociated       Image: Choree       Image: Chorde fully dis</td> <td>diffsee       Discolation of water       10º/(p#)       Kg/(H1)       Image: Construction of water       Image: Construct</td> <td>distage       Dissociation of water       10º/(pH)       K_/(H)       Second (H)       Second (H)</td> <td>distage       Discolation of water       10°(-pH)       Ku/(H*)       Image       <thimage< th=""> <t< td=""></t<></thimage<></td>	distage       Discolation of water       10°(-pH)       K_u/(H)       Sum(1AM,*1000)*(M/(H)*K_w)       Sum(1AM,*1000)*(M/(H)*K_w)         maper       Chorde fully dissociated       Image: Choree       Image: Chorde fully dis	diffsee       Discolation of water       10º/(p#)       Kg/(H1)       Image: Construction of water       Image: Construct	distage       Dissociation of water       10º/(pH)       K_/(H)       Second (H)	distage       Discolation of water       10°(-pH)       Ku/(H*)       Image       Image <thimage< th=""> <t< td=""></t<></thimage<>
dissues       tonization of ammonia       (Swu/(AMn,*1000))*(ku//(H*)+Kwu)       (Swu/(AMn,*1000))*(ku//(H*)+Kwu)          mapp       Chloride fully dissociated              maple       Chloride fully dissociated               maple       ferrous ions dissociated                 Symbol       Name       [№]       [OH]       [NH_1]       [NH_2]       [NO_7]       [№,0,0]         charge balance       1       -1       0       1       -1       0         isak       lonic strength       fmex.ñ.at       fmex.ñ.at       0       fmex.ñ.at       0         Help       Concepts       Parameters       Model       pH       Species       Components       Calculated variables       +         sy       I       Image: Sumo1.xlsm       Sumo1.xlsm       Q       Search Sheet          e       insert       Draw       Age Layout       Formulas       Data       Review       View       Developer       Image: Sumo1.xlsm	distand         ionization d'ammonia         ionization d'ammonia<	distance       constant of ammonia       Csu/(AM,*1000))*fu/(l(f)*fu/(l)       Su/(AM,*1000))*fu/(l(f)*fu/(l)       Su/(L)	distance       Directation of ammonia       CSup/(AMA,*1000))*fum/([H <sup>1</sup> ]+Kup)       (Sup/(AMA,*1000))*fum/([H <sup>1</sup> ]+Kup)       (Sup/(AMA,*1000))*fum/([H <sup>1</sup> ]+Kup)         mapper       Oblight for generation dissociated       Free       Support       (No.)       (PI,CO.)         Symbol       Name       (H <sup>1</sup> )       (OH)       (NH,1)       (NH,1)       (NO.)       (PI,CO.)         Symbol       Name       (H <sup>1</sup> )       (OH)       (NH,1)       (NH,1)       1       0         Boy       Darks balance       1       -1       0       1       -1       0         Boy       Doric Strength       Free/Corregabance       Free/Corregabance       Corregabance       0       free/Corregabance       0         Boy       Doric Strength       Free/Corregabance       Corregabance       Corregabance       Corregabance       0       free/Corregabance       0         Boy       Concepts       Parameters       Model       pH       Species       Components       Calculated variables       +         V       Concepts       Parameters       Data       Review       Developer       C <sup>2</sup> Shot         C       D       E       G       H       J       K       M       N       O       P<	dissue       Initiation of ammonia       (Sup/AMA,*1000)!*fu/(lf)*fu_m)       Image         mappe       Chlorde fully disociated	dissue       Unication of ammonia       (Sup/AMA,*1000)!*fu/(lf)*fu-up)       (Sup/AMA,*1000)!*fu/(lf)*fu-up)         mapper       Oblorde fully dissociated <td>distance       Initiation of ammonia       (Suu/(AM,*1000))*(u/1/(U/1+4uud)         mapp:       Oblicide fully dissociated          mapp::       Chicke fully dissociated          Chicke fully dissociated           Chicke fully dissociated           Chicke fully dissociated           Charge balance and ionic strength       Type(Chargebalance)       1       0         Symbol       Name       (N*1)       (N*4,*)       1       0         South       Ionic strength       f-max.tunt       f-max.tunt       0       f-max.tunt       0         Help       Concepts       Parameters       Model       pH       Species       Components       Calculated variables       +         V       Image:       Image:       Image:       Sumo1.xtsm       Q~ Search Sheet         Image:       <td< td=""></td<></td>	distance       Initiation of ammonia       (Suu/(AM,*1000))*(u/1/(U/1+4uud)         mapp:       Oblicide fully dissociated          mapp::       Chicke fully dissociated          Chicke fully dissociated           Chicke fully dissociated           Chicke fully dissociated           Charge balance and ionic strength       Type(Chargebalance)       1       0         Symbol       Name       (N*1)       (N*4,*)       1       0         South       Ionic strength       f-max.tunt       f-max.tunt       0       f-max.tunt       0         Help       Concepts       Parameters       Model       pH       Species       Components       Calculated variables       +         V       Image:       Image:       Image:       Sumo1.xtsm       Q~ Search Sheet         Image:       Image: <td< td=""></td<>
map.g     Chloride fully dissociated     Image set and ionic strength     Type(Charge balance of the set of t	map_i         Oblinitie fully dissociated         Image	map_ map_ map_ map_tensa         Olioride fully dissociated         Image lance	mapp         Otoride fully dissociated         Image         Im	mapp         Otoride fully dissociated         Image         Im	mapp         Otoride fully dissociated         Image         Im	mapp         Otionic fully dissociated         mappines         ferros ions dissociated         mappines           Charge balance and ionic strength         Typel(Carge balance)         Typel(Carge balance)         Typel(Carge balance)         Typel(Carge balance)           Symbol         Name         Pi1         Opt1         NH4,1         [NH5,2]         [NH0,2]
mapprens       ferrous ions dissociated       rupe(Chargebalance)         Charge balance and ionic strength       Type(Chargebalance)       [NH4]       [NH4] </td <th>mapperson       ferrous ions dissociated       vpelChargebalance)         Charge balance and ionic strength       vpelChargebalance)       [M*]       [M*]</th> <td>Image/renew         ferrous ions dissociated         y           Carge balance and locic strength Name         [µ1]         [04]         [N41]         &lt;</td> <td>mappyress         ferrous ions dissociated         rpe(Chargebalance)           Symbol         Name         [H1]         (OH)         [NH4]         (PH4]         (PG0]         [H4CO]           chargebalance         Ourge balance         1         1         0         1         1         0           form         Ionic strength         f=montum         0         1         1         0           form         Ionic strength         f=montum         0         f=montum         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           v         Image:         Image:<!--</td--><td>mappyress         ferrous ions dissociated         v         i         v           Charge balance and loois strength         Type(Chargebalance)         I/H         (Pol,1         I/H         I/H         0         1         1         0           chargebalance         Charge balance         I/H         0/H         I/H         0         1         0         0           form         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           V         If         Model         pH         Species         Components         Calculated variables         +           V         If         Sumo1xism         Calculated variables         +         If         If         If         Calculated variables         +           V         If         Sumo1xism         Calculated variables         +         If         If<td>mappyress         ferrous ions dissociated         v         v           Charge balance and ionic strength         Type(Chargebalance)         v         (No.1)         (No.2)         (No.2)</td><td>mappuress         ferross lons dissociated         Nume         Hu         Other         Nume         Hu         Nume         Nume         Hu         Nume         Nu         Nume         Nu         Nume</td></td></td>	mapperson       ferrous ions dissociated       vpelChargebalance)         Charge balance and ionic strength       vpelChargebalance)       [M*]	Image/renew         ferrous ions dissociated         y           Carge balance and locic strength Name         [µ1]         [04]         [N41]         <	mappyress         ferrous ions dissociated         rpe(Chargebalance)           Symbol         Name         [H1]         (OH)         [NH4]         (PH4]         (PG0]         [H4CO]           chargebalance         Ourge balance         1         1         0         1         1         0           form         Ionic strength         f=montum         0         1         1         0           form         Ionic strength         f=montum         0         f=montum         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           v         Image:         Image: </td <td>mappyress         ferrous ions dissociated         v         i         v           Charge balance and loois strength         Type(Chargebalance)         I/H         (Pol,1         I/H         I/H         0         1         1         0           chargebalance         Charge balance         I/H         0/H         I/H         0         1         0         0           form         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           V         If         Model         pH         Species         Components         Calculated variables         +           V         If         Sumo1xism         Calculated variables         +         If         If         If         Calculated variables         +           V         If         Sumo1xism         Calculated variables         +         If         If<td>mappyress         ferrous ions dissociated         v         v           Charge balance and ionic strength         Type(Chargebalance)         v         (No.1)         (No.2)         (No.2)</td><td>mappuress         ferross lons dissociated         Nume         Hu         Other         Nume         Hu         Nume         Nume         Hu         Nume         Nu         Nume         Nu         Nume</td></td>	mappyress         ferrous ions dissociated         v         i         v           Charge balance and loois strength         Type(Chargebalance)         I/H         (Pol,1         I/H         I/H         0         1         1         0           chargebalance         Charge balance         I/H         0/H         I/H         0         1         0         0           form         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           V         If         Model         pH         Species         Components         Calculated variables         +           V         If         Sumo1xism         Calculated variables         +         If         If         If         Calculated variables         +           V         If         Sumo1xism         Calculated variables         +         If         If <td>mappyress         ferrous ions dissociated         v         v           Charge balance and ionic strength         Type(Chargebalance)         v         (No.1)         (No.2)         (No.2)</td> <td>mappuress         ferross lons dissociated         Nume         Hu         Other         Nume         Hu         Nume         Nume         Hu         Nume         Nu         Nume         Nu         Nume</td>	mappyress         ferrous ions dissociated         v         v           Charge balance and ionic strength         Type(Chargebalance)         v         (No.1)         (No.2)	mappuress         ferross lons dissociated         Nume         Hu         Other         Nume         Hu         Nume         Nume         Hu         Nume         Nu         Nume         Nu         Nume
Charge balance and ionic strength       Type(Chargebalance)         Symbol       Name       [H1]       [[H1]       [[H4]]       [[N4,1]       [[N0,1]       [[H,00]]         charge balance       Oharge balance       1       -1       0       1       -1       0         Ideate       Onic strength       If wowsKatt       If wowsKatt       0       If wowsKatt       If wowsKatt       0         Help       Concepts       Parameters       Model       pH       Species       Components       Calculated variables       +         st       Image: Species       Components       Calculated variables       +       Iffill       Iffill <t< td=""><th>Charge balance and look strength         Type(Charge balance)           Symbol         Name         [H<sup>1</sup>]         [OH]         [NH4]         [NH4]         [NH4]         [NH4]         [NH4]         [H&lt;0]</th>         [H&lt;0]           charge balance         Olarge balance         1         -1         0         1         -1         0           Sake         Ionic strength         faces.S.at         0         faces.S.at         0         faces.S.at         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           4/         T         P         Sumo1.xism         Q&lt; Search Sheet</t<>	Charge balance and look strength         Type(Charge balance)           Symbol         Name         [H <sup>1</sup> ]         [OH]         [NH4]         [NH4]         [NH4]         [NH4]         [NH4]         [H<0]	Carge balance and ionic strength         Type(Chargebalance)           Symbol         Name         (µ')         (Qu')         (NH4)         (µH4')         (QuO)         (PL4C0)           chargebalance         Charge balance         1         -1         0         1         -1         0           Issue         ionic strength         format.au         format.au         0         format.au         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           V         Image: Species         Components         Calculated variables         +            Model         pH         Species         Components         Calculated variables         +           V         Image: Species         Model         pH         Species         Components         Calculated variables         +           V         Image: Species         Sumo1.xism         Q         Species         Q         Species           Image: Species         Image: Species         Sumo1.xism         Q         Species         Q         Species           Image: Species         Image: Species         Sumo1.xism         Q         Specis </td <td>Charge balance and ionic strength         Type(Chargebalance)           Symbol         Name         [H]*         (OA)         [NH4]         [NH4]*         (NA)         [NA,CO]         [H,CO]           chargebalance         Chargebalance         1         -1         0         1         -1         0           is unic         ionic strength         fuenci.au         fuenci.au         0         feenci.au         fuenci.au         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           y         I         Image: Species         Components         Calculated variables         +         Image: Species         Sumo1.xism         Q~ Search Sheet           e         insert         Draw         Parameters         Data         Review         View         Developer         Image: Species         Image: Species</td> <td>Charge balance and ionic strength         Type(Chargebalance)           Symbol         Name         [H<sup>1</sup>]         [Ot1]         [NH4]         [NH4]         [NH4,7]         (NO,1)         [H,60,1]           chargebalance         O         1         -1         0         1         -1         0           is unic         isonic strength         fume.t.m.it         fume.t.m.it         0         fume.t.m.it         fume.t.m.it         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           y         I         Image: Species         Components         Calculated variables         +         Image: Species         Species         Calculated variables         +           y         Image: Species         Calculated variables         +         Image: Species         Calculated variables         +           y         Image: Species         Sumo1.xtsm         Q         Species         Q         Species         Q         Species           image: Species         Image: Species         Sumo1.xtsm         Q         Species         Q         Species         Q         Species         Species         Species         Species<td>Charge balance and ionic strength         Type(Chargebalance)           Symbol         Name         [H<sup>1</sup>]         [Out]         [NH4]         [NH4]         [NH4,7]         (NO,1)         [H,C0,1]           chargebalance         Chargebalance         1         -1         0         1         -1         0           is out         ionic strength         fume.t.m.it         fume.t.m.it         0         fume.t.m.it         fume.t.m.it         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           y         I         Image: Species         Components         Calculated variables         +         Image: Species         Symbol         Q&lt; Search Sheet</td>         Image: Species         Image: Species         Image: Species         Q&lt; Search Sheet</td> Image: Species	Charge balance and ionic strength         Type(Chargebalance)           Symbol         Name         [H]*         (OA)         [NH4]         [NH4]*         (NA)         [NA,CO]         [H,CO]           chargebalance         Chargebalance         1         -1         0         1         -1         0           is unic         ionic strength         fuenci.au         fuenci.au         0         feenci.au         fuenci.au         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           y         I         Image: Species         Components         Calculated variables         +         Image: Species         Sumo1.xism         Q~ Search Sheet           e         insert         Draw         Parameters         Data         Review         View         Developer         Image: Species	Charge balance and ionic strength         Type(Chargebalance)           Symbol         Name         [H <sup>1</sup> ]         [Ot1]         [NH4]         [NH4]         [NH4,7]         (NO,1)         [H,60,1]           chargebalance         O         1         -1         0         1         -1         0           is unic         isonic strength         fume.t.m.it         fume.t.m.it         0         fume.t.m.it         fume.t.m.it         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           y         I         Image: Species         Components         Calculated variables         +         Image: Species         Species         Calculated variables         +           y         Image: Species         Calculated variables         +         Image: Species         Calculated variables         +           y         Image: Species         Sumo1.xtsm         Q         Species         Q         Species         Q         Species           image: Species         Image: Species         Sumo1.xtsm         Q         Species         Q         Species         Q         Species         Species         Species         Species <td>Charge balance and ionic strength         Type(Chargebalance)           Symbol         Name         [H<sup>1</sup>]         [Out]         [NH4]         [NH4]         [NH4,7]         (NO,1)         [H,C0,1]           chargebalance         Chargebalance         1         -1         0         1         -1         0           is out         ionic strength         fume.t.m.it         fume.t.m.it         0         fume.t.m.it         fume.t.m.it         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           y         I         Image: Species         Components         Calculated variables         +         Image: Species         Symbol         Q&lt; Search Sheet</td> Image: Species         Image: Species         Image: Species         Q< Search Sheet	Charge balance and ionic strength         Type(Chargebalance)           Symbol         Name         [H <sup>1</sup> ]         [Out]         [NH4]         [NH4]         [NH4,7]         (NO,1)         [H,C0,1]           chargebalance         Chargebalance         1         -1         0         1         -1         0           is out         ionic strength         fume.t.m.it         fume.t.m.it         0         fume.t.m.it         fume.t.m.it         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           y         I         Image: Species         Components         Calculated variables         +         Image: Species         Symbol         Q< Search Sheet	Carge balance and ionic strength         Type(Chargebalance)           Symbol         Name         [H]*         [OH]         [NH4]         0         1         1         0           But         ionic strength         fementait         fementait         0         fementait         fementait         0         fementait         fementait         0           Heip         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           0         -         +         +          0         -         +         +         >         -         +         >         -         -         +         >         0         -         -         +         +         >         0         -         -         -         -         -         -         -         -         -         -         -         -
Symbol         Name         (H <sup>1</sup> )         (OH)         (NH <sub>4</sub> )         (NH <sub>4</sub> ')         (NO <sub>3</sub> )         (H4,C0 <sub>3</sub> )           chargebalance         Charge balance         1         -1         0         1         -1         0           Isak         Ionic strength         fmousKant         fmousKant         0         fmousKant         fmousKant         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           sy         1           Sumo1.xism         Q< Search Sheet	Symbol         Name         (µ')         (QN)         [NH_J]         (NH_A)	Symbol         Name         (H <sup>1</sup> )         (OH)         (NH,1)         (NH,1)         (NH,1)         (NH,0)         (H,0)           chargebalance         Charge balance         1         -1         0         1         -1         0           Isue         ionic strength         fmexit.ac         0         fmexit.ac         1         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           V         Image: Species         Components         Calculated variables         +         Image: Species         Components         Calculated variables         +           V         Image: Species         Sumo1.xism         Q< Search Sheet	Symbol         Name         [H']         [OH]         [NH,]         [NH,]         [NH,]         [NH,0]         [H,C0,]           Chargebalance         O         1         -1         0         1         -1         0           Isue         Ionic strength         f=exclust         f=exclust         0         f=exclust         f=exclust         0           Heip         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           y         I         Imagebalance         Imagebalance         Imagebalance         Imagebalance         Q= Search Sheet           e         Insert         Draw         Page Layout         Formulas         Data         Review         View         Developer         Imagebalance         Imagebalance <t< td=""><td>Symbol         Name         [H]*         [OH]         [NH,]         [NH,]*         [NH,]*         [NH,0]         [H,C0]           chargebalance         Charge balance         1         -1         0         1         -1         0           isunc         ionic strength         f=mexture         0         f=mexture         0         f=mexture         0           Heip         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           y         I         Image: Species         Components         Calculated variables         +         Image: Species         Components         Calculated variables         +           y         I         Image: Species         Components         Calculated variables         +         Image: Species         Image: Species<td>Symbol         Name         [H']         [OH]         [NH,]         [NH,]         [NH,]         [NH,0]         [H,C0,]           Chargebalance         Charge balance         1         -1         0         1         -1         0           Isue         Ionic strength         f_mex.tax         f_mex.tax         0         f_mex.tax         f_mex.tax         0           Heip         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           y         I         Image: Species         Components         Calculated variables         +         Image: Species         Components         Calculated variables         +           y         Image: Species         Components         Calculated variables         +         Image: Species         Image: Species         Image: Species         Components         Calculated variables         +           y         Image: Species         Image: Species         Sumo1.xism         Q&lt; Search Sheet</td>         Image: Species         Species</td><td>Symbol         Name         [H<sup>1</sup>]         [OH]         [NH4]         [NH4]         [NH4]         [NH4]         [NH6]         [H40]           chargebalance         O         1         -1         0         1         -1         0           IS<sub>uic</sub>         Ionic strength         f<sub>mon,Lat</sub>         f<sub>mon,Lat</sub>         0         f<sub>mon,Lat</sub>         f<sub>mon,Lat</sub>         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           V         I         Imagebalance         Imagebalance         Imagebalance         0         Imagebalance         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           V         Imagebalance         Im</td></t<>	Symbol         Name         [H]*         [OH]         [NH,]         [NH,]*         [NH,]*         [NH,0]         [H,C0]           chargebalance         Charge balance         1         -1         0         1         -1         0           isunc         ionic strength         f=mexture         0         f=mexture         0         f=mexture         0           Heip         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           y         I         Image: Species         Components         Calculated variables         +         Image: Species         Components         Calculated variables         +           y         I         Image: Species         Components         Calculated variables         +         Image: Species         Image: Species <td>Symbol         Name         [H']         [OH]         [NH,]         [NH,]         [NH,]         [NH,0]         [H,C0,]           Chargebalance         Charge balance         1         -1         0         1         -1         0           Isue         Ionic strength         f_mex.tax         f_mex.tax         0         f_mex.tax         f_mex.tax         0           Heip         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           y         I         Image: Species         Components         Calculated variables         +         Image: Species         Components         Calculated variables         +           y         Image: Species         Components         Calculated variables         +         Image: Species         Image: Species         Image: Species         Components         Calculated variables         +           y         Image: Species         Image: Species         Sumo1.xism         Q&lt; Search Sheet</td> Image: Species         Species	Symbol         Name         [H']         [OH]         [NH,]         [NH,]         [NH,]         [NH,0]         [H,C0,]           Chargebalance         Charge balance         1         -1         0         1         -1         0           Isue         Ionic strength         f_mex.tax         f_mex.tax         0         f_mex.tax         f_mex.tax         0           Heip         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           y         I         Image: Species         Components         Calculated variables         +         Image: Species         Components         Calculated variables         +           y         Image: Species         Components         Calculated variables         +         Image: Species         Image: Species         Image: Species         Components         Calculated variables         +           y         Image: Species         Image: Species         Sumo1.xism         Q< Search Sheet	Symbol         Name         [H <sup>1</sup> ]         [OH]         [NH4]         [NH4]         [NH4]         [NH4]         [NH6]         [H40]           chargebalance         O         1         -1         0         1         -1         0           IS <sub>uic</sub> Ionic strength         f <sub>mon,Lat</sub> f <sub>mon,Lat</sub> 0         f <sub>mon,Lat</sub> f <sub>mon,Lat</sub> 0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           V         I         Imagebalance         Imagebalance         Imagebalance         0         Imagebalance         0           Help         Concepts         Parameters         Model         pH         Species         Components         Calculated variables         +           V         Imagebalance         Im
chargebalance       Onarge balance       1       -1       0       1       -1       0         IS <sub>aak</sub> Ionic strength       If <sub>monoLat</sub> If <sub>monoLat</sub> 0       If <sub>monoLat</sub> If <sub>monoLat</sub> 0         Help       Concepts       Parameters       Model       pH       Species       Components       Calculated variables       +         M       Image: Concepts       Parameters       Model       pH       Species       Components       Calculated variables       +         M       Image: Concepts       Parameters       Model       pH       Species       Components       Calculated variables       +         M       Image: Concepts       Parameters       Model       pH       Species       Components       Calculated variables       +         M       Image: Concepts       Parameters       Model       pH       Species       Components       Calculated variables       +         M       Image: Concepts       Parameters       Model       PH       Species       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  I       I       I       I       I       I       I       I	Equilibrium species         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Kame         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           [M1]         Proton         6.3095764         mol.1 <sup>4</sup> 2         PH         I	Equilibrium species         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           I(P1)         Priton         6.30957:04         mol.1 <sup>4</sup> 2         PH         I	B         C         D         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           B         C         D         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment         I
	B         C         D         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Decimals         Rule         Principle/comment         I </th <th>B         C         D         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Name         Value         Unit         Decimais         Rule         Principle/comment         Image: Common State         Image: Common State</th> <th>B         C         D         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment         I<!--</th--><th>B         C         D         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decinals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decinals         Rule         Principle/comment         I<!--</th--><th>B         C         D         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decinals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decinals         Rule         Principle/comment         I<!--</th--><th>B         C         D         E         F         G         H         I         J         K         L         M         N         D         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         D         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         D         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         III         IIII         IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII</th></th></th></th>	B         C         D         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Name         Value         Unit         Decimais         Rule         Principle/comment         Image: Common State	B         C         D         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment         I </th <th>B         C         D         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decinals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decinals         Rule         Principle/comment         I<!--</th--><th>B         C         D         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decinals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decinals         Rule         Principle/comment         I<!--</th--><th>B         C         D         E         F         G         H         I         J         K         L         M         N         D         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         D         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         D         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         III         IIII         IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII</th></th></th>	B         C         D         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decinals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decinals         Rule         Principle/comment         I </th <th>B         C         D         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decinals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decinals         Rule         Principle/comment         I<!--</th--><th>B         C         D         E         F         G         H         I         J         K         L         M         N         D         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         D         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         D         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         III         IIII         IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII</th></th>	B         C         D         E         F         G         H         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decinals         Rule         Principle/comment         I         J         K         L         M         N         O         P         Q         R           Symbol         Nome         Value         Unit         Decinals         Rule         Principle/comment         I </th <th>B         C         D         E         F         G         H         I         J         K         L         M         N         D         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         D         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         D         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         III         IIII         IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII</th>	B         C         D         E         F         G         H         I         J         K         L         M         N         D         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         D         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         J         K         L         M         N         D         P         Q         R           Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment         I         III         IIII         IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII
B C D E F G H I J K L M N O P Q K	Equilibrium species           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [H']         Proton         6.30957E08         mol.L <sup>3</sup> 2         pH           [CH]         Hydroxideion         1.30143E07         mol.L <sup>4</sup> 2         pH	Equilibrium species         Name         Value         Unit         Decimals         Rule         Principle/comment           [H]         Proton         6.309576.08         mol. <sup>1</sup> 2         pH           [GH]         Hydroxideion         1.30145607         mol. <sup>1</sup> 2         pH           [HH]         Free ammonia         4.45681607         mol. <sup>1</sup> 2         pH           [MH]         Free ammonia         4.45681607         mol. <sup>1</sup> 2         fS <sub>wub</sub> .pH           [NM]         Ammonium         7.094876.05         mol. <sup>1</sup> 2         fS <sub>wub</sub> .pH           [MM]         Area ammonia         4.45681607         mol. <sup>1</sup> 2         fS <sub>wub</sub> .pH           [NM]         Armonium         7.094876.05         mol. <sup>1</sup> 2         fS <sub>wub</sub> .pH           [MA]         Armonium         0.00058721         mol. <sup>1</sup> 2         fS <sub>wub</sub> .pH           [MA]         Magnesiumion         0.00058721         mol. <sup>1</sup> 2         fS <sub>wub</sub> .pH           [M]         Magnesiumion         0.00058146         mol. <sup>1</sup> 2         fS <sub>wub</sub> .pH           [K]         Patasium         0.00038468         mol. <sup>1</sup> 2         fS <sub>wub</sub> .pH	Equilibrium generation         Unit         Decimals         Rule         Principle/camment           [W]         Proton         6.3087568         mol.1 <sup>4</sup> 2         PH           [OH]         Hydroxideion         1.30148567         mol.1 <sup>4</sup> 2         PH           [WH,         Free ammonia         4.4561607         mol.1 <sup>4</sup> 2         (bg.); PH           [WH,         Armonium         7.09487635         mol.1 <sup>4</sup> 2         (bg.); PH           [WQ,         Nitrate         0.00050722         mol.1 <sup>4</sup> 2         (bg.); PH           [MQ,         Cobonic acid         0.000657851         mol.1 <sup>4</sup> 2         (bg.); PH           [MG]         Magnesiumion         0.000657851         mol.1 <sup>4</sup> 2         (bg.); PH           [MG]         Solum (Krong cations)         0.001527416         mol.1 <sup>4</sup> 2         (bg.); PH           [K]         Petaasium         0.00038848         mol.1 <sup>4</sup> 2         (bg.); PH           [K]         Petaasium         0.000389544         mol.1 <sup>4</sup> 2         (bg.); PH           [K]         Petaasium         0.00038954         mol.1 <sup>4</sup> 2         (bg.); PH           [K]	Equilibrium genesis           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [W]         Proton         6.30957648         mol.1 <sup>4</sup> 2         PH           [OH]         Hydroxideion         1.30143E07         mol.1 <sup>4</sup> 2         PH           [MH,         Free ammonia         4.45681E07         mol.1 <sup>4</sup> 2         (bc,);PH           [NNO,         Nitrate         0.00050272         mol.1 <sup>4</sup> 2         (bc,);PH           [MQ,]         Ammonium         7.09487E05         mol.1 <sup>3</sup> 2         (b5 <sub>sub</sub> );PH           [MQ,O]         Chronic acid         0.000659272         mol.1 <sup>4</sup> 2         (b5 <sub>sub</sub> );PH           [MQ,O]         Chronic acid         0.000659272         mol.1 <sup>4</sup> 2         (b5 <sub>sub</sub> );PH           [MQ,O]         Chronic acid         0.000657271         mol.1 <sup>4</sup> 2         (b5 <sub>sub</sub> );PH           [MQ,T]         Magnesiumion         0.000657271         mol.1 <sup>4</sup> 2         (b5 <sub>sub</sub> );PH           [MY]         Potasium         0.000383648         mol.1 <sup>4</sup> 2         (b5 <sub>sub</sub> );PH           [AN]         Chroride(strong anions) <t< th=""><th>Equilibrium genesis           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [W]         Proton         6.30957648         mol.1<sup>4</sup>         2         PH           [OH]         Hydroxideion         1.30143E07         mol.1<sup>4</sup>         2         PH           [WH,         Free ammonia         4.4564E07         mol.1<sup>4</sup>         2         fS<sub>sub</sub>:pH           [NNO,         Nitrate         0.00050572         mol.1<sup>4</sup>         2         fS<sub>sub</sub>:pH           [MQ_)         Cobonic acid         0.000657851         mol.1<sup>4</sup>         2         fS<sub>sub</sub>:pH           [MQ_)         Cobonic acid         0.000657851         mol.1<sup>4</sup>         2         fS<sub>sub</sub>:pH           [MQ_)         Cobonic acid         0.00053844         mol.1<sup>4</sup>         2         fS<sub>sub</sub>:pH           [M1         Choice factorg anions)         0.000238448         mol.1<sup>4</sup>         2         fS<sub>sub</sub>:pH           [K1         Petasium         0.000383648         mol.1<sup>4</sup>         2         fS<sub>sub</sub>:pH           [K1         Petasium         0.000383648         mol.1<sup>4</sup>         2         fS<sub>sub</sub>:pH           [K1         Petasium         0.000383648         <td< th=""><th>Equilibrium species           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [Y1]         Proton         6.30957648         mol.1<sup>4</sup>         2         pH           [OH1         Hydroxide ion         1.30145707         mol.2<sup>4</sup>         2         pH           [Wh]         Free ammonia         4.45681607         mol.1<sup>4</sup>         2         ftSts.pH           [Wh]         Free ammonia         4.45681607         mol.2<sup>4</sup>         2         ftSs.pL.pH           [Wh]         Ammonium         7.09487663         mol.2<sup>4</sup>         2         ftSs.pL.pH           [Wh]         Ammonium         0.000585972         mol.2<sup>4</sup>         2         ftSs.pL.pH           [Wh]         Ammonium         0.000585972         mol.2<sup>4</sup>         2         ftSs.pL.pH           [Wh]         Moneira cidi         0.00005827157         mol.1<sup>4</sup>         2         ftSs.pL.pH           [Wh]         Solidum (strong cations)         0.0001522416         mol.1<sup>4</sup>         2         ftSs.pL.pH           [KY]         Potasium         0.000382446         mol.1<sup>4</sup>         2         ftSs.pL.pH           [KY]         Potasium         0.0004320548</th></td<></th></t<>	Equilibrium genesis           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [W]         Proton         6.30957648         mol.1 <sup>4</sup> 2         PH           [OH]         Hydroxideion         1.30143E07         mol.1 <sup>4</sup> 2         PH           [WH,         Free ammonia         4.4564E07         mol.1 <sup>4</sup> 2         fS <sub>sub</sub> :pH           [NNO,         Nitrate         0.00050572         mol.1 <sup>4</sup> 2         fS <sub>sub</sub> :pH           [MQ_)         Cobonic acid         0.000657851         mol.1 <sup>4</sup> 2         fS <sub>sub</sub> :pH           [MQ_)         Cobonic acid         0.000657851         mol.1 <sup>4</sup> 2         fS <sub>sub</sub> :pH           [MQ_)         Cobonic acid         0.00053844         mol.1 <sup>4</sup> 2         fS <sub>sub</sub> :pH           [M1         Choice factorg anions)         0.000238448         mol.1 <sup>4</sup> 2         fS <sub>sub</sub> :pH           [K1         Petasium         0.000383648         mol.1 <sup>4</sup> 2         fS <sub>sub</sub> :pH           [K1         Petasium         0.000383648         mol.1 <sup>4</sup> 2         fS <sub>sub</sub> :pH           [K1         Petasium         0.000383648 <td< th=""><th>Equilibrium species           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [Y1]         Proton         6.30957648         mol.1<sup>4</sup>         2         pH           [OH1         Hydroxide ion         1.30145707         mol.2<sup>4</sup>         2         pH           [Wh]         Free ammonia         4.45681607         mol.1<sup>4</sup>         2         ftSts.pH           [Wh]         Free ammonia         4.45681607         mol.2<sup>4</sup>         2         ftSs.pL.pH           [Wh]         Ammonium         7.09487663         mol.2<sup>4</sup>         2         ftSs.pL.pH           [Wh]         Ammonium         0.000585972         mol.2<sup>4</sup>         2         ftSs.pL.pH           [Wh]         Ammonium         0.000585972         mol.2<sup>4</sup>         2         ftSs.pL.pH           [Wh]         Moneira cidi         0.00005827157         mol.1<sup>4</sup>         2         ftSs.pL.pH           [Wh]         Solidum (strong cations)         0.0001522416         mol.1<sup>4</sup>         2         ftSs.pL.pH           [KY]         Potasium         0.000382446         mol.1<sup>4</sup>         2         ftSs.pL.pH           [KY]         Potasium         0.0004320548</th></td<>	Equilibrium species           Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [Y1]         Proton         6.30957648         mol.1 <sup>4</sup> 2         pH           [OH1         Hydroxide ion         1.30145707         mol.2 <sup>4</sup> 2         pH           [Wh]         Free ammonia         4.45681607         mol.1 <sup>4</sup> 2         ftSts.pH           [Wh]         Free ammonia         4.45681607         mol.2 <sup>4</sup> 2         ftSs.pL.pH           [Wh]         Ammonium         7.09487663         mol.2 <sup>4</sup> 2         ftSs.pL.pH           [Wh]         Ammonium         0.000585972         mol.2 <sup>4</sup> 2         ftSs.pL.pH           [Wh]         Ammonium         0.000585972         mol.2 <sup>4</sup> 2         ftSs.pL.pH           [Wh]         Moneira cidi         0.00005827157         mol.1 <sup>4</sup> 2         ftSs.pL.pH           [Wh]         Solidum (strong cations)         0.0001522416         mol.1 <sup>4</sup> 2         ftSs.pL.pH           [KY]         Potasium         0.000382446         mol.1 <sup>4</sup> 2         ftSs.pL.pH           [KY]         Potasium         0.0004320548
	Equilibrium species         Value         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957E08         mol.L <sup>3</sup> 2         pH           [QH]         Hydroxideion         1.30143E07         mol.L <sup>4</sup> 2         pH	Equilibrium species         Equilibrium species <thequilibrium species<="" th="">         Equilibrium species         Equilibrium species</thequilibrium>	Equilibrium species         Value         Value <th>Equilibrium species         Value         Unit         Declimits         Rule         Princips/comment           [yr]         Proton         6.30957£08         mol.<sup>1</sup>         2         pH           [(yr]         Proton         1.30143£07         mol.<sup>1</sup>         2         pH           [(yr]         Hydroxideion         1.30143£07         mol.<sup>1</sup>         2         pH           [(hy]         Hydroxideion         1.30143£07         mol.<sup>1</sup>         2         pH           [(hy]         Framonium         7.09487£05         mol.<sup>1</sup>         2         (bs):: PH           [(hy]         Ammonium         7.09487£05         mol.<sup>1</sup>         2         (bs): PH           [(hy]         Ammonium         0.00058792         mol.<sup>1</sup>         2         (bs): PH           [(hy]         Magresiuminion         0.00058792         mol.<sup>1</sup>         2         (bs): PH           [(hy]         Magresiuminion         0.00058792         mol.<sup>1</sup>         2         (bs): PH           [(hy]         Partaium Kroncrationsin         0.000587921         mol.<sup>1</sup>         2         (bs): PH           [(hy]         Pataium         0.00058746         mol.<sup>1</sup>         2         (bs): PH      &lt;</th> <th>Equilibrium species         Value         Value<th>Equilibrium species         Value         Value</th></th>	Equilibrium species         Value         Unit         Declimits         Rule         Princips/comment           [yr]         Proton         6.30957£08         mol. <sup>1</sup> 2         pH           [(yr]         Proton         1.30143£07         mol. <sup>1</sup> 2         pH           [(yr]         Hydroxideion         1.30143£07         mol. <sup>1</sup> 2         pH           [(hy]         Hydroxideion         1.30143£07         mol. <sup>1</sup> 2         pH           [(hy]         Framonium         7.09487£05         mol. <sup>1</sup> 2         (bs):: PH           [(hy]         Ammonium         7.09487£05         mol. <sup>1</sup> 2         (bs): PH           [(hy]         Ammonium         0.00058792         mol. <sup>1</sup> 2         (bs): PH           [(hy]         Magresiuminion         0.00058792         mol. <sup>1</sup> 2         (bs): PH           [(hy]         Magresiuminion         0.00058792         mol. <sup>1</sup> 2         (bs): PH           [(hy]         Partaium Kroncrationsin         0.000587921         mol. <sup>1</sup> 2         (bs): PH           [(hy]         Pataium         0.00058746         mol. <sup>1</sup> 2         (bs): PH      <	Equilibrium species         Value         Value <th>Equilibrium species         Value         Value</th>	Equilibrium species         Value
Fauilibrium species	Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [H]         Proton         6.30957Fc08         mol.L <sup>3</sup> 2         PH           [CH]         Hydroxideion         1.00134Fc07         mol.L <sup>3</sup> 2         PH	Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [W1         Proton         6.030576         mol.1 <sup>4</sup> 2         PH           [W4, Proton         1.30143607         mol.1 <sup>4</sup> 2         PH           [W4, Proton         1.30143607         mol.1 <sup>4</sup> 2         PH           [W4, Transminu         7.09487E05         mol.1 <sup>4</sup> 2         RspH           [W4, Transminu         7.09487E05         mol.1 <sup>4</sup> 2         RspH           [W4, O]         Carbonic acid         0.000058972         mol.1 <sup>4</sup> 2         RspH           [W4, O]         Carbonic acid         0.000058715         mol.1 <sup>4</sup> 2         RspH           [W6, O]         Carbonic acid         0.000058116         mol.1 <sup>4</sup> 2         RspH           [M6]         Magnesiumion         0.000058146         mol.1 <sup>4</sup> 2         RspH           [M7]         Potasium         0.000383446         mol.1 <sup>4</sup> 2         RspH           [K1]         Potasium         0.000383446         mol.1 <sup>4</sup> 2         RspH           [K1]         Potasium         0.000383446	Symbol         None         Value         Unit         Descrimts         Rule         Principle/comment           [W1         Proton         6.3057-08         mol.1 <sup>-1</sup> 2         PH           [DH]         Hydroxideion         1.30143-07         mol.1 <sup>-1</sup> 2         PH           [IM1, Free ammonia         4.456815-07         mol.1 <sup>-1</sup> 2         B%         PH           [IM2, J         Ammonium         7.094876-05         mol.1 <sup>-1</sup> 2         8% <sub>sub.</sub> PH           [IM4, G]         Carbonic acid         0.000358921         mol.1 <sup>-1</sup> 2         8% <sub>sub.</sub> PH           [IM4, G]         Carbonic acid         0.000358921         mol.1 <sup>-1</sup> 2         8% <sub>sub.</sub> PH           [IM4, G]         Carbonic acid         0.00035841         mol.1 <sup>-1</sup> 2         8% <sub>sub.</sub> PH           [IM2, G]         Carbonic acid         0.00038416         mol.1 <sup>-1</sup> 2         8% <sub>sub.</sub> PH           [IM1         Choine detromagnions)         0.00038416         mol.1 <sup>-1</sup> 2         8% <sub>sub.</sub> PH           [IM1         Platasium         0.0003848         mol.1 <sup>-1</sup> 2         8% <sub>sub.</sub> PH           [IM2         Platasium         0.000439494         -1	Symbol         Name         Value         Unit         Descrimts         Rule         Principle/comment           [W1         Proton         6.3057-08         mol.1 <sup>-1</sup> 2         PH           [W1         Hydroxideion         1.30143-07         mol.1 <sup>-1</sup> 2         PH           [W4]         Frequential         1.30143-07         mol.1 <sup>-1</sup> 2         PH           [W4]         Frequential         1.30143-07         mol.1 <sup>-1</sup> 2         No.2         PH           [W4]         Frequential         4.456816-07         mol.1 <sup>-1</sup> 2         RS	Symbol         Name         Value         Unit         Descrimts         Rule         Principle/comment           [W1         Proton         6.3057-08         mol.1 <sup>-1</sup> 2         PH         PH           [W1]         Hydroxideion         1.30143-07         mol.1 <sup>-1</sup> 2         PH         PH           [W4]         Frequentian         1.30143-07         mol.1 <sup>-1</sup> 2         PH         PH           [W4]         Frequentian         1.30143-07         mol.1 <sup>-1</sup> 2         BS <sub>wab</sub> PH           [W4]         Frequentian         7.09487-05         mol.1 <sup>-1</sup> 2         BS <sub>wab</sub> PH           [W4, G)         Carbonic scid         0.000356972         mol.1 <sup>-1</sup> 2         BS <sub>wab</sub> PH           [W4, G)         Carbonic scid         0.00035481         mol.1 <sup>-1</sup> 2         BS <sub>wab</sub> PH           [W4, G)         Carbonic scid         0.00035446         mol.1 <sup>-1</sup> 2         BS <sub>wab</sub> PH           [V47)         Solution strong carbonic scid         0.00035446         mol.1 <sup>-1</sup> 2         BS <sub>wab</sub> PH           [W1         Protosion         0.00043446         0.01 <sup>-1</sup> 2         BS <sub>wab</sub> PH           [W1         Forosion         0.000434	Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [H]         Proton         6.303750         mol.1 <sup>4</sup> 2         PH           [OH]         Hydroxideion         1.30138507         mol.1 <sup>4</sup> 2         PH           [MH]         Free ammonia         4.45681607         mol.1 <sup>4</sup> 2         PH           [MH]         Armonia         7.0948705         mol.1 <sup>4</sup> 2         15 <sub>810</sub> ,pH           [MH]         Armonia         0.000355972         mol.1 <sup>4</sup> 2         8         PH           [MG]         Magnetium ion         0.000355972         mol.1 <sup>4</sup> 2         15 <sub>810</sub> ,pH           [Mg]         Magnetium ion         0.000354715         mol.1 <sup>4</sup> 2         15 <sub>810</sub> ,pH           [KT]         Polatium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         15 <sub>810</sub> ,pH           [KT]         Polatium (strong cations)         0.00035486         mol.1 <sup>4</sup> 2         15 <sub>810</sub> ,pH           [KN]         Aradium (strong cations)         0.004230954         mol.1 <sup>4</sup> 2         15 <sub>810</sub> ,pH
	Imp         room         co-source         print           [OH]         Hydroxideion         1.50/34707         mol.1 <sup>1</sup> 2         pH	In y         Process         D-3007Fees         pH           [OH]         Hydroxideion         1.30143F07         mol.1 <sup>4</sup> 2         pH           [NH,]         Free ammonia         4.45681E07         mol.1 <sup>4</sup> 2         PH           [NH,]         Ammonium         7.09487E05         mol.1 <sup>4</sup> 2         PH           [NH,]         Ammonium         7.09487E05         mol.1 <sup>4</sup> 2         PH           [MG]         Nitrate         0.00056952         mol.1 <sup>4</sup> 2         PS <sub>bab</sub> :PH           [MG]         Magnesiumion         0.000556972         mol.1 <sup>4</sup> 2         PS <sub>bab</sub> :PH           [MG]         Magnesiumion         0.000556972         mol.1 <sup>4</sup> 2         PS <sub>bab</sub> :PH           [CAT         Sodium (strong cations)         0.0001522416         mol.1 <sup>4</sup> 2         PS <sub>bab</sub> :PH           [K]         Potasium         0.00038568         mol.1 <sup>4</sup> 2         PS <sub>bab</sub> :PH           [K]         Potasium         0.0004230954         mol.1 <sup>4</sup> 2         PS <sub>bab</sub> :PH           [K]         Choride (strong anions)         0.04243094         2         PS <sub>bab</sub> :PH	Initial         0.0007450         mol.1 <sup>4</sup> 2         pH           [MH]         Arranmonium         7.0948765         mol.1 <sup>4</sup> 2         PH           [MH]         Arranmonium         7.0948765         mol.1 <sup>4</sup> 2         PS <sub>mb</sub> :PH           [MM]         Marmonium         7.09487655         mol.1 <sup>4</sup> 2         PS <sub>mb</sub> :PH           [MM]         Marmonium         7.09487655         mol.1 <sup>4</sup> 2         RS <sub>mb</sub> :PH           [MG]         Margesium ion         0.00068581         mol.1 <sup>4</sup> 2         RS <sub>mb</sub> :PH           [MG]         Margesium ion         0.00068581         mol.1 <sup>4</sup> 2         RS <sub>mb</sub> :PH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         RS <sub>mb</sub> :PH           [K]         Petasium         0.00038548         mol.1 <sup>4</sup> 2         RS <sub>mb</sub> :PH           [K]         Petasium         0.00048548         mol.1 <sup>4</sup> 2         RS <sub>mb</sub> :PH           [K]         Petasium         0.00048548         mol.1 <sup>4</sup> 2         RS <sub>mb</sub> :PH           [K]         Petasium         0.00048548         mol.1 <sup>4</sup> 2         RS <sub>mb</sub> :PH           [K]         Petasiu	Initial         Output         Description           [OH]         Hydroxidelon         1.00434-07         mol.1 <sup>4</sup> 2         pH           [NH]         Free ammonia         4.45681-07         mol.1 <sup>4</sup> 2         PH           [NH]         Ammonium         7.09487-05         mol.1 <sup>4</sup> 2         PH           [NH]         Ammonium         7.09487-05         mol.1 <sup>4</sup> 2         PH           [MG]         Nitrate         0.00058972         mol.1 <sup>4</sup> 2         PH           [MG]         Migresium ion         0.00068861         mol.1 <sup>4</sup> 2         PH           [K]         Point acid         0.00058972         mol.1 <sup>4</sup> 2         PH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         ftSt_2.pH           [K]         Petasium         0.00038848         mol.1 <sup>4</sup> 2         ftSt_2.pH           [K]         Petasium         0.000389954         mol.1 <sup>4</sup> 2         ftSt_2.pH           [K]         Petasium         0.000389954         mol.1 <sup>4</sup> 2         ftSt_2.pH           [K]         Petasium         0.00049954904         2         ftSt_2.pH <td>Initial         0.00078-05         mol.1         2         pH           [MH]         Arranmonium         7.09876-05         mol.1         2         PH           [MH]         Arranmonium         7.09876-05         mol.1         2         PSsab.PH           [MA]         Arranmonium         7.09876-05         mol.1         2         PSsab.PH           [MA]         Arranmonium         7.09876-05         mol.1         2         PSsab.PH           [MA]         Arranmonium         7.0987705         mol.1         2         PSsab.PH           [MG]         Migresium ion         0.00005861         mol.1         2         PSsab.PH           [K]         Point acid         0.0001522416         mol.1         2         PSsab.PH           [K]         Point acidon         0.000358268         mol.1         2         PSsab.PH           [K]         Point acidon         0.0001522416         mol.1         2         PSsab.PH           [K]         Point acidon         0.000358268         mol.1         2         PSsab.PH           [K]         Point acidon         0.0004382648         mol.1         2         PSsab.PH           [K]         Point acidon         0.000438999</td> <td>Int // Autom         0.00074cm         pH           [OH]         Hydroxideion         1.001484c0         mol.L<sup>1</sup>         2         pH           [NH]         Free ammonia         4.45681c0         mol.L<sup>1</sup>         2         fb           [NH]         Ammonium         7.09487c5         mol.L<sup>1</sup>         2         fb           [NH]         Ammonium         7.09487c5         mol.L<sup>1</sup>         2         fb           [NG]         Nitrate         0.00058972         mol.L<sup>1</sup>         2         fb           [Md]         Amgresium ion         0.00068861         mol.L<sup>1</sup>         2         fb           [CAT)         Sodium (strong cations)         0.00151257         mol.L<sup>1</sup>         2         fb&lt;</td> [KT]         Potasium         0.000386972         mol.L <sup>1</sup> 2         fb<	Initial         0.00078-05         mol.1         2         pH           [MH]         Arranmonium         7.09876-05         mol.1         2         PH           [MH]         Arranmonium         7.09876-05         mol.1         2         PSsab.PH           [MA]         Arranmonium         7.09876-05         mol.1         2         PSsab.PH           [MA]         Arranmonium         7.09876-05         mol.1         2         PSsab.PH           [MA]         Arranmonium         7.0987705         mol.1         2         PSsab.PH           [MG]         Migresium ion         0.00005861         mol.1         2         PSsab.PH           [K]         Point acid         0.0001522416         mol.1         2         PSsab.PH           [K]         Point acidon         0.000358268         mol.1         2         PSsab.PH           [K]         Point acidon         0.0001522416         mol.1         2         PSsab.PH           [K]         Point acidon         0.000358268         mol.1         2         PSsab.PH           [K]         Point acidon         0.0004382648         mol.1         2         PSsab.PH           [K]         Point acidon         0.000438999	Int // Autom         0.00074cm         pH           [OH]         Hydroxideion         1.001484c0         mol.L <sup>1</sup> 2         pH           [NH]         Free ammonia         4.45681c0         mol.L <sup>1</sup> 2         fb           [NH]         Ammonium         7.09487c5         mol.L <sup>1</sup> 2         fb           [NH]         Ammonium         7.09487c5         mol.L <sup>1</sup> 2         fb           [NG]         Nitrate         0.00058972         mol.L <sup>1</sup> 2         fb           [Md]         Amgresium ion         0.00068861         mol.L <sup>1</sup> 2         fb           [CAT)         Sodium (strong cations)         0.00151257         mol.L <sup>1</sup> 2         fb<
Symbol Nome Value Unit Decimols Rule Principle/comment		[NH]         Free ammonia         4.45681E07         mol. <sup>1</sup> 2 $(S_{sub}; pH)$ [NH]         Ammonium         7.09487E05         mol. <sup>1</sup> 2 $(S_{sub}; pH)$ [NO]         Nitrate         0.00055927         mol. <sup>1</sup> 2 $(S_{sub}; pH)$ [NG]         Kirtate         0.00055851         mol. <sup>1</sup> 2 $(S_{sub}; pH)$ [MG]         Magnesium ion         0.00061757         mol. <sup>1</sup> 2 $(S_{sub}; pH)$ [M]         Magnesium ion         0.000352416         mol. <sup>1</sup> 2 $(S_{sub}; pH)$ [K]         Petasium         0.00033548         mol. <sup>1</sup> 2 $(S_{sub}; pH)$ [K]         Petasium         0.0004230954         mol. <sup>1</sup> 2 $(S_{sub}; pH)$ [AN]         Chloride (strong anions)         0.04230954         mol. <sup>1</sup> 2 $(S_{sub}; pH)$	[NH]         Free ammonia         4.45681E-07         mol. <sup>1-1</sup> 2         fts <sub>mb</sub> : pH           [NH]         Ammonium         7.09487E-05         mol.1 <sup>-1</sup> 2         fts <sub>mb</sub> : pH           [NG)         Nitrate         0.00058927         mol.1 <sup>-1</sup> 2         fts <sub>mb</sub> : pH           [H,GO]         Carbonic acid         0.000685861         mol.1 <sup>-1</sup> 2         fts <sub>mb</sub> : pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000685861         mol.1 <sup>-1</sup> 2         fts <sub>mb</sub> : pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000685861         mol.1 <sup>-1</sup> 2         fts <sub>mb</sub> : pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000683681         mol.1 <sup>-1</sup> 2         fts <sub>mb</sub> : pH           [K]         Petasium         0.000383648         mol.1 <sup>-1</sup> 2         fts <sub>mb</sub> : pH           [K]         Petasium         0.00043994         mol.1 <sup>-1</sup> 2         fts <sub>mb</sub> : pH           [K]         Petasium         0.00043994         mol.1 <sup>-1</sup> 2         fts <sub>mb</sub> : pH           [Fe <sup>2</sup> ]         Ferous ion         1.79067E-55         mol.1 <sup>-1</sup> 2         fts <sub>mb</sub> : pH	[NH]         Free ammonia         4.45681E-07         mol. <sup>1-1</sup> 2 $\{S_{uull}, p\}$ [NH]         Ammonium         7.09487E-05         mol.1 <sup>-1</sup> 2 $\{S_{uull}, p\}$ [NG]         Nitrate         0.00055927         mol.1 <sup>-1</sup> 2 $\{P_{uull}, p\}$ [H,CO]         Carbonic acid         0.00065851         mol.1 <sup>-1</sup> 2 $\{P_{uull}, p\}$ [Mg <sup>2</sup> ]         Magnesiumion         0.000617377         mol.1 <sup>-1</sup> 2 $\{P_{uull}, p\}$ [(At7)         Solum (strong cations)         0.0016212416         mol.1 <sup>-1</sup> 2 $\{P_{uull}, p\}$ [(X)         Potassium         0.000383648         mol.1 <sup>-1</sup> 2 $\{P_{uull}, p\}$ [(X)         Potassium         0.000383648         mol.1 <sup>-1</sup> 2 $\{P_{uull}, p\}$ [(Mt)         Cholor(strong anions)         0.004232404         2 $\{P_{uull}, p\}$ 1           [(Mt)         Frequencies (anions)         0.004233945         2 $\{P_{uull}, p\}$ 1           [(Rt)         Potassium         0.004233945         mol.1 <sup>-1</sup> 2 $\{P_{uull}, p\}$ [Fte <sup>2</sup> ]         Ferrous ion	[NH]         Free ammonia         4.45681E-07         mol. <sup>1-1</sup> 2 $\{S_{huh}\}$ , pH           [NH]         Ammonium         7.09487E-05         mol.1 <sup>-1</sup> 2 $\{S_{huh}\}$ , pH           [NG)         Nitrate         0.00058927         mol.1 <sup>-1</sup> 2 $\{S_{huh}\}$ , pH           [H,Co]         Carbonic acid         0.000685861         mol.1 <sup>-1</sup> 2 $\{S_{huh}\}$ , pH           [Mg <sup>2</sup> ]         Magnesiumion         0.00061757         mol.1 <sup>-1</sup> 2 $\{S_{huh}\}$ , pH           [CAT)         Solum (strong cations)         0.001522416         mol.1 <sup>-1</sup> 2 $\{S_{huh}\}$ , pH           [K]         Petasaium         0.000383648         mol.1 <sup>-1</sup> 2 $\{S_{huh}\}$ , pH           [K1]         Petasaium         0.000383648         mol.1 <sup>-1</sup> 2 $\{S_{huh}\}$ , pH           [Fe <sup>3</sup> ]         Ferrous ion         1.790678-55         mol.1 <sup>-1</sup> 2 $\{S_{huh}\}$ , pH	[WH,]         Free ammonia         4.45681E-07         mol. <sup>1</sup> 2         (St_sub.PH           [WH,]         Ammonium         7.09487E-05         mol. <sup>1</sup> 2         (St_sub.PH           [WQ,]         Vitrate         0.00058972         mol. <sup>1</sup> 2         (Pkm)           [Wd] <sup>2</sup> Magnetium for 0.000687573         mol. <sup>1</sup> 2         (Fkm), PH           [Wd] <sup>2</sup> Magnetium for 0.00067577         mol. <sup>1</sup> 2         (Fkm), PH           [CAT]         Sodium (strong cations)         0.000528416         mol. <sup>1</sup> 2         (Fkm), PH           [KY]         Sodium (strong cations)         0.000382416         mol. <sup>1</sup> 2         (Fkm), PH           [KY]         Foldsatum         0.000382416         mol. <sup>1</sup> 2         (Fkm), PH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [H]         Proton         6.30957E08         mol.1 <sup>4</sup> 2         pH           [H]         Proton         1.30143677         mol.1 <sup>4</sup> 2         pH	[NH <sub>3</sub> ] Free ammonia 4.45681E-07 mol.L <sup>-1</sup> 2 ff(S <sub>119</sub> ); pH	[MH]         Ammonium         7.094876.05         mol.1 <sup>1</sup> 2         95%.pH           [MO,]         Nitrate         0.00035697         mol.1 <sup>1</sup> 2         pH           [MC,O]         Carbonic acid         0.000058861         mol.1 <sup>1</sup> 2         fts_ab_2.pH           [MG]         Magnetium inn         0.000051757         mol.1 <sup>1</sup> 2         fts_ab_2.pH           [MG]         Patasium         0.00035416         mol.1 <sup>1</sup> 2         fts_ab_2.pH           [KT]         Patasium         0.00038416         mol.1 <sup>1</sup> 2         fts_ab_2.pH           [KT]         Patasium         0.00038416         mol.1 <sup>1</sup> 2         fts_ab_2.pH           [KT]         Patasium         0.00038416         mol.1 <sup>1</sup> 2         fts_ab_2.pH           [KT]         Patasium         0.000423054         mol.1 <sup>1</sup> 2         fts_ab_2.pH           [AN]         Chloride (strong anions)         0.004230545         mol.1 <sup>1</sup> 2         fts_ab_2.pH	[Wh]         Ammonium         7.094876-05         mol.1 <sup>-1</sup> 2         8 \$\mathbb{Sharphi}\$           [WhO]         Nitrate         0.00055927         mol.1 <sup>-1</sup> 2         PH           [WhCG]         Carbonic acid         0.00055927         mol.1 <sup>-1</sup> 2         PH           [MgCG]         Magnetium ion         0.000051757         mol.1 <sup>-1</sup> 2         Pt_Sci.2 PH           [CAT]         Solumi strong cation         0.000051757         mol.1 <sup>-1</sup> 2         Pt_Sci.2 PH           [KT]         Potasium         0.00035848         mol.1 <sup>-1</sup> 2         Pt_Sci.2 PH           [KT]         Potasium         0.00038448         mol.1 <sup>-1</sup> 2         Pt_Sci.2 PH           [KT]         Potasium         0.000383048         mol.1 <sup>-1</sup> 2         Pt_Sci.2 PH           [KT]         Potasium         0.000383048         mol.1 <sup>-1</sup> 2         Pt_Sci.2 PH           [Fe <sup>T</sup> ]         Ferrousion         1.790678-55         mol.1 <sup>-1</sup> 2         Pt_Sci.2 PH	[Wh]         Ammonium         7.094876-05         mol.1 <sup>-1</sup> 2         8 %s_b; PH           [NG,]         Nitrate         0.000358921         mol.1 <sup>-1</sup> 2         PH           [MC,G]         Carbonic acid         0.000035801         mol.1 <sup>-1</sup> 2         ff %s_b; PH           [MG,G]         Carbonic acid         0.000051757         mol.1 <sup>-1</sup> 2         ff %s_b; PH           [MG]         Magnetium inon         0.00001737         mol.1 <sup>-1</sup> 2         ff %s_b; PH           [CAT]         Solumitation action         0.000383468         mol.1 <sup>-1</sup> 2         ff %s_b; PH           [KN]         Potasium         0.00038448         mol.1 <sup>-1</sup> 2         ff %s_b; PH           [KN]         Potasium         0.00038448         mol.1 <sup>-1</sup> 2         ff %s_b; PH           [KN]         Chloride (strong anions)         0.004230954         mol.1 <sup>-1</sup> 2         ff %s_b; PH           [Ka <sup>+</sup> ]         Ferrous ion         1.790677-55         mol.1 <sup>-1</sup> 2         ff %s_b; PH	[Wh]         Ammonium         7.094876-05         mol.1 <sup>1</sup> 2         8 % s_b.PH           [MQ,]         Nitrate         0.000558272         mol.1 <sup>1</sup> 2         PH           [MC,G)         Carbonic acid         0.00058361         mol.1 <sup>1</sup> 2         PK           [MC,G)         Carbonic acid         0.00051757         mol.1 <sup>1</sup> 2         PK         PK           [MG]         Magnetium ion         0.00051757         mol.1 <sup>11</sup> 2         PK         PK           [CAT)         Sodium Strong cations         0.00052446         mol.1 <sup>11</sup> 2         PK         PK           [KN]         Potasium         0.000523946         mol.1 <sup>11</sup> 2         PK         PK           [M]         Ferousion         0.000238048         mol.1 <sup>11</sup> 2         PK         PK           [M]         Chorise(strong anions)         0.00423094         2         PK         PK           [M]         Ferousion         1.790678-55         mol.1 <sup>11</sup> 2         PK         PK	[NH,]         Ammonium         7.09487E05         mol.1 <sup>-1</sup> 2         PK           [NG,)         Nitrate         0.00056972         mol.1 <sup>-1</sup> 2         pH           [H,G,O]         Chrobini add         0.000056811         mol.1 <sup>-1</sup> 2         PK           [Mg <sup>2</sup> ]         Magnesium ion         0.000617157         mol.1 <sup>-1</sup> 2         PK <sub>50/2</sub> ;pH           [GK1]         Sodium (throng cations)         0.001522416         mol.1 <sup>-1</sup> 2         PK <sub>50/2</sub> ;pH           [K1]         Potasium         0.0004230954         mol.1 <sup>-1</sup> 2         PK <sub>50/2</sub> ;pH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>-1</sup> 2         PK <sub>50/2</sub> ;pH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M1]         Proton         6.30957E08         mol.1 <sup>3</sup> 2         pH           [OH]         Hydroxideion         1.30143E-07         mol.1 <sup>4</sup> 2         pH           [H4]         Free ammonia         4.45651E-07         mol.1 <sup>4</sup> 2         fK		[No]         Nitrate         0.000356972         mol. <sup>1</sup> 2         pH           [H,C0]         Carbonicald         0.000685861         mol. <sup>1</sup> 2         fSco.); pH           [Md*]         Magnesiumion         0.000657157         mol. <sup>1</sup> 2         fSco.); pH           [CAT]         Sodium (strong cations)         0.001522416         mol. <sup>1</sup> 2         fSco.); pH           [KV]         Petasium         0.00038568         mol. <sup>1</sup> 2         fSco.); pH           [KV]         Potasium         0.00038568         mol. <sup>1</sup> 2         fSco.); pH           [KV]         Petasium         0.0004230954         mol. <sup>1</sup> 2         fSco.); pH           [Ke*]         Ferrousion         1.700677-55         mol. <sup>1</sup> 2         fSco.); pH	[N0, Nirate         0.000356972         mol.1-4         2         0H           [N4,C0,]         Carbonic acid         0.00065861         mol.1-3         2         ftsc <sub>01</sub> ; pH           [Mg <sup>2</sup> ]         Magresium ion         0.00051737         mol.1-4         2         ftsc <sub>01</sub> ; pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1-4         2         ftsc <sub>02</sub> ; pH           [K1]         Potassium         0.000338648         mol.1-3         2         ftsc <sub>02</sub> ; pH           [K1]         Potassium         0.000338648         mol.1-3         2         ftsc <sub>02</sub> ; pH           [Fe <sup>3</sup> ]         Ferrousion         1.790675-55         mol.1-4         2         ftsc <sub>02</sub> ; pH	[N0, Ni Tate         0.000356972         mol.1 <sup>4</sup> 2         PH           [H7,C0]         Carbonic acid         0.000638801         mol.1 <sup>4</sup> 2         PH           [Mg <sup>2</sup> ]         Magnesium inon         0.000687157         mol.1 <sup>4</sup> 2         fts <sub>col</sub> ; pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         fts <sub>col</sub> ; pH           [K1]         Potasium         0.00038868         mol.1 <sup>4</sup> 2         fts <sub>col</sub> ; pH           [K1]         Potasium         0.00038964         mol.1 <sup>3</sup> 2         fts <sub>col</sub> ; pH           [Fe <sup>3</sup> ]         Ferrous ion         1.790678-55         mol.1 <sup>3</sup> 2         fts <sub>col</sub> ; pH	[N0, Nirate         0.000356972         mol.1 <sup>4</sup> 2         PH           [N4,Co]         Carbonic acid         0.000358972         mol.1 <sup>4</sup> 2         PK           [Mg <sup>2</sup> ]         Magnesium ion         0.000687157         mol.1 <sup>4</sup> 2         fK <sub>col</sub> ; PH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         fK <sub>col</sub> ; PH           [K1]         Potassium         0.00038848         mol.4 <sup>3</sup> 2         fK <sub>col</sub> ; PH           [K1]         Potassium         0.000389548         mol.4 <sup>3</sup> 2         fK <sub>col</sub> ; PH           [Fe <sup>3</sup> ]         Ferrous ion         1.79067E-55         mol.4 <sup>3</sup> 2         fK <sub>col</sub> ; PH	[No, Ni trate         0.000356972         mol.t <sup>4</sup> 2         pH           [H,GO,]         Carbonic add         0.000685861         mol.t <sup>-1</sup> 2         fSc <sub>00</sub> ); pH           [Mg <sup>2</sup> ]         Magnesium inon         0.000651757         mol.t <sup>-1</sup> 2         fSc <sub>00</sub> ; pH           [CAT)         Sodium (strong cations)         0.001522416         mol.t <sup>-1</sup> 2         fSc <sub>00</sub> ; pH           [KT]         Potasium         0.00035468         mol.t <sup>-1</sup> 2         fSc <sub>00</sub> ; pH           [KT]         Ocidation (strong anions)         0.00423054         mol.t <sup>-1</sup> 2         fSc <sub>00</sub> ; pH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [H]         Proton         6.30957608         mol. <sup>13</sup> 2         pH           [OH]         Hydroxideion         1.30145607         mol. <sup>14</sup> 2         pH           [MH]         Freatmonia         4.45681607         mol. <sup>14</sup> 2         pH           [NH]         Ammonium         7.09487E65         mol. <sup>12</sup> 2         fS <sub>sub</sub> .pH	[NH <sub>4</sub> ] Ammonium 7.09487E-05 mol.L <sup>-1</sup> 2 f(S <sub>NIN</sub> ); pH	[H,CQ)         Carbonic acid         0.000655861         mol.1 <sup>4</sup> 2         [FS <sub>021</sub> ): pH           [Mg] <sup>2</sup> Magnesiumion         0.000651737         mol.1 <sup>4</sup> 2         [FS <sub>021</sub> ): pH           [CAT         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         [FS <sub>021</sub> ): pH           [K1]         Potassium         0.000338548         mol.1 <sup>4</sup> 2         [FS <sub>021</sub> ): pH           [K1]         Chloride (strong anions)         0.00423954         mol.1 <sup>4</sup> 2         [FS <sub>021</sub> ): pH           [K4]         Ferrousion         0.00423954         mol.1 <sup>4</sup> 2         [FS <sub>021</sub> ): pH	[H,CQ)         Carbonic acid         0.000655861         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [Mg] <sup>4</sup> Magnesium ion         0.000651757         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [CAT]         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [K]         Petasium         0.00038848         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [K]         Petasium         0.00038848         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [K]         Petasium         0.00038948         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [Fe <sup>2</sup> ]         Ferrous ion         1.79067E-55         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH	[H,CQ)         Carbonic acid         0.000655861         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [Mg] <sup>4</sup> Magnesium ion         0.000651737         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [CKT]         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [K]         Petasaium         0.00038368         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [K]         Petasaium         0.00038368         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [K]         Petasaium         0.00038368         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [Fe <sup>1</sup> ]         Ferrous ion         1.790678-55         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH	[H,CQ)         Carbonic acid         0.000655861         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [Mg <sup>2</sup> ]         Magnesium ion         0.000651737         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [CAT]         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [K]         Petassium         0.00038868         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [K]         Petassium         0.00038848         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [K]         Petassium         0.00038954         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [K]         Petassium         0.000489549         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH           [Fe <sup>3</sup> ]         Ferrous ion         1.790678:55         mol.1. <sup>4</sup> 2         [FS <sub>CUE</sub> ):PH	[H4,CO]         Carbonic acid         0.000655861         mol.1 <sup>k</sup> 2         [H5 <sub>C0]</sub> ):pH           [Mg] <sup>k</sup> Magnetismin on         0.000651757         mol.1 <sup>k</sup> 2         [H5 <sub>C0]</sub> ):PH           [Kd] <sup>k</sup> Magnetismin on         0.000521757         mol.1 <sup>k</sup> 2         [H5 <sub>C0]</sub> ):PH           [Kd] <sup>k</sup> Sodium (strong cations)         0.001522416         mol.1 <sup>k</sup> 2         [H5 <sub>C0]</sub> ):PH           [K1]         Potasium         0.000338468         mol.1 <sup>k<sup>k</sup></sup> 2         [H5 <sub>C0]</sub> ):PH           [K1]         Choirde (strong anions)         0.004330548         mol.1 <sup>k<sup>k</sup></sup> 2         [H5 <sub>C0]</sub> ):PH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [N]         Proton         6.30957568         mol. <sup>1</sup> 2         pH           [GH]         Hydroxideion         1.30143607         mol. <sup>1</sup> 2         pH           [M]         Free ammonia         4.45681607         mol. <sup>1</sup> 2         fH           [M]         Affset         mol. <sup>10</sup> 2         f(%m), pH           [Num]         Volume         mol. <sup>11</sup> 2         f(%m), pH           [Num]         Norski et al.         mol. <sup>12</sup> 2         f(%m), pH	[NH <sub>4</sub> ]         Ammonium         7.09487-605         mol.L <sup>-1</sup> 2         ftS <sub>lm/k</sub> pH           [N0 <sub>7</sub> ]         Nitrate         0.000356972         mol.L <sup>-1</sup> 2         pH	[Mg]         Mgersium ion         0.000617157         mol.1 <sup>4</sup> 2         [f S <sub>spi</sub> ]:pH           [CAT         Sodium (strong cation)         0.00032416         mol.1 <sup>4</sup> 2         [f S <sub>spi</sub> ]:pH           [K]         Potassium         0.00032416         mol.1 <sup>4</sup> 2         [f S <sub>spi</sub> ]:pH           [AN]         Chlorde (strong anions)         0.004230954         mol.1 <sup>4</sup> 2         [f S <sub>spi</sub> ]:pH           [Fe <sup>2</sup> ]         Ferossion         1.79067555         mol.1 <sup>4</sup> 2         [f S <sub>spi</sub> ]:pH	[Mg]         Mggresium ion         0.000517157         mol.1 <sup>4</sup> 2         f(S <sub>xx</sub> ): PH           [CAT]         Sodium (strong calons)         0.001522416         mol.1 <sup>4</sup> 2         f(S <sub>xx</sub> ): PH           [K]         Potasium         0.00035848         mol.1 <sup>4</sup> 2         f(S <sub>xx</sub> ): PH           [K]         Chloride (strong anions)         0.004230954         mol.1 <sup>4</sup> 2         f(S <sub>xx</sub> ): PH           [Fe <sup>3</sup> ]         Ferrousion         1.790675:55         mol.1 <sup>4</sup> 2         f(S <sub>xx</sub> ): PH	[Mg]         Magnetium ion         0.000517157         mol.1 <sup>4</sup> 2         [Sta_k]: PH           [CAT         Solumi Ritrom Cations         0.00152416         mol.1 <sup>4</sup> 2         [Sta_k]: PH           [K]         Petasalum         0.00032416         mol.1 <sup>4</sup> 2         [Sta_k]: PH           [K]         Chloride (strong anions)         0.004230954         mol.1 <sup>4</sup> 2         [Sta_k]: PH           [K <sup>2</sup> ]         Ferous ion         1.75067E-55         mol.1 <sup>4</sup> 2         [Sta_k]: PH	[Mg]         Mggresium ion         0.000517157         mol.1 <sup>4</sup> 2         ffS <sub>up</sub> : PH           [CAT]         Sodium (strong calons)         0.001522416         mol.1 <sup>4</sup> 2         ffS <sub>up</sub> : PH           [K]         Potasium         0.000512368         mol.1 <sup>4</sup> 2         ffS <sub>up</sub> : PH           [K]         Potasium         0.0004230954         mol.1 <sup>4</sup> 2         ffS <sub>up</sub> : PH           [Fe <sup>2</sup> ]         Ferrousion         1.79067E-55         mol.1 <sup>4</sup> 2         ffS <sub>up</sub> : PH	[Mg]         Mggresium ion         0.000517157         mol.1 <sup>4</sup> 2         [fS <sub>scl</sub> ): pH           [CAT]         Sodium (strong calons)         0.001522416         mol.1 <sup>4</sup> 2         [fS <sub>scl</sub> ): pH           [KY]         Potassium         0.0004230954         mol.1 <sup>4</sup> 2         [fS <sub>scl</sub> ): pH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>4</sup> 2         [fS <sub>scl</sub> ): pH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [H]         Proton         6.309576.08         mol.1 <sup>4</sup> 2         pH           [OH]         Hydroxide ion         1.3014570         mol.1 <sup>4</sup> 2         pH           [MH]         Free ammonia         4.45681607         mol.1 <sup>4</sup> 2         fSmub.PH           [MH]         Armonium         7.09487605         mol.1 <sup>4</sup> 2         fSmub.PH           [MG]         Nitrate         0.000685861         mol.1 <sup>4</sup> 2         fSmub.PH           [MG]         Carbonic acid         0.000685861         mol.1 <sup>4</sup> 2         fSmub.PH	[NH]         Ammonium         7.09487+05         mol.1 <sup>4</sup> 2         ( $fS_{max}$ ); PH           [NG)         INtrate         0.00058952         col.4 <sup>4</sup> 2         PH           [H4,C0]         Carbonic acid         0.00068861         mol.4 <sup>4</sup> 2         fS <sub>col</sub> ); PH	[CAT         Sodium (trong cations)         0.001522416         mol.1.*         2         f(S <sub>2,0</sub> ); pH           [K]         Potassium         0.00383848         mol.1.*         2         f(S <sub>2,0</sub> ); pH           [K]         Cholnide(strong anions)         0.004329344         mol.1.*         2         f(S <sub>2,0</sub> ); pH           [Fe <sup>3</sup> ]         Ferousion         1.79067E-55         mol.1.*         2         f(S <sub>10</sub> ); pH	[CAT]         Sodium (strong cations)         0.001522416         mol.1.*         2         ftSc.jb; pH           [K1]         Potassium         0.000338648         mol.1.*         2         ftSj; pH           [K1]         Choirde (strong anions)         0.004320954         mol.1.*         2         ftSj; pH           [Fe <sup>2</sup> ]         Ferrousion         1.79067555         mol.1.*         2         ftSj; pH	[CAT]         Sodium (strong cations)         0.001522416         mol.1.*         2         [ftScub: pH           [KT]         Potassium         0.000333648         mol.1.*         2         [ftScub: pH           [KN]         Choirde (strong anions)         0.001322054         mol.1.*         2         [ftScub: pH           [Fe <sup>3</sup> T]         Ferrous ion         1.79067E-55         mol.1.*         2         [ftScub: pH	[CAT]         Sodium (strong cations)         0.001522416         mol.1.*         2         ftSc.jb; pH           [K1]         Potassium         0.000333648         mol.1.*         2         ftSj; pH           [K1]         Foldsoft strong anions)         0.001322054         mol.1.*         2         ftSj; pH           [K1]         Formula         0.00433054         mol.1.*         2         ftSj; pH           [K2]         Ferrousion         1.790676:55         mol.1.*         2         ftSj; pH	[CAT]         Sodium (strong cations)         0.001522416         mol.1.*         2         (FSc.);; pH           [K]         Potasium         0.000382468         mol.1.*         2         45; ; pH           [AN]         Chloride (strong anions)         0.004230954         mol.1.*         2         45; ; pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [Y1]         Protom         6.30975-08         mol. <sup>1</sup> 2         pH           [W1]         Hydroxideion         1.304345-07         mol. <sup>1</sup> 2         pH           [WH]         Free ammonia         4.456816-07         mol. <sup>1</sup> 2         pH           [WH]         Free ammonia         4.456816-07         mol. <sup>1</sup> 2         fS <sub>mub</sub> .pH           [WH]         JArmonium         7.09487-05         mol. <sup>1</sup> 2         fS <sub>mub</sub> .pH           [WH]         Armonium         0.000356972         mol. <sup>1</sup> 2         gS <sub>mub</sub> .pH           [Mg <sup>2</sup> ]         Magresium inn         0.0000687891         mol. <sup>1</sup> 2         fS <sub>mub</sub> .pH	[NH,]         Ammonium         7.09487+05         mol.1 <sup>4</sup> 2         1 f Swaji: PH           [NG,]         Nitrate         0.000356972         mol.4 <sup>4</sup> 2         PH           [HC,G)         Carbonic acid         0.000056836         mol.4 <sup>4</sup> 2         fSwaji: PH           [Mg <sup>2</sup> ]         Magnesium ion         0.000617157         mol.4 <sup>3</sup> 2         fSwaji: PH	[K]         Potassium         0.000383648         mol.1*         Z         15,2;pH           [AN]         Chloride(strong anions)         0.004230954         mol.1*         Z         15,3;pH           [Fe*]         Ferrousion         1.79067E-55         mol.1*         Z         15,3;pH	[K]         Potasium         0.000383648         mol.1*         2         15,1;pH           [KN]         Cholned(strong anions)         0.00423094         mol.1*         2         15,1;pH           [Fe <sup>2</sup> ]         Ferrousion         1.09067E-55         mol.1*         2         15,1;pH	[K]         Potasium         0.000383648         mol.1*         2         15,1,pH           [KN]         Cholod(strong anions)         0.00423094         mol.1*         2         15,2,pH           [Fe <sup>1</sup> ]         Ferrous ion         0.00423094         mol.1*         2         15,2,pH           [Fe <sup>1</sup> ]         Ferrous ion         1.790675-55         mol.1*         2         15,3,2H	[K]         Potasium         0.000383648         mol.1*         2         15,1,pH           [KN]         Cholofe(strong anions)         0.00423094         mol.1*         2         15,2,pH           [Fe <sup>3</sup> ]         Ferrous ion         0.00423094         mol.1*         2         15,2,pH           [Fe <sup>3</sup> ]         Ferrous ion         1.79067E-55         mol.1*         2         15,3,2H	[K]         Potassum         0.000383648         mol.L*         2         ft5_0; pH           [AN]         Chloride (strong anions)         0.004230954         mol.L*         2         ft5 <sub>30</sub> ; pH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [IY]         Proton         6.30957E-08         mol.1 <sup>4</sup> 2         pH           [OH]         Hydroxide ion         1.301456-07         mol.1 <sup>4</sup> 2         pH           [IM]         Free ammonia         4.45681E-07         mol.1 <sup>4</sup> 2         fFe           [IM4,]         Free ammonia         4.45681E-07         mol.1 <sup>4</sup> 2         fSe <sub>30</sub> .pH           [IM4,]         Ammonium         7.09487E-05         mol.1 <sup>4</sup> 2         fSe <sub>30</sub> .pH           [IM2,]         Atriate         0.000556972         mol.1 <sup>4</sup> 2         fSe <sub>30</sub> .pH           [IM2]         Megesium ion         0.0006558671         mol.1 <sup>4</sup> 2         fSe <sub>300</sub> .pH           [IM2]         Megesium ion         0.000655972         mol.1 <sup>4</sup> 2         fSe <sub>300</sub> .pH           [EACT]         Sodium (strong cations)         0.001522415         mol.1 <sup>4</sup> 2         fSe <sub>300</sub> .pH	[Net, ]         Ammonium         7.94487£49         mol.1. <sup>4</sup> 2         [Stau]; PH           [Mo, ]         Nitrate         0.00058561         mol.1. <sup>4</sup> 2         PH           [Mg <sup>2</sup> ]         Magnetiumion         0.000158261         mol.1. <sup>4</sup> 2         ffScau]; PH           [Mg <sup>2</sup> ]         Magnetiumion         0.00015717         mol.1. <sup>4</sup> 2         ffScau]; PH           [CAT]         Sodium(strong cations)         0.001522416         mol.1. <sup>4</sup> 2         ffScau]; PH	[AN] Chloride[strong amons) 0.004330954 mol.1 <sup>+</sup> ∠ 1 [S <sub>kab</sub> .pH [fe <sup>1</sup> ] Ferrousion 1.17906755 mol.1 <sup>+</sup> 2 1 [S <sub>kab</sub> .pH	[AN]         Chloride (strong anions)         0.004230954         mol.L*         2         15 <sub>kul</sub> ; pH           [Fe <sup>3</sup> *]         Ferrousion         1.79067E-55         mol.L*         2         15 <sub>kul</sub> ; pH	[AN]         Chloride (strong anions)         0.004230954         mol.L*         2         ttps_u); pH           [Fe <sup>1</sup> ]         Ferrousion         1.79067E55         mol.L*         2         ftps_u); pH	[AN]         Chloride (strong anions)         0.004230954         mol.L*         2         15 <sub>kul</sub> ; pH           [Fe <sup>1</sup> P]         Ferrousion         1.79067E:55         mol.L*         2         15 <sub>kul</sub> ; pH	[AN] Chloride (strong anions) 0.004230954 mol.L <sup>2</sup> 2 fl <sub>5M</sub> ); pH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957E-08         mol.1 <sup>4</sup> 2         pH           [JM]         Proton         1.301452-07         mol.1 <sup>4</sup> 2         pH           [MM]         Free ammonia         4.45681E-07         mol.1 <sup>4</sup> 2         ftSpace           [MM,]         Armonium         7.09487E-05         mol.1 <sup>4</sup> 2         ftSpace,pH           [MQ,]         Nitrate         0.00055927         mol.1 <sup>4</sup> 2         ftSpace,pH           [M,CO]         Carbonic acid         0.00055927         mol.1 <sup>4</sup> 2         ftSpace,pH           [M,CO]         Nitrate         0.00055927         mol.1 <sup>4</sup> 2         ftSpace,pH           [M,CO]         Carbonic acid         0.00052592         mol.1 <sup>4</sup> 2         ftSpace,pH           [M,CO]         Magnesium ion         0.00052146         mol.1 <sup>4</sup> 2         ftSpace,pH           [KT]         Potassium         0.000383648         mol.1 <sup>4</sup> 2         ftSpace,pH	[Nh], Ammonium         7.9487.F45         mol.1, <sup>1</sup> 2         [Shau], PH           [Nh], Dirate         0.0005872         mol.1, <sup>2</sup> 2         PH           [Nh, O], Nirate         0.0005872         mol.1, <sup>2</sup> 2         PH           [M, Go], Carbonic acid         0.00058561         mol.1, <sup>2</sup> 2         f(S <sub>cub</sub> ), PH           [Mg]         Magnesium ion         0.0005175         mol.1, <sup>2</sup> 2         f(S <sub>cub</sub> ), PH           [Mg]         Magnesium ion         0.00051244         mol.1, <sup>2</sup> 2         f(S <sub>cub</sub> ), PH           [Mg]         Magnesium ion         0.00051244         mol.1, <sup>2</sup> 2         f(S <sub>cub</sub> ), PH           [Mg]         Potasium         0.000532446         mol.1, <sup>2</sup> 2         f(S <sub>cub</sub> ), PH	[Fe**] Ferrousion 1.79067E-55 mol.L <sup>-2</sup> 2 10 <sub>Ye2</sub> ); pH	[Fe <sup>**</sup> ] Ferrousion 1.79067E-55 mol. <sup>1,2</sup> 2 η <sub>2<sup>1</sup>/2</sub> , ρH	[Fe*] Ferrousion 1.79067E55 mol.L <sup>4</sup> 2 10 <sub>Fe3</sub> ; pH	[Fe*"] Ferrousion 1.79067E-55 mol.L <sup>2</sup> 2 10 <sub>562</sub> /; pH	and the second
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [N]         Proton         6.30957E-08         mol.1 <sup>-1</sup> 2         pH           [OH]         Hydroxide ion         1.301452-07         mol.1 <sup>-1</sup> 2         pH           [NH]         Ammonium         7.09487-05         mol.1 <sup>-1</sup> 2         fStaubert           [NH]         Free ammonia         4.456816-07         mol.1 <sup>-1</sup> 2         fStaubert           [NH]         Ammonium         7.09487-05         mol.1 <sup>-1</sup> 2         fStaubert           [NH]         Ammonium         0.000356972         mol.1 <sup>-1</sup> 2         fStaubert           [Md]         Magenium ion         0.000085861         mol.1 <sup>-1</sup> 2         fStaubert           [Md]         Sadium (strong cations)         0.000352157         mol.1 <sup>-1</sup> 2         fStaubert           [CAT)         Sodium (strong cations)         0.0003548         mol.1 <sup>-1</sup> 2         fStaubert           [CM]         Sadium (strong cations)         0.000354848         mol.1 <sup>-1</sup> 2         fStaubert           [CM]         Chloride (strong anions)         0.004230954         mol.1 <sup>-1</sup>	[Nh],         Ammonium         7.09487£95         mol.1, <sup>4</sup> 2         1 f Suu); PH           [Nh],         Intrate         0.00058752         mol.1, <sup>4</sup> 2         ff Suu); PH           [McO],         Carbonic acid         0.00058752         mol.1, <sup>4</sup> 2         ff Suu); PH           [McG]         Carbonic acid         0.00058751         mol.1, <sup>4</sup> 2         ff Suu); PH           [McG]         Sodium (strong cations)         0.00051757         mol.1, <sup>4</sup> 2         ff Suu); PH           [CAT]         Sodium (strong cations)         0.001522416         mol.1, <sup>4</sup> 2         ff Suu); PH           [AN]         Chloride (strong anions)         0.004330954         mol.1, <sup>4</sup> 2         ff Suu); PH					[Fe <sup>4*</sup> ] Ferrousion 1.79067E-55 mol.L <sup>-4</sup> 2 (\$\$\mbox{\$\mbox
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [H]         Proton         6.30957E-08         mol.1 <sup>1</sup> 2         pH           [OH]         Hydroxideion         1.30143E-07         mol.1 <sup>2</sup> pH	[NH <sub>3</sub> ] Free ammonia 4.456816-07 mol.L <sup>-1</sup> 2 f(S <sub>HH3</sub> ); pH	[Wh]         Ammonium         7.09487505         mol.1 <sup>1</sup> 2         f(S <sub>mb</sub> ,P)H           [Mo]         Nitrate         0.00058792         mol.1 <sup>1</sup> 2         f(S <sub>mb</sub> ,P)H           [Mg,Ch]         Carbonic acid         0.000685861         mol.1 <sup>1</sup> 2         f(S <sub>mb</sub> ,P)H           [Mg]         Magnesium ion         0.00051737         mol.1 <sup>1</sup> 2         f(S <sub>mb</sub> ,P)H           [Mg]         Magnesium ion         0.000182166         mol.1 <sup>1</sup> 2         f(S <sub>mb</sub> ,P)H           [Mg]         Patasium (strong cation)         0.000383648         mol.1 <sup>1</sup> 2         f(S <sub>mb</sub> ,P)H           [K]         Patasium         0.000383648         mol.1 <sup>1</sup> 2         f(S <sub>mb</sub> ,P)H           [K]         Chloride (strong anions)         0.004230954         mol.1 <sup>1</sup> 2         f(S <sub>mb</sub> ,P)H	[Net, ]         Ammonium         7.09487505         mol.1, <sup>1</sup> 2         15%mic           [INO, ]         Nitrate         0.00055927         mol.1, <sup>4</sup> 2         0         H           [INO, ]         Chronic acid         0.00058951         mol.1, <sup>4</sup> 2         15%mic         H           [Mg]         Magnesiumion         0.00058951         mol.1, <sup>4</sup> 2         15%mic         H           [Mg]         Magnesiumion         0.00051757         mol.1, <sup>4</sup> 2         15%mic         H           [Mg]         Magnesiumion         0.000521416         mol.1, <sup>4</sup> 2         15%mic         H           [Mt]         Chronic defactorg anions)         0.00033848         mol.1, <sup>4</sup> 2         15%mic         H           [Mt]         Chronic defactorg anions)         0.00033804         mol.1, <sup>4</sup> 2         15%mic         H           [Fe <sup>1</sup> ]         Ferrousion         1.290678-55         mol.1, <sup>4</sup> 2         15%mic         H	[Net, ]         Ammonium         7.09487505         mol.1, <sup>1</sup> 2         15%micb           [No, ]         Nitrate         0.00058951         mol.1, <sup>2</sup> 2         PH           [M, Co, ]         Carbonic acid         0.00058951         mol.1, <sup>2</sup> 2         f(St <sub>10</sub> ): PH           [Mg]         Magnesium ion         0.00051737         mol.1, <sup>2</sup> 2         f(St <sub>20</sub> ): PH           [CAT)         Solumitation of 0.000512446         -0.2         f(St <sub>20</sub> ): PH           [K]         Potasium         0.000383648         mol.1, <sup>3</sup> 2         f(St <sub>20</sub> ): PH           [AN]         Chorine distrong anions)         0.00423446         -2         f(St <sub>20</sub> ): PH           [AN]         Chorine distrong anions)         0.00423446         -2         f(St <sub>20</sub> ): PH           [AN]         Chorine distrong anions)         0.004234954         -2         f(St <sub>20</sub> ): PH	[Net, ]         Ammonium         7.09487505         mol.1, <sup>1</sup> 2         15%mic H           [No, ]         Nitrate         0.00055927         mol.1, <sup>4</sup> 2         flSgub; pH           [Mc, Obj         Carbonic acid         0.00058961         mol.1, <sup>4</sup> 2         flSgub; pH           [Mc]         Magnesiumion         0.00051737         mol.1, <sup>4</sup> 2         flSgub; pH           [CAT]         Sodum (tareng cations)         0.000312416         mol.1, <sup>4</sup> 2         flSgub; pH           [K]         Potasium         0.00033848         mol.1, <sup>4</sup> 2         flSgub; pH           [K]         Potasium         0.00033848         mol.1, <sup>4</sup> 2         flSgub; pH           [K]         Potasium         0.00033848         mol.1, <sup>4</sup> 2         flSgub; pH           [K]         Potasium         0.00403394         al.1, <sup>4</sup> 2         flSgub; pH           [Fe <sup>+</sup> ]         Ferrous ion         1.790678-55         mol.1, <sup>4</sup> 2         flSgub; pH	[NH]         Ammonium         7.09487505         mol.1 <sup>4</sup> 2         f Smj.bH           [NG,]         Nitrate         0.000356972         mol.4 <sup>3</sup> 2         f Smj.bH           [MG,O]         Carbonic acid         0.000356861         mol.4 <sup>3</sup> 2         f Smj.bH           [Mg <sup>2</sup> )         Magnesium ion         0.000517157         mol.4 <sup>3</sup> 2         f Smj.bH           [KY]         Potasium         0.001522416         mol.4 <sup>3</sup> 2         f Smj.bH           [KY]         Potasium         0.001522468         mol.4 <sup>3</sup> 2         f Smj.bH           [KN]         Chloride (strong anions)         0.004230954         mol.4 <sup>3</sup> 2         f Smj.bH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [N]         Proton         6.30957668         mol. <sup>1</sup> 2         pH           [OH]         Hydroxideion         1.3043807         mol. <sup>12</sup> 2         pH	[NH <sub>4</sub> ] Free ammonia 4.45681E-07 mol.L <sup>-1</sup> 2 ffS <sub>1110</sub> ; pH	[NH, 7]         Ammonium         7.09487E05         mol.L <sup>3</sup> 2         f5 <sub>mull</sub> :pH           [NG, 0]         Nitrate         0.000356972         mol.L <sup>3</sup> 2         pH           [HC, O]         Carbonic acid         0.000058681         mol.L <sup>3</sup> 2         f5 <sub>mull</sub> :pH           [MG]         Magnesium ion         0.0000517157         mol.L <sup>3</sup> 2         f5 <sub>mull</sub> :pH           [MG]         Magnesium ion         0.0000517157         mol.L <sup>3</sup> 2         f5 <sub>mull</sub> :pH           [MG]         Magnesium ion         0.000052146         mol.L <sup>3</sup> 2         f5 <sub>mull</sub> :pH           [KT]         Potasalum         0.000383648         mol.L <sup>3</sup> 2         f5 <sub>mull</sub> :pH           [KT]         Potasalum         0.000383648         mol.L <sup>3</sup> 2         f5 <sub>mull</sub> :pH           [KT]         Potasalum         0.000383648         mol.L <sup>3</sup> 2         f5 <sub>mull</sub> :pH           [KT]         Chloride (strong anions)         0.00423054         mol.L <sup>3</sup> 2         f5 <sub>mull</sub> :pH	Image         Ammonium         7.09487E05         mol.1 <sup>4</sup> 2         fScu.; pH           [No,0]         Nitrate         0.000356972         mol.1 <sup>4</sup> 2         fScu.; pH           [H,C0]         Carbonic add         0.0000586912         mol.1 <sup>4</sup> 2         fScu.; pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000617157         mol.1 <sup>4</sup> 2         fScu.; pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         fScu.; pH           [K7]         Potassium         0.000383648         mol.1 <sup>-4</sup> 2         fScu.; pH           [K7]         Potassium         0.000330954         mol.1 <sup>-4</sup> 2         fScu.; pH           [K8]         Potassium         0.000330954         mol.1 <sup>-4</sup> 2         fScu.; pH           [Fe <sup>1</sup> ]         Ferrousion         1.790675:55         mol.1 <sup>-4</sup> 2         fScu.; pH	[MM,]         Ammonium         7.09887E-05         mol.1 <sup>-3</sup> 2         ftsmith           [MG,0]         Nitrate         0.000358972         mol.1 <sup>-3</sup> 2         pH           [MG,0]         Carbonic acid         0.000058801         mol.1 <sup>-4</sup> 2         ftsmith           [MG,0]         Carbonic acid         0.000051757         mol.1 <sup>-4</sup> 2         ftsmith           [CAT         Solumi Strong carbonic         0.00051757         mol.1 <sup>-4</sup> 2         ftsmith           [CAT         Solumi Strong carbonic         0.00053246         mol.1 <sup>-4</sup> 2         ftsmith           [CAT         Solumi Strong carbonic         0.000383468         mol.1 <sup>-4</sup> 2         ftsmith           [K*]         Persous ion         0.000383468         mol.1 <sup>-4</sup> 2         ftsmith           [K*]         Ferrous ion         1.79067455         mol.1 <sup>-4</sup> 2         ftsmith	[MA]         Ammonium         7.09887E-05         mol. <sup>1,3</sup> 2         fism.pH           [MG,0]         Nitrate         0.000356972         mol. <sup>1,4</sup> 2         pH           [MG,0]         Carbonic acid         0.000058681         mol. <sup>1,4</sup> 2         fism.pH           [Mg,0]         Carbonic acid         0.000051757         mol. <sup>1,4</sup> 2         fism.pH           [Mg]         Magnetium ion         0.00051757         mol. <sup>1,4</sup> 2         fism.pH           [CAT         Solum Strong carbonic         0.00052446         mol. <sup>1,4</sup> 2         fism.pH           [K]         Petasium         0.00032446         mol. <sup>1,4</sup> 2         fism.pH           [K]         Petasium         0.00032446         mol. <sup>1,4</sup> 2         fism.pH           [K]         Petasium         0.00043944         2         fism.pH           [K]         Petrosion         0.00424994         2         fism.pH	Ima         Ammonium         7.09487E05         mol.1 <sup>-1</sup> 2         fis_m); pH           [No, ]         Nitrate         0.000356972         mol.1 <sup>-1</sup> 2         fis_m); pH           [Mc, O]         Chonic aid         0.000058972         mol.1 <sup>-1</sup> 2         fis_m); pH           [Mc, O]         Chonic aid         0.000058912         mol.1 <sup>-1</sup> 2         fis_m); pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000617157         mol.1 <sup>-1</sup> 2         fis_m); pH           [CAT)         Sodium (strong cations)         0.001522416         mol.1 <sup>-1</sup> 2         fis_m); pH           [K]         Potasium         0.0004230954         mol.1 <sup>-1</sup> 2         fis_m); pH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>-1</sup> 2         fis_m); pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [k]         Proton         6.30957E-08         mol.1 <sup>4</sup> 2         pH           [CH]         Hydroxide ion         1.304345-07         mol.1 <sup>4</sup> 2         pH	[NH <sub>3</sub> ] Free ammonia 4.45681E-07 mol.L <sup>-1</sup> 2 f(S <sub>110</sub> ); pH	[MH,]         Ammonium         7.09487E05         mol.L <sup>3</sup> 2         f(S <sub>mill</sub> ):pH           [MG,0]         Nitrate         0.00055972         mol.L <sup>3</sup> 2         pH           [MG,0]         Carbonic acid         0.000058972         mol.L <sup>3</sup> 2         f(S <sub>mill</sub> ):pH           [Mg,0]         Carbonic acid         0.000051757         mol.L <sup>3</sup> 2         f(S <sub>mill</sub> ):pH           [Mg]         Magnesium ino         0.000517157         mol.L <sup>3</sup> 2         f(S <sub>mill</sub> ):pH           [CM1         Solumi attorne; attorne; 0         0.00052416         mol.L <sup>3</sup> 2         f(S <sub>mill</sub> ):pH           [K1]         Potassium         0.00038446         mol.L <sup>3</sup> 2         f(S <sub>mill</sub> ):pH           [K1]         Potassium         0.00038446         mol.L <sup>3</sup> 2         f(S <sub>mill</sub> ):pH           [K1]         Otioride (strong anions)         0.00423054         mol.L <sup>3</sup> 2         f(S <sub>mill</sub> ):pH           [K2]         Chioride (strong anions)         0.00423054         mol.L <sup>3</sup> 2         f(S <sub>mill</sub> ):pH	[NH,7]         Ammonium         7.09487E05         mol.1 <sup>-1</sup> 2         fScu.; pH           [NO,7]         Nitrate         0.000356972         mol.1 <sup>-1</sup> 2         fScu.; pH           [H,C0]         Carbonic add         0.0000586912         mol.1 <sup>-1</sup> 2         fScu.; pH           [Mg <sup>2</sup> ]         Magnesium Ion         0.000617157         mol.1 <sup>-1</sup> 2         fScu.; pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>-1</sup> 2         fScu.; pH           [K7]         Potassium         0.000383648         mol.1 <sup>-1</sup> 2         fScu.; pH           [K7]         Potassium         0.000330954         mol.1 <sup>-1</sup> 2         fScu.; pH           [K7]         Potassium         0.000330954         mol.1 <sup>-1</sup> 2         fScu.; pH           [K8]         Potassium         0.004330954         mol.1 <sup>-1</sup> 2         fScu.; pH           [Fe <sup>1</sup> Ferrousion         1.79067E-55         mol.1 <sup>-1</sup> 2         fScu.; pH	[MH_1]         Ammonium         7.09887E-05         mol.L <sup>3</sup> 2         ftsmith           [MG,0]         Nitrate         0.000356972         mol.L <sup>3</sup> 2         pH           [MG,0]         Carbonic acid         0.000058681         mol.L <sup>4</sup> 2         pH           [Mg]         Magnetium inon         0.000051757         mol.L <sup>4</sup> 2         ftSu.j:pH           [Mg]         Magnetium inon         0.000051757         mol.L <sup>4</sup> 2         ftSu.j:pH           [CAT)         Solum Strong cations         0.00038446         mol.L <sup>4</sup> 2         ftSu.j:pH           [K]         Petasium         0.00038446         mol.L <sup>4</sup> 2         ftSu.j:pH           [K]         Petasium         0.00038448         mol.L <sup>4</sup> 2         ftSu.j:pH           [K]         Petasium         0.0004230954         mol.L <sup>4</sup> 2         ftSu.j:pH           [K <sup>4</sup> )         Ferrous ion         1.75067E-55         mol.L <sup>4</sup> 2         ftSu.j:pH	[MH,]         Ammonium         7.09887E-05         mol. <sup>1,3</sup> 2         ftsmith           [MG,]         Nitrate         0.000356972         mol. <sup>1,4</sup> 2         pH           [MG,C]         Carbonic acid         0.000058681         mol. <sup>1,4</sup> 2         ftSmith           [Mg,C]         Carbonic acid         0.000051757         mol. <sup>1,4</sup> 2         ftSmith           [Mg]         Magnetium ion         0.00051757         mol. <sup>1,4</sup> 2         ftSmith           [CAT         Solum Strong cations         0.00051446         mol. <sup>1,4</sup> 2         ftSmith           [VAT         Solum Strong cations         0.00052446         mol. <sup>1,4</sup> 2         ftSmith           [K]         Petasalum         0.000325994         mol. <sup>1,4</sup> 2         ftSmith           [K]         Petasalum         0.000429944         2         ftSmith         1           [K*]         Ferrous ion         1.790678-55         mol. <sup>1,4</sup> 2         ftSmith	[NH,]         Ammonium         7.09487E05         mol.1 <sup>-1</sup> 2         f(Su,k); pH           [NO,]         Nitrate         0.000356972         mol.1 <sup>-1</sup> 2         f(Su,k); pH           [MC,O]         Choronic aid         0.000058972         mol.1 <sup>-1</sup> 2         f(Su,k); pH           [MG <sup>2</sup> ]         Magnesium ion         0.000617157         mol.1 <sup>-1</sup> 2         f(Su,k); pH           [GAT']         Sodium (strong cations)         0.001522416         mol.1 <sup>-1</sup> 2         f(Su,k); pH           [K]         Potasium         0.0004230954         mol.1 <sup>-1</sup> 2         f(Su,k); pH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>-1</sup> 2         f(Su,k); pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [k1]         Proton         6.30957E08         mol. <sup>1</sup> 2         pH           [bt]         Hydroxideion         1.30434E07         mol. <sup>12</sup> 2         pH	[NH <sub>3</sub> ] Free ammonia 4.45681E-07 mol.L <sup>-1</sup> 2 f(S <sub>1196</sub> ); pH	[NH]         Ammonium         7.09487E-05         mol.1 <sup>-1</sup> 2         [Stap:]PH           [NG,]         Nitrate         0.000356972         mol.1 <sup>-1</sup> 2         PH           [HC,G)         Carbonic acid         0.000356972         mol.1 <sup>-1</sup> 2         fts_ab;           [Mg]         Magnetium inn         0.00051757         mol.1 <sup>-1</sup> 2         fts_ab;         PH           [Mg]         Magnetium inn         0.00051757         mol.1 <sup>-1</sup> 2         fts_ab;         PH           [Mg]         Patasium         0.00038416         mol.1 <sup>-1</sup> 2         fts_ab;         PH           [KT]         Patasium         0.00038416         mol.1 <sup>-1</sup> 2         fts_ab;         PH           [KT]         Patasium         0.00038416         mol.1 <sup>-1</sup> 2         fts_ab;         PH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>-1</sup> 2         fts_ab;         PH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>-1</sup> 2         fts_ab;         PH	[NH]         Ammonium         7.094876-05         mol.1 <sup>-1</sup> 2         [Sh_sh_c]H           [NO]         Nitrate         0.00058927         mol.1 <sup>-1</sup> 2         PH           [NA, CA]         Carbonic acid         0.000689861         mol.1 <sup>-1</sup> 2         PH           [MG]         Magnetium ion         0.000681737         mol.1 <sup>-1</sup> 2         PSc_b2         PH           [MC]         Magnetium ion         0.00061737         mol.1 <sup>-1</sup> 2         PSc_b2         PH           [M]         Potasium         0.00052146         mol.1 <sup>-1</sup> 2         PSc_b2         PH           [K1]         Potasium         0.0003848         mol.1 <sup>-1</sup> 2         PSc_b2         PH           [K1]         Potasium         0.00038488         mol.1 <sup>-1</sup> 2         PSc_b2         PH           [Fe <sup>-1</sup> ]         Ferrousion         1.2790678-55         mol.1 <sup>-3</sup> 2         PSc_b2         PH	[NH]         Ammonium         7.094876-05         mol.1 <sup>-1</sup> 2         [Sh_2], PH           [NG)         Nitrate         0.00058921         mol.1 <sup>-1</sup> 2         PH           [NG,0]         Carbonic acid         0.000685861         mol.1 <sup>-1</sup> 2         P[Scol], PH           [Mg2]         Magnetium ion         0.00051757         mol.1 <sup>-1</sup> 2         P[Scol], PH           [CAT)         Solumitation strong cations         0.00052446         mol.1 <sup>-1</sup> 2         P[Scol], PH           [KY]         Potasium         0.00053846         mol.1 <sup>-1</sup> 2         P[Scol], PH           [KY]         Potasium         0.00053846         mol.1 <sup>-1</sup> 2         P[Scol], PH           [KY]         Potasium         0.00053846         mol.1 <sup>-1</sup> 2         P[Scol], PH           [K*]         Fertous ion         1.70677-55         mol.1 <sup>-1</sup> 2         P[Scol], PH	[NH]         Ammonium         7.094876-05         mol.1 <sup>4</sup> 2         [Sh_2]_bPI           [ND_3]         Nitrate         0.00058921         mol.1 <sup>4</sup> 2         PI           [H4,C0]         Carbonic acid         0.000689861         mol.1 <sup>4</sup> 2         PI           [Md]         Magnetium ion         0.000681737         mol.1 <sup>4</sup> 2         PIScip.PH           [Md]         Magnetium ion         0.00068146         mol.1 <sup>4</sup> 2         PIScip.PH           [Md]         Potasium         0.00038364         mol.1 <sup>4</sup> 2         PIScip.PH           [KN]         Potasium         0.00038364         mol.1 <sup>4</sup> 2         PIScip.PH           [M]         Chronic deptongaionsi)         0.00423094         2         PIScip.PH           [M]         Forousion         0.00423094         2         PIScip.PH	[MH,]         Ammonium         7.09487E-05         mol.L <sup>-1</sup> 2         PK           [NG,]         Nitrate         0.00055927         mol.L <sup>-1</sup> 2         pH           [MG,O]         Chronic aidd         0.00005881         mol.L <sup>-1</sup> 2         PK           [Mg <sup>2</sup> ]         Magnesiumion         0.000617157         mol.L <sup>-1</sup> 2         PK <sub>50/2</sub> :pH           [KM]         Sodium (terrog cations)         0.001522416         mol.L <sup>-1</sup> 2         PK <sub>50/2</sub> :pH           [KM]         Polasium         0.0005488         mol.L <sup>-1</sup> 2         PK <sub>50/2</sub> :pH           [KM]         Octoide (strong anions)         0.004230954         mol.L <sup>-1</sup> 2         PK <sub>50/2</sub> :pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [H]         Proton         6.30957E08         mol.1 <sup>3</sup> 2         PH           [UH]         Hydroxideion         1.30145E07         mol.1 <sup>4</sup> 2         PH           [UH]         Examponia         4.656E1677         mol.1 <sup>4</sup> 2         PH		[Price]         permannum         Justifies Color         Color <thcolor< th=""> <thcolor< th="">         Color<td>[Pric]         primonum         / Josep / Evo         Dil.1         Z         Disub_D Pi           [PiQ_0]         Nitrate         0.00055922         mol.1.<sup>4</sup>         2         Pi           [PiQ_0]         Carbonic acid         0.00058561         mol.1.<sup>4</sup>         2         Pisub_D Pi           [Mg]<sup>2</sup>         Magnesiumion         0.00058561         mol.1.<sup>4</sup>         2         Pisub_D Pi           [Mg]<sup>2</sup>         Magnesiumion         0.000512717         mol.1.<sup>4</sup>         2         Pisub_D Pi           [CAT         Solum (strong cations)         0.001522416         mol.1.<sup>4</sup>         2         Pisub_D Pi           [K]         Petasium         0.00038868         mol.1.<sup>4</sup>         2         Pisub_D Pi           [K]         Petasium         0.000438948         mol.1.<sup>4</sup>         2         Pisb_D Pi           [Fe<sup>3</sup>]         Ferrous ion         1.790678:55         mol.1.<sup>4</sup>         2         Pisb_D Pi</td><td>[Pric]         permannum         / Josep 4'=00         Philic         2         P H           [Pric]         Nitrate         0.00055922         mol.1.<sup>4</sup>         2         P H           [Mg]         Magnesiumion         0.00065921         mol.1.<sup>4</sup>         2         P Sup.P H           [Mg]         Magnesiumion         0.000657157         mol.1.<sup>4</sup>         2         P Sup.P H           [Mg]         Magnesiumion         0.000657157         mol.1.<sup>4</sup>         2         P Sup.P H           [Mg]         Magnesiumion         0.000657157         mol.1.<sup>4</sup>         2         P Sup.P H           [Mg]         P stasium         0.000852446         mol.1.<sup>4</sup>         2         P Sup.P H           [K]         P stasium         0.00083848         mol.1.<sup>4</sup>         2         P Sup.P H           [K1]         P stasium         0.00083848         mol.1.<sup>4</sup>         2         P Sup.P H           [Pe<sup>*</sup>]         Ferrous ion         1.790678-55         mol.1.<sup>4</sup>         2         P Sup.P H</td><td>[Pric]         permannum         / Joseps / Evol         Mol, L<sup>2</sup>         Z         P H           [Pric]         Ni Trate         0.00055922         mol, L<sup>3</sup>         Z         P H           [Pric]         Ni Trate         0.00059292         mol, L<sup>3</sup>         Z         P H           [Mg<sup>2</sup>]         Magnesiumion         0.000617577         mol, L<sup>3</sup>         Z         P Stage H           [Mg<sup>2</sup>]         Magnesiumion         0.000517377         mol, L<sup>3</sup>         Z         P Stage H           [CAT         Sodium (strong cations)         0.001522416         mol, L<sup>3</sup>         Z         P Stage H           [K]         Petasaium         0.00038368         mol, L<sup>3</sup>         Z         P Stage H           [K1]         Foroids (strong cations)         0.001232416         mol, L<sup>3</sup>         Z         P Stage H           [Pa<sup>1</sup>]         Ferrous ion         0.00403848         mol, L<sup>3</sup>         Z         P Stage H</td><td>[Print]         perminantum         / Justice / Color         / Justice / Color           [Mo,]         Nitrate         0.00055922         mol.1.<sup>4</sup>         2         PH           [Md]         Magnesium ion         0.00065861         mol.1.<sup>4</sup>         2         If Sc<sub>00</sub>: PH           [Md]<sup>2</sup>         Magnesium ion         0.00065861         mol.1.<sup>4</sup>         2         If Sc<sub>00</sub>: PH           [CAT)         Sodium (strong cations)         0.000522416         mol.1.<sup>4</sup>         2         If Sc<sub>00</sub>: PH           [K1]         Potasium         0.000382446         mol.1.<sup>4</sup>         2         If Sc<sub>00</sub>: PH           [K1]         Oborde (strong anions)         0.004320548         mol.1.<sup>4</sup>         2         If Sc<sub>00</sub>: PH</td></thcolor<></thcolor<>	[Pric]         primonum         / Josep / Evo         Dil.1         Z         Disub_D Pi           [PiQ_0]         Nitrate         0.00055922         mol.1. <sup>4</sup> 2         Pi           [PiQ_0]         Carbonic acid         0.00058561         mol.1. <sup>4</sup> 2         Pisub_D Pi           [Mg] <sup>2</sup> Magnesiumion         0.00058561         mol.1. <sup>4</sup> 2         Pisub_D Pi           [Mg] <sup>2</sup> Magnesiumion         0.000512717         mol.1. <sup>4</sup> 2         Pisub_D Pi           [CAT         Solum (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         Pisub_D Pi           [K]         Petasium         0.00038868         mol.1. <sup>4</sup> 2         Pisub_D Pi           [K]         Petasium         0.000438948         mol.1. <sup>4</sup> 2         Pisb_D Pi           [Fe <sup>3</sup> ]         Ferrous ion         1.790678:55         mol.1. <sup>4</sup> 2         Pisb_D Pi	[Pric]         permannum         / Josep 4'=00         Philic         2         P H           [Pric]         Nitrate         0.00055922         mol.1. <sup>4</sup> 2         P H           [Mg]         Magnesiumion         0.00065921         mol.1. <sup>4</sup> 2         P Sup.P H           [Mg]         Magnesiumion         0.000657157         mol.1. <sup>4</sup> 2         P Sup.P H           [Mg]         Magnesiumion         0.000657157         mol.1. <sup>4</sup> 2         P Sup.P H           [Mg]         Magnesiumion         0.000657157         mol.1. <sup>4</sup> 2         P Sup.P H           [Mg]         P stasium         0.000852446         mol.1. <sup>4</sup> 2         P Sup.P H           [K]         P stasium         0.00083848         mol.1. <sup>4</sup> 2         P Sup.P H           [K1]         P stasium         0.00083848         mol.1. <sup>4</sup> 2         P Sup.P H           [Pe <sup>*</sup> ]         Ferrous ion         1.790678-55         mol.1. <sup>4</sup> 2         P Sup.P H	[Pric]         permannum         / Joseps / Evol         Mol, L <sup>2</sup> Z         P H           [Pric]         Ni Trate         0.00055922         mol, L <sup>3</sup> Z         P H           [Pric]         Ni Trate         0.00059292         mol, L <sup>3</sup> Z         P H           [Mg <sup>2</sup> ]         Magnesiumion         0.000617577         mol, L <sup>3</sup> Z         P Stage H           [Mg <sup>2</sup> ]         Magnesiumion         0.000517377         mol, L <sup>3</sup> Z         P Stage H           [CAT         Sodium (strong cations)         0.001522416         mol, L <sup>3</sup> Z         P Stage H           [K]         Petasaium         0.00038368         mol, L <sup>3</sup> Z         P Stage H           [K1]         Foroids (strong cations)         0.001232416         mol, L <sup>3</sup> Z         P Stage H           [Pa <sup>1</sup> ]         Ferrous ion         0.00403848         mol, L <sup>3</sup> Z         P Stage H	[Print]         perminantum         / Justice / Color         / Justice / Color           [Mo,]         Nitrate         0.00055922         mol.1. <sup>4</sup> 2         PH           [Md]         Magnesium ion         0.00065861         mol.1. <sup>4</sup> 2         If Sc <sub>00</sub> : PH           [Md] <sup>2</sup> Magnesium ion         0.00065861         mol.1. <sup>4</sup> 2         If Sc <sub>00</sub> : PH           [CAT)         Sodium (strong cations)         0.000522416         mol.1. <sup>4</sup> 2         If Sc <sub>00</sub> : PH           [K1]         Potasium         0.000382446         mol.1. <sup>4</sup> 2         If Sc <sub>00</sub> : PH           [K1]         Oborde (strong anions)         0.004320548         mol.1. <sup>4</sup> 2         If Sc <sub>00</sub> : PH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957E08         mol.1 <sup>3</sup> 2         pH           [OH]         Hydroxideion         1.30143E07         mol.1 <sup>4</sup> 2         pH           [MH]         Free ammonia         4.45681E07         mol.1 <sup>4</sup> 2         fK		[No]         Nitrate         0.00356972         mol.t <sup>1</sup> 2         PH           [H,C0]         Carbonic acid         0.000658972         mol.t <sup>1</sup> 2         PH           [Mg <sup>2</sup> )         Magnesiumion         0.000658971         mol.t <sup>1</sup> 2         R5 <sub>00</sub> ); PH           [Mg <sup>2</sup> ]         Magnesiumion         0.000651727         mol.t <sup>1</sup> 2         R5 <sub>00</sub> ; PH           [CAT)         Sodium (strong cations)         0.001522416         mol.t <sup>1</sup> 2         R5 <sub>00</sub> ; PH           [K]         Potassium         0.000383648         mol.t <sup>1</sup> 2         R5 <sub>00</sub> ; PH           [K]         Potassium         0.000383648         mol.t <sup>1</sup> 2         R5 <sub>00</sub> ; PH           [K]         Potassium         0.0004230954         mol.t <sup>1</sup> 2         R5 <sub>00</sub> ; PH           [K <sup>1</sup> ]         Potosion         1.790676-55         mol.t <sup>1</sup> 2         R5 <sub>00</sub> ; PH	Image         Nitrate         0.00356972         mol.t <sup>4</sup> 2         PMH           [Hq,C0]         Carbonic acid         0.00068561         mol.t <sup>4</sup> 2         PH           [Hq,C0]         Carbonic acid         0.00068561         mol.t <sup>4</sup> 2         PStapped           [Mg <sup>2</sup> )         Magnesium ion         0.000615772         mol.t <sup>4</sup> 2         PStapped           [CAT]         Sodium (strong cations)         0.001522416         mol.t <sup>4</sup> 2         PStapped           [K]         Petasium         0.00083868         mol.t <sup>4</sup> 2         PStapped           [K]         Petasium         0.00083868         mol.t <sup>3</sup> 2         PStapped           [K]         Petasium         0.00083868         mol.t <sup>3</sup> 2         PStapped           [K]         Petasium         0.000438948         mol.t <sup>3</sup> 2         PStapped           [Fe <sup>2</sup> ]         Ferrousion         1.790678-55         mol.t <sup>3</sup> 2         PStapped	[No]         Nitrate         0.00356972         mol.t <sup>4</sup> 2         PH           [H,CO]         Carbonic acid         0.00065861         mol.t <sup>4</sup> 2         PH           [Mo] <sup>*</sup> Magnesium ion         0.00065861         mol.t <sup>4</sup> 2         ffSc <sub>00</sub> :pH           [CAT]         Sodium (strong cations)         0.001522416         mol.t <sup>4</sup> 2         ffSc <sub>00</sub> :pH           [CAT]         Sodium (strong cations)         0.00038548         mol.t <sup>4</sup> 2         ffSc <sub>00</sub> :pH           [K]         Petasium         0.00038548         mol.t <sup>4</sup> 2         ffSc <sub>00</sub> :pH           [K]         Petasium         0.00038548         mol.t <sup>4</sup> 2         ffSc <sub>00</sub> :pH           [Fe <sup>1</sup> ]         Ferrous ion         1.790678-55         mol.t <sup>3</sup> 2         ffSc <sub>00</sub> :pH	Image         Nitrate         0.00356972         mol.t <sup>4</sup> 2         PH           [Hq,C0]         Carbonic acid         0.000685861         mol.t <sup>4</sup> 2 $PH$ [Hq,C0]         Carbonic acid         0.000685861         mol.t <sup>4</sup> 2 $PE_{C02}$ [Mg <sup>2</sup> ]         Magnesium ion         0.000685861         mol.t <sup>4</sup> 2 $PE_{C02}$ [CAT]         Sodium (strong cations)         0.001522416         mol.t <sup>4</sup> 2 $PE_{C02}$ [K]         Petasium         0.00088848         mol.t <sup>4</sup> 2 $PE_{C02}$ $PH$ [K]         Petasium         0.00088948         mol.t <sup>4</sup> 2 $PE_{C02}$ $PH$ [K]         Petasium         0.00088948         mol.t <sup>4</sup> 2 $PE_{C02}$ $PH$ [K]         Petasium         0.00088948         mol.t <sup>4</sup> 2 $PE_{C02}$ $PH$ [K]         Petasium         0.00048948         mol.t <sup>4</sup> 2 $PE_{C02}$ $PE_{C02}$ [Fe <sup>2</sup> ]         Ferrous ion         1.790678-55         mol.t <sup>4</sup> 2 $PE_{C02}$ $PE_{C02}$	Link         Distance         Constraint         Constraint           [Mo,]         Nitrate         0.00035972         mol.4         2         ph/m           [Mo,C]         Carbonic acid         0.00068561         mol.14         2         ffSc <sub>0</sub> ): pH           [Mg] <sup>*</sup> Magnesium ion         0.000582712         mol.14         2         ffSc <sub>0</sub> ): pH           [Mg] <sup>*</sup> Magnesium ion         0.0001522416         mol.14         2         ffSc <sub>0</sub> ): pH           [KT]         Sodium (strong cations)         0.00083868         mol.14         2         ffSc <sub>0</sub> ): pH           [KT]         Potasium         0.00083868         mol.14         2         ffSc <sub>0</sub> ): pH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957608         mol.1 <sup>4</sup> 2         pH           [OH]         Hydroxideion         1.301415407         mol.1 <sup>4</sup> 2         pH           [IMH]         Free ammonia         4.45681E07         mol.1 <sup>4</sup> 2         f[Sus], pH		[No,]         Nitrate         0.000356972         mol. <sup>1,4</sup> 2         PH           [N,CQ]         Carbonic acid         0.00068581         mol. <sup>1,4</sup> 2         ffSc <sub>0.0</sub> : pH           [Mg <sup>2</sup> )         Magnesium ion         0.00067575         mol. <sup>1,4</sup> 2         ffSc <sub>0.0</sub> : pH           [CAT]         Sodium (strong cations)         0.001522416         mol. <sup>4</sup> 2         ffSc <sub>0.0</sub> : pH           [K]         Potasium         0.00038368         mol. <sup>1,4</sup> 2         ffSc <sub>0.0</sub> : pH           [K]         Potasium         0.0004230954         mol. <sup>1,4</sup> 2         ffSc <sub>0.0</sub> : pH           [AN]         Chloride (strong anions)         0.004230954         mol. <sup>1,4</sup> 2         ffSc <sub>0.0</sub> : pH           [F4 <sup>T</sup> ]         Ferrous ion         1.790676-55         mol. <sup>1,4</sup> 2         ffSc <sub>0.0</sub> : pH	[No,]         Nitrate         0.000356972         mol. <sup>1,4</sup> 2         pH           [H,QG)         Carbonic acid         0.00045861         mol. <sup>1,4</sup> 2         ftS <sub>col</sub> ; pH           [Mg <sup>2</sup> )         Magnesium inin         0.00015727         mol. <sup>1,4</sup> 2         ftS <sub>col</sub> ; pH           [CAT)         Sodium (strong cations)         0.001522416         mol. <sup>1,4</sup> 2         ftS <sub>col</sub> ; pH           [K]         Potassium         0.00038368         mol. <sup>1,4</sup> 2         ftS <sub>col</sub> ; pH           [K]         Potassium         0.00038368         mol. <sup>1,4</sup> 2         ftS <sub>col</sub> ; pH           [K]         Potassium         0.00043868         mol. <sup>1,4</sup> 2         ftS <sub>col</sub> ; pH           [K]         Potassium         0.00438468         mol. <sup>1,4</sup> 2         ftS <sub>col</sub> ; pH           [K]         Potassium         0.00439054         mol. <sup>1,4</sup> 2         ftS <sub>col</sub> ; pH           [Fe <sup>3</sup> ]         Ferrousion         1.790675:5         mol. <sup>1,4</sup> 2         ftS <sub>col</sub> ; pH	[No,]         Nitrate         0.000356972         mol. <sup>1,4</sup> 2         pH           [M,QC)         Carbonic acid         0.000685861         mol. <sup>1,4</sup> 2         fSc <sub>0</sub> ); pH           [Mg <sup>2</sup> )         Magnetium ion         0.00061572         mol. <sup>1,4</sup> 2         fSc <sub>0</sub> ); pH           [CAT)         Sodium (strong cations)         0.001522416         mol. <sup>1,4</sup> 2         fSc <sub>0</sub> ); pH           [CAT)         Potasium         0.00038848         mol. <sup>1,4</sup> 2         fSc <sub>0</sub> ); pH           [K1)         Choinde (strong anions)         0.00438944         mol. <sup>1,4</sup> 2         fSc <sub>0</sub> ); pH           [Fe <sup>3</sup> ]         Ferrous ion         1.79067855         mol. <sup>1,4</sup> 2         fSc <sub>0</sub> ); pH	[No,]         Nitrate         0.000356972         mol. <sup>1</sup> 2         pH           [H,QG)         Carbonic acid         0.00045861         mol. <sup>1</sup> 2         ftScoll; pH           [Mg <sup>2</sup> )         Magnetismin inin         0.00015127         mol. <sup>1</sup> 2         ftScoll; pH           [CAT)         Sodium (strong cations)         0.001522416         mol. <sup>1</sup> 2         ftSc <sub>0</sub> ; pH           [K]         Potassium         0.00038364         mol. <sup>1</sup> 2         ftSc <sub>0</sub> ; pH           [K]         Potassium         0.00043845         mol. <sup>1</sup> 2         ftSc <sub>0</sub> ; pH           [K]         Potassium         0.00043845         mol. <sup>1</sup> 2         ftSc <sub>0</sub> ; pH           [K]         Potassium         0.0043845         mol. <sup>1</sup> 2         ftSc <sub>0</sub> ; pH           [K]         Potassium         0.0043845         mol. <sup>1</sup> 2         ftSc <sub>0</sub> ; pH           [K]         Potassium         0.0043845         mol. <sup>1</sup> 2         ftSc <sub>0</sub> ; pH	[No.]         Nitrate         0.000355972         mol.1 <sup>-1</sup> 2         pH           [H,Q_0]         Carbonic acid         0.000685861         mol.1 <sup>-1</sup> 2         ftSc <sub>01</sub> , pH           [Mg <sup>2</sup> ]         Magnetium ion         0.000517157         mol.1 <sup>-1</sup> 2         ftSc <sub>01</sub> , pH           [CAT)         Sodium (strong cations)         0.001522416         mol.1 <sup>-1</sup> 2         ftSc <sub>01</sub> , pH           [K <sup>1</sup> ]         Potasium         0.00038648         mol.1 <sup>-1</sup> 2         ftSc <sub>01</sub> , pH           [K <sup>1</sup> ]         Potasium         0.00038648         mol.1 <sup>-1</sup> 2         ftSc <sub>01</sub> , pH
Symbol         None         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957E-08         mol.1 <sup>-1</sup> 2         pH           [DH]         Hydroxide ion         1.301435-07         mol.1 <sup>-1</sup> 2         pH           [MH]         Free ammonia         4.45581E-07         mol.1 <sup>-1</sup> 2         f[Sun_2: pH		[No,1]         Nitrate         0.000356972         mol.1 <sup>-1</sup> 2         pH           [M,CO]         Carbonic acid         0.000458972         mol.1 <sup>-1</sup> 2         fScol); pH           [Mg <sup>2</sup> ]         Magnesium ion         0.00045757         mol.1 <sup>-1</sup> 2         fScol); pH           [CAT]         Sodium (strong cations)         0.0001522416         mol.1 <sup>-1</sup> 2         fScol); pH           [K]         Potasium         0.00038368         mol.1 <sup>-1</sup> 2         fScol); pH           [K]         Potasium         0.0004230954         mol.1 <sup>-1</sup> 2         fScol); pH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>-1</sup> 2         fScol); pH           [F4 <sup>T</sup> ]         Ferrous ion         1.79067655         mol.1 <sup>-1</sup> 2         fScol; pH	[No, ]         Nirate         0.000356972         mol.L <sup>4</sup> 2         pH           [H,Q,G]         Carbonic acid         0.00068861         mol.L <sup>4</sup> 2         fk <sub>col</sub> ; pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000517157         mol.L <sup>4</sup> 2         fk <sub>col</sub> ; pH           [CAT]         Sodium (strong cations)         0.001522416         mol.L <sup>4</sup> 2         f(k <sub>col</sub> ; pH           [K]         Potassium         0.00038368         mol.L <sup>4</sup> 2         f(k <sub>col</sub> ; pH           [K]         Potassium         0.00038368         mol.L <sup>4</sup> 2         f(k <sub>col</sub> ; pH           [K]         Potassium         0.00438468         mol.L <sup>4</sup> 2         f(k <sub>col</sub> ; pH           [K]         Potassium         0.00438468         mol.L <sup>4</sup> 2         f(k <sub>col</sub> ; pH           [K]         Potassium         0.00438468         mol.L <sup>4</sup> 2         f(k <sub>col</sub> ; pH           [Fe <sup>3</sup> ]         Ferousion         1.790676-55         mol.L <sup>4</sup> 2         f(k <sub>col</sub> ; pH	[No,]         Nitrate         0.000356972         mol.1 <sup>4</sup> 2         pH           [Mc,O]         Carbonic acid         0.00068561         mol.1 <sup>4</sup> 2         ffSco); pH           [Mg <sup>2</sup> ]         Magnesium inon         0.000517157         mol.1 <sup>4</sup> 2         ffSco); pH           [CAT)         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         ffSco); pH           [K]         Potassium         0.00038848         mol.1 <sup>4</sup> 2         ffSco); pH           [K]         Potassium         0.000389549         mol.1 <sup>4</sup> 2         ffSco); pH           [K]         Potassium         0.000489549         mol.1 <sup>4</sup> 2         ffSco); pH           [K]         Potassium         0.00489549         mol.1 <sup>4</sup> 2         ffSco); pH           [K]         Potassium         0.00489549         mol.1 <sup>4</sup> 2         ffSco); PH           [K]         Potassium         0.00489549         mol.1 <sup>4</sup> 2         ffSco); PH	[No, ]         Nitrate         0.000356972         mol.1 <sup>4</sup> 2         pH           [Me, C]         Carbonic acid         0.00068861         mol.1 <sup>4</sup> 2         ftSco); pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000517157         mol.1 <sup>4</sup> 2         ftSco); pH           [CAT)         Sodium (strong cations)         0.00151251         mol.1 <sup>4</sup> 2         ftSco); pH           [K]         Potassium         0.00038364         mol.1 <sup>4</sup> 2         ftSco); pH           [K]         Potassium         0.000383648         mol.1 <sup>4</sup> 2         ftSco); pH           [K]         Potassium         0.000438648         mol.1 <sup>4</sup> 2         ftSco); pH           [K]         Potassium         0.00438648         mol.1 <sup>4</sup> 2         ftSco); pH           [K]         Potassium         0.00438648         mol.1 <sup>4</sup> 2         ftSco); pH           [K]         Potassium         0.00438648         mol.1 <sup>4</sup> 2         ftSco); pH	[No.7]         Nitrate         0.000356972         mol.1 <sup>-1</sup> 2         PH           [H,Co.]         Carbonic acid         0.000685861         mol.1 <sup>-3</sup> 2         ftScojl. pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000685861         mol.1 <sup>-3</sup> 2         ftScojl. pH           [CAT)         Sodium (strong cations)         0.001522416         mol.1 <sup>-4</sup> 2         ftScojl. pH           [K1]         Potasium         0.00038668         mol.1 <sup>-4</sup> 2         ftScojl. pH           [K1]         Otoride (strong anions)         0.004320594         mol.1 <sup>-4</sup> 2         ftScjl. pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957E-08         mol.1 <sup>4</sup> 2         pH           [DH]         Hydroxide ion         1.301456-07         mol.1 <sup>4</sup> 2         pH           [MH_]         Free ammonia         4.45581E-07         mol.1 <sup>4</sup> 2         PH		[No,7]         Nitrate         0.000358972         mol.1 <sup>4</sup> 2         pH           [H,CQ]         Carbonic acid         0.000488972         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ; pH           [Mg <sup>2</sup> ]         Magnesium inon         0.00048884         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ; pH           [CAT]         Sodium (strong cations)         0.00038248         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ; pH           [K]         Potasium         0.00038348         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ; pH           [K]         Potasium         0.0004230954         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ; pH           [AN]         Chloride (strong anions)         0.04230954         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ; pH           [F4 <sup>*</sup> ]         Ferous ion         1.79067655         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ; pH	[No,7]         Nitrate         0.000358972         mol.1 <sup>4</sup> 2         PH           [M,CG,]         Carbonic acid         0.000685861         mol.1 <sup>4</sup> 2         fSt <sub>c0</sub> ); PH           [Mg <sup>2</sup> ]         Magnesium ion         0.000658715         mol.1 <sup>4</sup> 2         fSt <sub>c0</sub> ); PH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         fSt <sub>c0</sub> ); PH           [K]         Potassium         0.00033868         mol.1 <sup>4</sup> 2         fSt <sub>c0</sub> ); PH           [K]         Potassium         0.00033054         mol.1 <sup>4</sup> 2         fSt <sub>c0</sub> ); PH           [K]         Potassium         0.00433054         mol.1 <sup>4</sup> 2         fSt <sub>c0</sub> ); PH           [K]         Potassium         0.00433054         mol.1 <sup>4</sup> 2         fSt <sub>c0</sub> ); PH           [K]         Ferousion         1.790676:55         mol.1 <sup>4</sup> 2         fSt <sub>c0</sub> ); PH	[No,7]         Nitrate         0.000358972         mol.1 <sup>4</sup> 2         pH           [H,Co,]         Carbonic acid         0.000685801         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ), pH           [Mg <sup>2</sup> ]         Magnesium ion         0.0006517157         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ), pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ), pH           [K1]         Potassium         0.00038368         mol.4 <sup>4</sup> 2         fS <sub>col</sub> ), pH           [K1]         Potassium         0.00038369         mol.4 <sup>4</sup> 2         fS <sub>col</sub> ), pH           [Fe <sup>3</sup> ]         Ferrous ion         1.790678:55         mol.4 <sup>4</sup> 2         fS <sub>col</sub> ), pH	[No,7]         Nitrate         0.000358972         mol.1 <sup>4</sup> 2         pH           [H,Co,]         Carbonic acid         0.000685801         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ); pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000517157         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ); pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ); pH           [K]         Potassium         0.00038368         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ); pH           [K]         Potassium         0.00038368         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ); pH           [K]         Potassium         0.0043848         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ); pH           [K]         Potassium         0.0043848         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ); pH           [K]         Potassium         0.00423094         -0.01 <sup>4</sup> 2         fS <sub>col</sub> ); pH	[No.7]         Nitrate         0.000355972         mol.1 <sup>4</sup> 2         PH           [H,GD,]         Carbonic acid         0.000558972         mol.1 <sup>4</sup> 2         flS <sub>503</sub> /pH           [Mg <sup>2</sup> ]         Magnetium ion         0.000558972         mol.1 <sup>4</sup> 2         flS <sub>503</sub> /pH           [GAT]         Sodium (storegations)         0.001532416         mol.1 <sup>4</sup> 2         flS <sub>503</sub> /pH           [K1]         Polasium         0.0001532416         mol.1 <sup>4</sup> 2         flS <sub>503</sub> /pH           [K1]         Obioide (strong anions)         0.004230954         mol.1 <sup>4</sup> 2         flS <sub>10</sub> /pH
Symbol         None         Value         Unit         Decimals         Rule         Principle/comment           [IY]         Proton         6.30957E-08         mol.1 <sup>4</sup> 2         pH           [OH]         Hydroxide ion         1.301456-07         mol.1 <sup>4</sup> 2         pH           [INH]         Free ammonia         4.45681E-07         mol.1 <sup>4</sup> 2         pH           [INH]         Free ammonia         4.45681E-07         mol.1 <sup>4</sup> 2         FSmb.pH	1 (All) 7 (Ammonium) 1 7 (DAV75.05)	[No,7]         Nitrate         0.000356972         mol.1 <sup>4</sup> 2         pH           [M,CO,]         Carbonic acid         0.000685801         mol.1 <sup>-1</sup> 2         fl\$c <sub>01</sub> ; pH           [Mg <sup>2</sup> ]         Magnesium inon         0.000685801         mol.1 <sup>-1</sup> 2         fl\$c <sub>01</sub> ; pH           [CAT)         Sodium (strong cations)         0.000352416         mol.1 <sup>-1</sup> 2         fl\$c <sub>02</sub> ; pH           [K]         Potassium         0.00038368         mol.1 <sup>-1</sup> 2         fl\$c <sub>02</sub> ; pH           [K]         Potassium         0.00038368         mol.1 <sup>-1</sup> 2         fl\$c <sub>02</sub> ; pH           [AN]         Chloride [strong anions]         0.004230954         mol.1 <sup>-1</sup> 2         fl\$c <sub>02</sub> ; pH           [F4 <sup>*</sup> ]         Ferous ion         1.79067655         mol.1 <sup>-1</sup> 2         fl\$c <sub>02</sub> ; pH	[No.7]         Nitrate         0.000356972         mol.1. <sup>4</sup> 2         PH           [H,GO]         Carbonic acid         0.00068861         mol.1. <sup>4</sup> 2         fSc <sub>03</sub> ); pH           [Mg <sup>2</sup> ]         Magnesium ion         0.00068861         mol.1. <sup>4</sup> 2         fSc <sub>03</sub> ); pH           [CAT)         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         fSc <sub>03</sub> ); pH           [KT]         Potasium         0.000383648         mol.1. <sup>4</sup> 2         fSc <sub>03</sub> ); pH           [KT]         Potasium         0.00338048         mol.1. <sup>4</sup> 2         fSc <sub>03</sub> ); pH           [Fe <sup>3</sup> T]         Ferousion         1.79067E-55         mol.1. <sup>4</sup> 2         fSc <sub>03</sub> ); pH	[No.7]         Nitrate         0.000356972         mol.1 <sup>4</sup> 2         PH           [Hy,Co,]         Carbonic acid         0.000685861         mol.1 <sup>4</sup> 2         fSc <sub>02</sub> ); pH           [Mg <sup>2</sup> ]         Magnesium ion         0.00065821         mol.1 <sup>4</sup> 2         fSc <sub>02</sub> ); pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         fSc <sub>02</sub> ); pH           [K]         Potassium         0.00038368         mol.1 <sup>4</sup> 2         fSc <sub>02</sub> ); pH           [K]         Potassium         0.000383694         mol.1 <sup>4</sup> 2         fSc <sub>02</sub> ); pH           [K]         Potassium         0.0043848         mol.1 <sup>4</sup> 2         fSc <sub>02</sub> ); pH           [K]         Potassium         0.00438494         mol.1 <sup>4</sup> 2         fSc <sub>02</sub> ); pH           [K]         Potassium         0.00423094         mol.1 <sup>4</sup> 2         fSc <sub>02</sub> ); pH	[No.7]         Nitrate         0.000356972         mol.1 <sup>4</sup> 2         PH           [H,GO]         Carbonic acid         0.000685861         mol.1 <sup>4</sup> 2         fSc <sub>03</sub> ); pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000517157         mol.1 <sup>4</sup> 2         fSc <sub>03</sub> ); pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         fSc <sub>03</sub> ); pH           [K]         Potassium         0.00038368         mol.1 <sup>4</sup> 2         fSc <sub>03</sub> ); pH           [K]         Potassium         0.0043848         mol.1 <sup>4</sup> 2         fSc <sub>03</sub> ); pH           [K]         Potassium         0.0043848         mol.1 <sup>4</sup> 2         fSc <sub>03</sub> ); pH           [K]         Potassium         0.00423849         mol.1 <sup>4</sup> 2         fSc <sub>03</sub> ); pH           [K]         Potassium         0.00423849         mol.1 <sup>4</sup> 2         fSc <sub>03</sub> ); pH	[No.7]         Nirate         0.000356972         mol.1 <sup>4</sup> 2         PH           [H,CG)         Carbonicaid         0.00065861         mol.4 <sup>3</sup> 2         flS <sub>103</sub> :pH           [Mg <sup>2</sup> ]         Magnesium ion         0.00055861         mol.4 <sup>3</sup> 2         flS <sub>103</sub> :pH           [GAT]         Sodium (storegrations)         0.001532416         mol.1 <sup>4</sup> 2         flS <sub>103</sub> :pH           [K1]         Polasium         0.000358468         mol.1 <sup>4</sup> 2         flS <sub>103</sub> :pH           [K1]         Chloride (strong anions)         0.004230954         mol.1 <sup>4</sup> 2         flS <sub>103</sub> :pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957E-08         mol.1 <sup>3</sup> 2         pH           [DM]         Hydroxide ion         1.301452-07         mol.1 <sup>3</sup> 2         pH           [MH]         Free ammonia         4.45581E-07         mol.1 <sup>4</sup> 2         PI		[No,]         Nitrate         0.000356972         mol.t <sup>-1</sup> 2         pH           [H,CQ,]         Carbonic acid         0.000356972         mol.t <sup>-1</sup> 2         fScoj); pH           [Mg <sup>2</sup> ]         Magnesium Ion         0.00005177         mol.t <sup>-1</sup> 2         fScoj); pH           [CAT]         Sodium (strong cations)         0.0001522416         mol.t <sup>-1</sup> 2         fScoj); pH           [K]         Petasium         0.00038368         mol.t <sup>-1</sup> 2         fScoj); pH           [K]         Potasium         0.00038368         mol.t <sup>-1</sup> 2         fScoj); pH           [K]         Potasium         0.0004230954         mol.t <sup>-1</sup> 2         fScoj); pH           [K <sup>2</sup> ]         Petrous ion         1.790676-55         mol.t <sup>-1</sup> 2         fScoj); pH	[No,]         Nitrate         0.000356972         mol.1 <sup>4</sup> 2         pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000687861         mol.4 <sup>4</sup> 2         flscoli.pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000687157         mol.4 <sup>4</sup> 2         flscoli.pH           [CAT]         Sodium (strong cations)         0.001522416         mol.4 <sup>4</sup> 2         flscoli.pH           [K]         Potasuum         0.00038368         mol.4 <sup>4</sup> 2         flscoli.pH           [K]         Potasuum         0.000383688         mol.4 <sup>4</sup> 2         flscoli.pH           [Fe <sup>3</sup> ]         Ferousion         1.790676:55         mol.4 <sup>4</sup> 2         flscoli.pH	[No,]         Nitrate         0.000358972         mol.1 <sup>-1</sup> 2         pH           [Mg,2]         Carbonic acid         0.00068861         no.01.1 <sup>-1</sup> 2         fl\$c <sub>0.0</sub> ;pH           [Mg] <sup>2</sup> Magnesium ion         0.000687157         mol.1 <sup>-1</sup> 2         fl\$c <sub>0.0</sub> ;pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>-1</sup> 2         fl\$c <sub>0.0</sub> ;pH           [K]         Petasium         0.00038868         mol.1 <sup>-1</sup> 2         fl\$c <sub>0.0</sub> ;pH           [K]         Petasium         0.00038997         mol.1 <sup>-1</sup> 2         fl\$c <sub>0.0</sub> ;pH           [K]         Petasium         0.00038998         mol.1 <sup>-1</sup> 2         fl\$c <sub>0.0</sub> ;pH           [K]         Petasium         0.00439984         mol.1 <sup>-1</sup> 2         fl\$c <sub>0.0</sub> ;pH           [K]         Petasium         0.00439994         mol.1 <sup>-1</sup> 2         fl\$c <sub>0.0</sub> ;pH           [Fe <sup>3</sup> T]         Ferrous ion         1.790678-55         mol.1 <sup>-1</sup> 2         fl\$c <sub>0.0</sub> ;pH	[No,]         Nitrate         0.000358972         mol.1 <sup>4</sup> 2         pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000688861         mol.4 <sup>3</sup> 2         flscol; pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000517157         mol.4 <sup>3</sup> 2         flscol; pH           [C4T]         Sodium (strong cations)         0.001522416         mol.4 <sup>3</sup> 2         flsc <sub>0</sub> ; pH           [K]         Potasium         0.00038848         mol.4 <sup>3</sup> 2         flsc <sub>0</sub> ; pH           [K]         Potasium         0.000389548         mol.4 <sup>3</sup> 2         flsc <sub>0</sub> ; pH           [Fe <sup>3</sup> ]         Ferrous ion         1.79067Ex55         mol.4 <sup>3</sup> 2         flsc <sub>0</sub> ; pH	[N0, 1]         Nitrate         0.000356972         mol.1 <sup>-1</sup> 2         PH           [N4,C0,]         Carbonic acid         0.000685861         mol.1 <sup>-1</sup> 2         flscp); PH           [Mg <sup>2</sup> ]         Magnetium inon         0.000651757         mol.1 <sup>-1</sup> 2         flscp); PH           [CAT)         Sodium (strong cations)         0.001522416         mol.1 <sup>-1</sup> 2         flscp); PH           [K1]         Potasium         0.00035468         mol.1 <sup>-1</sup> 2         flscp); PH           [K1]         Potasium         0.000423054         mol.1 <sup>-1</sup> 2         flscp); PH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957608         mol.1 <sup>1</sup> 2         pH           [OH]         Hydroxileion         1.30148507         mol.1 <sup>1</sup> 2         pH           [MH]         Free ammonia         4.4568160         mol.1 <sup>1</sup> 2         fSm.p.pH		[No].         Nitrate         0.00356972         mol.t <sup>4</sup> 2         PH           [HyCo].         Carbonic acid         0.00056972         mol.t <sup>4</sup> 2         PH           [Mg <sup>2</sup> ].         Magnesiumion         0.000681581         mol.t <sup>4</sup> 2         ffSc <sub>02</sub> :pH           [Mg <sup>2</sup> ].         Magnesiumion         0.000617157         mol.t <sup>4</sup> 2         ffSc <sub>02</sub> :pH           [CAT].         Solution (trans cations)         0.000832468         mol.t <sup>4</sup> 2         ffSc <sub>02</sub> :pH           [K].         Potasium         0.000383648         mol.t <sup>4</sup> 2         ffSc <sub>02</sub> :pH           [K].         Diorde (strong anions)         0.004230954         mol.t <sup>4</sup> 2         ffSc <sub>02</sub> :pH           [KaY]         Persous ion         1.790676-55         mol.t <sup>4</sup> 2         ffSc <sub>02</sub> :pH	INITATE         0.00356972         mol.t <sup>4</sup> 2         PMH           [Hy,CQ]         Carbonic acid         0.00058972         mol.t <sup>4</sup> 2         PJH           [Hy,CQ]         Carbonic acid         0.00058972         mol.t <sup>4</sup> 2         PJH           [Mg <sup>2</sup> ]         Magnesiumion         0.00058861         mol.t <sup>4</sup> 2         HS <sub>cob</sub> :PH           [CAT]         Sodium (strong cations)         0.001522416         mol.t <sup>4</sup> 2         HS <sub>cob</sub> :PH           [CAT]         Potasium         0.00038848         mol.t <sup>4</sup> 2         HS <sub>cob</sub> :PH           [CAT]         Potasium         0.000489484         mol.t <sup>4</sup> 2         HS <sub>cob</sub> :PH           [FM]         Chinde(strong anions)         0.004392465         mol.t <sup>4</sup> 2         HS <sub>cob</sub> :PH           [Fe <sup>3</sup> ]         Ferrousion         1.79067E-55         mol.t <sup>4</sup> 2         HS <sub>cob</sub> :PH	Instruction         Instruction         Instruction         Instruction           [No <sub>1</sub> ]         Nitrate         0.00356972         mol.1 <sup>4</sup> 2         PH           [H <sub>2</sub> O <sub>2</sub> ]         Carbonic acid         0.000685861         mol.1 <sup>4</sup> 2         Pls_{col.2}PH           [Mg <sup>2</sup> ]         Magnesiumion         0.000685861         mol.1 <sup>4</sup> 2         fls_{col.2}PH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         fls_{col.2}PH           [K]         Potassium         0.00038848         mol.1 <sup>4</sup> 2         fls_{col.2}PH           [K]         Potassium         0.00038948         mol.1 <sup>4</sup> 2         fls_{col.2}PH           [K]         Potassium         0.0004995494         12         fls_{col.2}PH           [Far]         Ferrous ion         0.004995494         12         fls_{col.2}PH	INITATE         0.00356972         mol.1 <sup>4</sup> 2         PH           [Hy,CQ]         Carbonic acid         0.00058972         mol.1 <sup>4</sup> 2         PH           [Hy,CQ]         Carbonic acid         0.00058972         mol.1 <sup>4</sup> 2         PH           [Mg <sup>2</sup> ]         Magnessium ion         0.000589861         mol.1 <sup>4</sup> 2         ffS <sub>0.01</sub> : PH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         ffS <sub>0.02</sub> : PH           [CAT]         Potasium         0.000383848         mol.1 <sup>4</sup> 2         ffS <sub>0.02</sub> : PH           [K]         Potasium         0.000438448         mol.1 <sup>4</sup> 2         ffS <sub>0.02</sub> : PH           [K]         Potasium         0.000438448         mol.1 <sup>4</sup> 2         ffS <sub>0.02</sub> : PH           [K]         Potasium         0.000439944         0.014 <sup>4</sup> 2         ffS <sub>0.02</sub> : PH           [K]         Potasium         0.000439944         0.014 <sup>4</sup> 2         ffS <sub>0.02</sub> : PH           [Ferrous ion         1.790678:55         mol.1 <sup>4</sup> 2         ffS <sub>0.02</sub> : PH	INitrate         0.000356972         mol.t <sup>4</sup> 2         Permitting           [HyCo]         Carbonic acid         0.000458972         mol.t <sup>4</sup> 2         [Ph]           [Mg2]         Magnesium ion         0.000458861         mol.t <sup>4</sup> 2         [Exp.pH]           [Mg2]         Magnesium ion         0.000458261         mol.t <sup>4</sup> 2         [Exp.pH]           [CAT)         Sodium (storagecations)         0.001522416         mol.t <sup>4</sup> 2         [Exp.pH]           [K1]         Potasium         0.000332648         mol.t <sup>4</sup> 2         [Exp.pH]           [K1]         Oxford (strong anions)         0.00232095         mol.t <sup>4</sup> 2         [Exp.pH]
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957608         mol.1 <sup>4</sup> 2         pH           [OH]         Hydroxideion         1.30143E07         mol.1 <sup>4</sup> 2         pH           [NH]         Free ammonia         4.45681E07         mol.1 <sup>4</sup> 2         fH		Immunu         Avana x < x0         Mol.1         Z         This,p. PH           [Mo, ]         Nitrate         0.00055927         mol.1.*         2         PH           [Md, C]         Carbonic acid         0.00065927         mol.1.*         2         PH           [Md, C]         Magnesiumion         0.00065927         mol.1.*         2         flS <sub>sub</sub> .pH           [Md, C]         Magnesiumion         0.000639246         mol.1.*         2         flS <sub>sub</sub> .pH           [K1]         Potasium         0.00033846         mol.1.*         2         flS <sub>sub</sub> .pH           [K1]         Chloride (strong anions)         0.004230954         mol.1.*         2         flS <sub>sub</sub> .pH           [AN]         Chloride (strong anions)         0.04230954         mol.1.*         2         flS <sub>sub</sub> .pH           [K1]         Persous ion         1.796676-55         mol.1.*         2         flS <sub>sub</sub> .pH	Immunu         //www.rcvo         mol.1*         2         Thum, PH           [MQ_0]         Nitrate         0.00059527         mol.1*         2         PH           [MQ_0]         Carbonic acid         0.00065861         mol.1*         2         PH           [Mg <sup>0</sup> ]         Magnesiumion         0.00065861         mol.1*         2         flSoup.PH           [Mg <sup>0</sup> ]         Magnesiumion         0.0001522416         mol.1*         2         flSoup.PH           [K]         Petasium         0.00038368         mol.1*         2         flSoup.PH           [K]         Petasium         0.00038368         mol.1*         2         flSoup.PH           [K]         Petasium         0.00038368         mol.1*         2         flSoup.PH           [K]         Petasium         0.000439548         mol.1*         2         flSoup.PH           [Fe] <sup>3</sup> Ferrousion         1.790678:55         mol.1*         2         flSoup.PH	[Pre]         perminantum         // Symaple Color         2         P H           [Mo, ]         Nitrate         0.00055922         mol.1 <sup>4</sup> 2         P H           [Mg <sup>2</sup> ]         Magnesiumion         0.000659292         mol.1 <sup>4</sup> 2         flS <sub>sub</sub> : pH           [Mg <sup>2</sup> ]         Magnesiumion         0.000571977         mol.1 <sup>4</sup> 2         flS <sub>sub</sub> : pH           [Mg <sup>2</sup> ]         Magnesiumion         0.000571977         mol.1 <sup>4</sup> 2         flS <sub>sub</sub> : pH           [CAT]         Solum (trans cations)         0.001522416         mol.1 <sup>4</sup> 2         flS <sub>sub</sub> : pH           [K]         Potasium         0.00038368         mol.1 <sup>4</sup> 2         flS <sub>sub</sub> : pH           [K]         Potasium         0.000383648         mol.1 <sup>4</sup> 2         flS <sub>sub</sub> : pH           [K]         Potasium         0.000493594         2         flS <sub>sub</sub> : pH           [K]         Potasium         0.004935946         2         flS <sub>sub</sub> : pH	[Pres]         perminantum         // Jose/FCO         DL1         Z         That, DP           [Mo, ]         Nitrate         0.00059522         m0L1         2         DP           [MgC]         Nitrate         0.00059527         m0L1         2         DP           [MgC]         Magnesiumion         0.00059527         m0L1         2         BS <sub>30</sub> , DH           [MgC]         Magnesiumion         0.00051757         m0L1         2         BS <sub>30</sub> , DH           [CAT)         Soldim (tring cations)         0.001522416         moL1 <sup>4</sup> 2         BS <sub>30</sub> , DH           [K]         Potasium         0.00038368         moL1 <sup>4</sup> 2         BS <sub>30</sub> , DH           [K]         Potasium         0.00038368         moL1 <sup>4</sup> 2         BS <sub>30</sub> , DH           [K]         Potasium         0.000439548         moL1 <sup>4</sup> 2         BS <sub>30</sub> , DH           [K]         Potasium         0.00429594         0.014 <sup>4</sup> 2         BS <sub>30</sub> , DH           [Fe <sup>3</sup> ]         Ferrousion         1.79067855         moL1 <sup>4</sup> 2         BS <sub>30</sub> , DH	[Perg.]         perminsmum         // Jose/E<0         Dit.1         2         Dis.1
Symbol         None         Value         Unit         Decimals         Rule         Principle/comment           [H]         Proton         6.30957608         mol. <sup>13</sup> 2         pH           [OH]         Hydroxideion         1.301458c0 <sup>1</sup> mol. <sup>14</sup> 2         pH           [INH]         Free ammonia         4.45651E07         mol. <sup>14</sup> 2         pH		[Nh], Ammonium         7.09487+05         mol.1 <sup>3</sup> 2         [Sh <sub>mb</sub> , PH           [No], Nitrate         0.00055927         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH           [Nf, CD], Carbonic acid         0.00058961         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH           [Mg]         Magnesium ion         0.00051379         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH           [CAT)         Solum (strong cations)         0.000523446         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH           [K]         Petasium         0.000383468         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH           [AN]         Chloride (strong anions)         0.04230954         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH	[Net, ]         Ammonium         7.09487+05         mol.1 <sup>4</sup> 2         [TS <sub>mb</sub> :PH           [Mo, ]         Nitrate         0.00055927         mol.1 <sup>4</sup> 2         PH           [Mg <sup>2</sup> ]         Magnesiumion         0.00065851         mol.1 <sup>4</sup> 2         ffS <sub>mb</sub> :PH           [Mg <sup>2</sup> ]         Magnesiumion         0.0005272         mol.1 <sup>4</sup> 2         ffS <sub>mb</sub> :PH           [Mg <sup>2</sup> ]         Magnesiumion         0.000522416         mol.1 <sup>4</sup> 2         ffS <sub>mb</sub> :PH           [K]         Potasium         0.00033848         mol.1 <sup>3</sup> 2         ffS <sub>mb</sub> :PH           [K]         Petasium         0.000393946         mol.1 <sup>3</sup> 2         ffS <sub>mb</sub> :PH           [K]         Petasium         0.00039394         mol.1 <sup>3</sup> 2         ffS <sub>mb</sub> :PH           [K]         Petasium         0.00047959         mol.1 <sup>3</sup> 2         ffS <sub>mb</sub> :PH           [Fe <sup>3</sup> ]         Ferrousion         1.79067E55         mol.1 <sup>3</sup> 2         ffS <sub>mb</sub> :PH	[Nut, ]         Ammonium         7.09487+05         mol.1 <sup>4</sup> 2         [Shaub PH           [Nuc, ]         Nitrate         0.00055927         mol.1 <sup>4</sup> 2         PH           [MgC]         Carbonic acid         0.00068561         mol.1 <sup>4</sup> 2         [Shaub PH           [Mg <sup>2</sup> ]         Magnesiumion         0.000687517         mol.1 <sup>4</sup> 2         [Shaub PH           [CAT]         Solum (ktrong cations)         0.001522416         mol.1 <sup>4</sup> 2         [Shaub PH           [K]         Potasium         0.00038248         mol.1 <sup>4</sup> 2         [Shaub PH           [K]         Potasium         0.00038348         mol.1 <sup>4</sup> 2         [Shaub PH           [K]         Potasium         0.00038348         mol.1 <sup>4</sup> 2         [Shaub PH           [K]         Potasium         0.00047955         mol.1 <sup>4</sup> 2         [Shaub PH           [K <sup>2</sup> ]         Perosi Ion         1.79067855         mol.1 <sup>4</sup> 2         [Shaub PH	[Net, ]         Ammonium         7.09487+05         mol.1 <sup>4</sup> 2         [TS <sub>mb</sub> :PH           [Mo, ]         Nitrate         0.00055927         mol.1 <sup>4</sup> 2         PH           [Mg <sup>2</sup> ]         Magnesiumion         0.00065851         mol.1 <sup>4</sup> 2         IfS <sub>mb</sub> :PH           [Mg <sup>2</sup> ]         Magnesiumion         0.000522416         mol.1 <sup>4</sup> 2         IfS <sub>mb</sub> :PH           [K]         Potasium         0.000352416         mol.1 <sup>4</sup> 2         IfS <sub>mb</sub> :PH           [K]         Potasium         0.000352445         mol.1 <sup>4</sup> 2         IfS <sub>mb</sub> :PH           [K]         Potasium         0.000352445         mol.1 <sup>4</sup> 2         IfS <sub>mb</sub> :PH           [K]         Potasium         0.00035364         mol.1 <sup>4</sup> 2         IfS <sub>mb</sub> :PH           [K]         Potasium         0.00047505         mol.1 <sup>4</sup> 2         IfS <sub>mb</sub> :PH           [Fe <sup>3</sup> ]         Ferrous ion         1.79067855         mol.1 <sup>4</sup> 2         IfS <sub>mb</sub> :PH	[NH]         Ammonium         7.09487+05         mol.1 <sup>4</sup> 2         [Sh_m]: PH           [NG]         Nitrate         0.000356972         mol.1 <sup>4</sup> 2         flScol: PH           [MG]         Adobaic acid         0.000356972         mol.1 <sup>4</sup> 2         flScol: PH           [Mg] <sup>*</sup> Magnesiumion         0.00051757         mol.1 <sup>4</sup> 2         flScol: PH           [Mg] <sup>*</sup> Sodium (strong calons)         0.001522416         mol.1 <sup>4</sup> 2         flScol: PH           [KY]         Potasium         0.000354868         mol.1 <sup>4</sup> 2         flScol: PH           [KN]         Chloride (strong anions)         0.004230954         mol.1 <sup>4</sup> 2         flScol: PH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.309576.08         mol.1 <sup>-1</sup> 2         pH           [OH]         Hydroxideion         1.30143E-07         mol.1 <sup>-1</sup> 2         pH           [NH]         Free ammonia         4.45651E-07         mol.1 <sup>-1</sup> 2         fH		[Net, ]         JAMMONIUM         JUMP874-05         mol.1 <sup>1</sup> 2         T Staub, PH           [Mo, ]         Nitrate         0.00055957         mol.1 <sup>1</sup> 2         PH           [Md Z]         Magnesium ion         0.000659561         mol.1 <sup>1</sup> 2         ftStojb, PH           [Md Z]         Magnesium ion         0.000517357         mol.1 <sup>1</sup> 2         ftStojb, PH           [CAT]         Sodium Krong cations)         0.000517346         mol.1 <sup>1</sup> 2         ftStojb, PH           [KA]         Potasium         0.000352416         mol.1 <sup>11</sup> 2         ftStojb, PH           [KA]         Chloride (strong anions)         0.0004230954         mol.1 <sup>11</sup> 2         ftStojb, PH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>11</sup> 2         ftStojb, PH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>11</sup> 2         ftStojb, PH	[Net, j]         JAMMONIUM         JUMP8 / 4-05         mol.1 <sup>-1</sup> 2         T Shug, PH           [No, j]         Nitrate         0.00055927         mol.1 <sup>-1</sup> 2         PH           [Mg <sup>2</sup> )         Magnesiumion         0.000651861         mol.1 <sup>-1</sup> 2         ffSc <sub>10</sub> , pH           [Mg <sup>2</sup> ]         Magnesiumion         0.000651757         mol.1 <sup>-1</sup> 2         ffSc <sub>10</sub> , pH           [CAT)         Sodium (trang cations)         0.0016212416         mol.1 <sup>-1</sup> 2         ffSc <sub>10</sub> , pH           [K]         Potasium         0.00038368         mol.1 <sup>-1</sup> 2         ffSc <sub>10</sub> , pH           [K]         Potasium         0.00038368         mol.1 <sup>-1</sup> 2         ffSc <sub>10</sub> , pH           [K]         Potasium         0.00038368         mol.1 <sup>-1</sup> 2         ffSc <sub>10</sub> , pH           [Fe <sup>3</sup> ]         Ferrousion         1.790678-55         mol.1 <sup>-1</sup> 2         ffSc <sub>10</sub> , pH	[Net, j]         JAMMONIUM         JUMPS X+05         mol.1 <sup>1</sup> 2         T Stag. PH           [Mo, J]         Intrate         0.00055927         mol.1 <sup>4</sup> 2         PH           [Mg <sup>2</sup> ]         Magnesiumion         0.000657851         mol.1 <sup>4</sup> 2         ffStag. PH           [Mg <sup>2</sup> ]         Magnesiumion         0.0005727         mol.1 <sup>4</sup> 2         ffStag. PH           [Mg <sup>2</sup> ]         Magnesiumion         0.00067177         mol.1 <sup>4</sup> 2         ffStag. PH           [CAT]         Solum (krong cations)         0.001522416         mol.1 <sup>4</sup> 2         ffStag. PH           [K]         Potasium         0.00038348         mol.1 <sup>4</sup> 2         ffStag. PH           [K]         Potasium         0.00038348         mol.1 <sup>4</sup> 2         ffStag. PH           [K]         Potasium         0.00479555         mol.1 <sup>4</sup> 2         ffStag. PH           [K <sup>2</sup> ]         Ferrous ion         1.79067855         mol.1 <sup>4</sup> 2         ffStag. PH	[Net, j]         JAMMONIUM         JUMPS X+05         mol.1 <sup>1</sup> 2         T Stage, PH           [No, j]         Nitrate         0.00055927         mol.1 <sup>4</sup> 2         PH           [Mg <sup>2</sup> ]         Magnesiumion         0.000657851         mol.1 <sup>4</sup> 2         ffScage, PH           [Mg <sup>2</sup> ]         Galum (trans cations)         0.00057157         mol.1 <sup>4</sup> 2         ffScage, PH           [Mg <sup>2</sup> ]         Magnesiumion         0.00057157         mol.1 <sup>4</sup> 2         ffScage, PH           [Mg <sup>2</sup> ]         Magnesiumion         0.000532446         mol.1 <sup>4</sup> 2         ffScage, PH           [K]         Potasium         0.00033848         mol.1 <sup>4</sup> 2         ffScage, PH           [K]         Potasium         0.000339548         mol.1 <sup>4</sup> 2         ffScage, PH           [K]         Potasium         0.00439548         mol.1 <sup>4</sup> 2         ffScage, PH           [K]         Potasium         0.00439548         mol.1 <sup>4</sup> 2         ffScage, PH           [K]         Potasium         0.00429595         mol.1 <sup>4</sup> 2         ffScage, PH	[Net, ]         Ammonium         Auses x+o5         mol.1 <sup>+</sup> 2         T Sin_b, PH           [No, ]         Nitrate         0.00058592         mol.1 <sup>+</sup> 2         PH           [Nd, ]         Nitrate         0.00058581         mol.1 <sup>+</sup> 2         If Sin_b, PH           [Md] <sup>+</sup> Magnesiumion         0.00068581         mol.1 <sup>+</sup> 2         If Sin_b, PH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>+1</sup> 2         If Sin_b, PH           [K1]         Potasium         0.00033648         mol.1 <sup>+1</sup> 2         If Sin_b, PH           [K1]         Obinde (strong anions)         0.00233054         mol.1 <sup>+1</sup> 2         If Sin_b, PH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957E08         mol.1 <sup>1</sup> 2         pH           [GH]         Hydroxideion         1.30148E07         mol.1 <sup>1</sup> 2         pH           [HM]         Free ammonia         4.4568E67         mol.1 <sup>1</sup> 2         fSp.		Instance         District         2         Plant           [Mo_0]         Nitrate         0.00056972         mol.1 <sup>4</sup> 2         pH           [Mg_0]         Carbonic acid         0.00068581         mol.1 <sup>4</sup> 2         ffScol_bH           [Mg] <sup>2</sup> Magnesiumion         0.000617157         mol.1 <sup>4</sup> 2         ffScol_bH           [CAT]         Sodum (trong cations)         0.000122416         mol.1 <sup>4</sup> 2         ffScol_bH           [K]         Potasium         0.00033848         mol.1 <sup>4</sup> 2         ffScol_bH           [K]         Detasium         0.00033848         mol.1 <sup>4</sup> 2         ffScol_bH           [K]         Personision         0.0004230954         mol.1 <sup>4</sup> 2         ffScol_bH           [K <sup>4</sup> ]         Ferrousion         0.094230954         mol.1 <sup>4</sup> 2         ffScol_bH	Intrade         0.000356972         mol.1         2         Phil           [Hy,Q]         Nirrate         0.000556972         mol.1         2 $phi$ [Hy,Q]         Carbonic acid         0.000558972         mol.1         2 $phi$ [Mg <sup>2</sup> ]         Magnesiumion         0.00058581         mol.1         2 $ffS_{coll}$ : pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1         2 $ffS_{coll}$ : pH           [K]         Petasium         0.000383648         mol.1         2 $ffS_{coll}$ : pH           [K]         Petasium         0.000383648         mol.1         2 $ffS_{coll}$ : pH           [K]         Petasium         0.000438948         mol.1         2 $ffS_{coll}$ : pH           [K]         Petasium         0.000438948         mol.1         2 $ffS_{coll}$ : pH           [K]         Petasium         0.000438948         mol.1         2 $ffS_{coll}$ : pH           [K]         Petasium         0.004230954         mol.1         2 $ffS_{coll}$ : pH           [Fe <sup>2</sup> ]         Ferrousion         1.790678:55         mol.1         2 $ffS_{coll}$ : pH <td>Instance         Description         Description           [Mo,7]         Nitrate         0.00056972         mol.1 * 2         <math>pH</math>           [Mo,7]         Nitrate         0.00056972         mol.1 * 2         <math>pH</math>           [Mo,7]         Nitrate         0.00058972         mol.1 * 2         <math>pH</math>           [Mg*]         Magnesium ion         0.00058972         mol.1 * 2         <math>f(S_{cult}) pH</math>           [GAT]         Sodium (strong cations)         0.001522416         mol.1 * 2         <math>f(S_{cult}) pH</math>           [K]         Potasium         0.00038368         mol.1 * 2         <math>f(S_{cult}) pH</math>           [K]         Potasium         0.00039394         mol.1 * 2         <math>f(S_{cult}) pH</math>           [K]         Potasium         0.00039394         mol.1 * 2         <math>f(S_{cult}) pH</math>           [K]         Potasium         0.00043994         mol.1 * 2         <math>f(S_{cult}) pH</math>           [Fe]*         Ferrous ion         1.790678-55         mol.1 * 2         <math>f(S_{cult}) pH</math></td> <td>Intrate         0.00056972         mol.1         2         PhH           [H,Q_0]         Carbonic acid         0.00056972         mol.1.<sup>4</sup>         2         <math>PH</math>           [H,Q_0]         Carbonic acid         0.00058972         mol.1.<sup>4</sup>         2         <math>PH</math>           [Mg<sup>1</sup>)         Magnesium ion         0.00058861         mol.1.<sup>4</sup>         2         <math>PI_{S_{20},PH}</math>           [CAT]         Sodium (strong cations)         0.001522416         mol.1.<sup>4</sup>         2         <math>PI_{S_{20},PH}</math>           [K]         Potasium         0.00038848         mol.1.<sup>4</sup>         2         <math>PI_{S_{20},PH}</math>           [K]         Potasium         0.00039848         mol.1.<sup>4</sup>         2         <math>PI_{S_{20},PH}</math>           [K]         Potasium         0.00049944         2         <math>PI_{S_{20},PH}</math>           [K]         Potasium         0.00049944         2         <math>PI_{S_{20},PH}</math>           [Far]         Ferrous ion         1.790678-55         mol.1<sup>4</sup>         2         <math>PI_{S_{20},PH}</math></td> <td>[Ho_1]         Nitrate         0.00058072         mol.t<sup>-1</sup>         2         Phil           [Hy_C0]         Carbonic acid         0.000585072         mol.t<sup>-1</sup>         2         Phil           [Hy_C0]         Carbonic acid         0.000585072         mol.t<sup>-1</sup>         2         Hy_C0           [Mg<sup>2</sup>)         Magnesium ion         0.00058501         mol.t<sup>-1</sup>         2         Hy_C0+H           [CAT)         Sodium (storag cations)         0.001522416         mol.t<sup>-1</sup>         2         Hy_C0+H           [K1]         Potasium         0.00038368         mol.t<sup>-1</sup>         2         Hy_C0+H           [K1]         Oboride (strong anions)         0.00233056         mol.t<sup>-1</sup>         2         Hy_C0+H</td>	Instance         Description         Description           [Mo,7]         Nitrate         0.00056972         mol.1 * 2 $pH$ [Mo,7]         Nitrate         0.00056972         mol.1 * 2 $pH$ [Mo,7]         Nitrate         0.00058972         mol.1 * 2 $pH$ [Mg*]         Magnesium ion         0.00058972         mol.1 * 2 $f(S_{cult}) pH$ [GAT]         Sodium (strong cations)         0.001522416         mol.1 * 2 $f(S_{cult}) pH$ [K]         Potasium         0.00038368         mol.1 * 2 $f(S_{cult}) pH$ [K]         Potasium         0.00039394         mol.1 * 2 $f(S_{cult}) pH$ [K]         Potasium         0.00039394         mol.1 * 2 $f(S_{cult}) pH$ [K]         Potasium         0.00043994         mol.1 * 2 $f(S_{cult}) pH$ [Fe]*         Ferrous ion         1.790678-55         mol.1 * 2 $f(S_{cult}) pH$	Intrate         0.00056972         mol.1         2         PhH           [H,Q_0]         Carbonic acid         0.00056972         mol.1. <sup>4</sup> 2 $PH$ [H,Q_0]         Carbonic acid         0.00058972         mol.1. <sup>4</sup> 2 $PH$ [Mg <sup>1</sup> )         Magnesium ion         0.00058861         mol.1. <sup>4</sup> 2 $PI_{S_{20},PH}$ [CAT]         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2 $PI_{S_{20},PH}$ [K]         Potasium         0.00038848         mol.1. <sup>4</sup> 2 $PI_{S_{20},PH}$ [K]         Potasium         0.00039848         mol.1. <sup>4</sup> 2 $PI_{S_{20},PH}$ [K]         Potasium         0.00049944         2 $PI_{S_{20},PH}$ [K]         Potasium         0.00049944         2 $PI_{S_{20},PH}$ [Far]         Ferrous ion         1.790678-55         mol.1 <sup>4</sup> 2 $PI_{S_{20},PH}$	[Ho_1]         Nitrate         0.00058072         mol.t <sup>-1</sup> 2         Phil           [Hy_C0]         Carbonic acid         0.000585072         mol.t <sup>-1</sup> 2         Phil           [Hy_C0]         Carbonic acid         0.000585072         mol.t <sup>-1</sup> 2         Hy_C0           [Mg <sup>2</sup> )         Magnesium ion         0.00058501         mol.t <sup>-1</sup> 2         Hy_C0+H           [CAT)         Sodium (storag cations)         0.001522416         mol.t <sup>-1</sup> 2         Hy_C0+H           [K1]         Potasium         0.00038368         mol.t <sup>-1</sup> 2         Hy_C0+H           [K1]         Oboride (strong anions)         0.00233056         mol.t <sup>-1</sup> 2         Hy_C0+H
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M']         Proton         6.30957E08         mol.1 <sup>4</sup> 2         pH           [DM]         Hydroxideion         1.301435407         mol.1 <sup>4</sup> 2         pH           [MM]         Free ammonia         4.45681E07         mol.1 <sup>4</sup> 2         f[Sus], pH		[No <sub>3</sub> ]         Nitrate         0.00035972         mol. <sup>4</sup> 2         pH           [H <sub>2</sub> O <sub>3</sub> ]         Carbonic acid         0.000685861         mol.1 <sup>4</sup> 2         fK <sub>203</sub> ): pH           [Mg <sup>2</sup> )         Magnesiumion         0.000685861         mol.1 <sup>4</sup> 2         fK <sub>203</sub> ): pH           [Mg <sup>2</sup> ]         Magnesiumion         0.0001522416         mol.1 <sup>4</sup> 2         fK <sub>203</sub> ; pH           [CAT)         Sodium (strong cations)         0.000383648         mol.1 <sup>4</sup> 2         fK <sub>203</sub> ; pH           [K]         Potasium         0.000383648         mol.1 <sup>4</sup> 2         fK <sub>203</sub> ; pH           [K1]         Chloride (strong anions)         0.004230954         mol.1 <sup>4</sup> 2         fK <sub>204</sub> ; pH           [F4 <sup>3</sup> ]         Ferrous ion         1.796076-55         mol.1 <sup>4</sup> 2         fK <sub>204</sub> ; pH	Nitrate         0.000356972         mol.1 <sup>-4</sup> 2         pH           [HyCQ]         Carbonic acid         0.00045861         mol.1 <sup>-4</sup> 2         ftSc <sub>0</sub> ): pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000658561         mol.1 <sup>-4</sup> 2         ftSc <sub>0</sub> ): pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>-4</sup> 2         ftSc <sub>0</sub> ): pH           [K]         Potassium         0.000383648         mol.1 <sup>-4</sup> 2         ftSc <sub>0</sub> ): pH           [K]         Potassium         0.000383648         mol.1 <sup>-4</sup> 2         ftSc <sub>0</sub> ): pH           [K]         Potassium         0.000439549         mol.1 <sup>-4</sup> 2         ftSc <sub>0</sub> ): pH           [K]         Potassium         0.000439549         mol.1 <sup>-4</sup> 2         ftSc <sub>0</sub> ): pH           [K]         Potassium         0.000439509         mol.1 <sup>-4</sup> 2         ftSc <sub>0</sub> ): pH           [Fe <sup>3</sup> ]         Ferrousion         1.790676:55         mol.1 <sup>-4</sup> 2         ftSc <sub>0</sub> ): pH	[No <sub>2</sub> ]         Nitrate         0.000356972         mol. <sup>1,4</sup> 2         pH           [HyCO]         Carbonic acid         0.00068561         mol.1,4         2         fK <sub>CO2</sub> ):pH           [Mg <sup>2</sup> ]         Magnesium ion         0.00061577         mol.1,4         2         fK <sub>SO2</sub> ):pH           [CAT]         Sodium (strong cations)         0.0001522416         mol.1,4         2         fK <sub>SO2</sub> ):pH           [CAT]         Sodium (strong cations)         0.0001522416         mol.1,4         2         fK <sub>SO2</sub> ):pH           [CAT]         Potasium         0.000383648         mol.1,4         2         fK <sub>SO2</sub> ):pH           [CAT]         Formosion         0.000493944         2         fK <sub>SO2</sub> ):pH           [Fat]         Formosion         0.00493944         2         fK <sub>SO2</sub> ):pH	[No <sub>2</sub> ]         Nitrate         0.000356972         mol. <sup>1,4</sup> 2         pH           [HyCO]         Carbonic acid         0.000685861         mol.1,4         2         ftSc <sub>02</sub> ):pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000685861         mol.1,4         2         ftSc <sub>02</sub> ):pH           [CAT]         Sodium (strong cations)         0.0001522416         mol.1,4         2         ftSc <sub>02</sub> ):pH           [CAT]         Potasium         0.000383648         mol.1,4         2         ftSc <sub>02</sub> ):pH           [K]         Potasium         0.0004382648         mol.1,4         2         ftSc <sub>02</sub> ):pH           [K]         Potasium         0.0004389468         mol.1,4         2         ftSc <sub>02</sub> ):pH           [K]         Potasium         0.000438948         mol.1,4         2         ftSc <sub>02</sub> ):pH           [K]         Potasium         0.000438948         mol.1,4         2         ftSc <sub>02</sub> ):pH           [Ferrous ion         1.790678:55         mol.1,4         2         ftSc <sub>02</sub> ):pH	[No,]         Nitrate         0.000356972         mol. <sup>1,4</sup> 2         pH           [H,CO,]         Carbonic acid         0.000685861         mol.1,4         2         ftxcs); pH           [Mg <sup>2</sup> ]         Magnesium ion         0.00015727         mol.1,4         2         ftxcs); pH           [CAT)         Sodium (strong cations)         0.0001522416         mol.1,4         2         ftxcs); pH           [KT]         Potasium         0.000338648         mol.1,4         2         ftxcs); pH           [KT]         Potasium         0.000338648         mol.1,4         2         ftxcs); pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [W]         Proton         6.309576.08         mol.1 <sup>3</sup> 2         pH           [OH]         Hydroxide ion         1.3014567         mol.1 <sup>3</sup> 2         pH           [NH]         Free ammonia         4.45681607         mol.1 <sup>4</sup> 2         H		[No,]         Nitrate         0.000356972         mol. <sup>4</sup> 2         pH           [Ni,Co]         Carbonic acid         0.000685861         mol. <sup>4</sup> 2         fSc <sub>0.0</sub> : pH           [Mg <sup>1</sup> )         Magnesium ion         0.00061757         mol. <sup>4</sup> 2         fSc <sub>0.0</sub> : pH           [Mg <sup>1</sup> )         Magnesium ion         0.00061757         mol. <sup>4</sup> 2         fSc <sub>0.0</sub> : pH           [CAT)         Sodium (strong cations)         0.0001522416         mol. <sup>4</sup> 2         fSc <sub>0.0</sub> : pH           [K]         Potassium         0.00038368         mol. <sup>1</sup> 2         fSc <sub>0.0</sub> : pH           [K]         Potassium         0.0004230954         mol. <sup>1</sup> 2         fSc <sub>0.0</sub> : pH           [K <sup>2</sup> ]         Potassium         0.0024230954         mol. <sup>1</sup> 2         fSc <sub>0.0</sub> : pH           [K <sup>2</sup> ]         Potassion         1.79067455         mol. <sup>1</sup> 2         fS <sub>0.0</sub> : pH	[No,]         Nirate         0.000356972         mol. <sup>4</sup> 2         pH           [H(C0)]         Carbonic acid         0.00045861         mol. <sup>4</sup> 2         ftS <sub>col</sub> , pH           [Mg <sup>2</sup> ]         Magnesium ion         0.00045757         mol. <sup>4</sup> 2         ftS <sub>col</sub> , pH           [CAT)         Sodium (strong cations)         0.001522416         mol. <sup>4</sup> 2         ftS <sub>col</sub> , pH           [K1]         Potasium         0.00038648         mol. <sup>4</sup> 2         ftS <sub>col</sub> , pH           [K1]         Potasium         0.00038648         mol. <sup>4</sup> 2         ftS <sub>col</sub> , pH           [Fe <sup>3</sup> ]         Ferousion         1.790676:55         mol. <sup>4</sup> 2         ftS <sub>col</sub> , pH	[No,]         Nitrate         0.000356972         mol.1 <sup>A</sup> 2         pH           [P(CQ)         Carbonic acid         0.000685861         mol.1 <sup>A</sup> 2         fSc <sub>0</sub> ); pH           [Mg <sup>2</sup> )         Magnesium ion         0.00061572         mol.1 <sup>A</sup> 2         fSc <sub>0</sub> ); pH           [CAT)         Sodium (strong cations)         0.000522416         mol.1 <sup>A</sup> 2         fSc <sub>0</sub> ; pH           [CAT)         Potasium         0.00038848         mol.1 <sup>A</sup> 2         fSc <sub>0</sub> ; pH           [AN)         Choinde strong anions)         0.00043994         mol.1 <sup>A</sup> 2         fSc <sub>0</sub> ; pH           [Fe7 <sup>3</sup> ]         Ferrousion         1.79067855         mol.4 <sup>A</sup> 2         fSc <sub>0</sub> ; pH	[No,]         Nirate         0.000356972         mol. <sup>4</sup> 2         pH           [P(Q)]         Carbonic acid         0.00045861         mol. <sup>4</sup> 2         ffS <sub>col</sub> ; pH           [Mg <sup>2</sup> )         Magnesium ion         0.00045757         mol. <sup>4</sup> 2         ffS <sub>col</sub> ; pH           [CAT)         Sodium (strong cations)         0.001522416         mol. <sup>4</sup> 2         ffS <sub>col</sub> ; pH           [K]         Potassium         0.00038848         mol. <sup>4</sup> 2         ffS <sub>col</sub> ; pH           [K]         Potassium         0.000489598         mol. <sup>4</sup> 2         ffS <sub>col</sub> ; pH           [K]         Potassium         0.00048959         mol. <sup>4</sup> 2         ffS <sub>col</sub> ; pH           [K]         Potassium         0.00048959         mol. <sup>4</sup> 2         ffS <sub>col</sub> ; pH           [Fe <sup>3</sup> ]         Ferrousion         1.790676:55         mol. <sup>4</sup> 2         ffS <sub>col</sub> ; pH	[No.]         Nirate         0.000356972         mol.1 <sup>-1</sup> 2         pH           [H,Co.]         Carbonic acid         0.000468581         mol.1 <sup>-1</sup> 2         ftSc <sub>03</sub> ), pH           [Mg <sup>2</sup> ]         Mignetium inion         0.000157157         mol.1 <sup>-1</sup> 2         ftSc <sub>03</sub> ), pH           [Kd <sup>2</sup> ]         Sodium (strong cations)         0.001522416         mol.1 <sup>-1</sup> 2         ftSc <sub>03</sub> ), pH           [K <sup>1</sup> ]         Potasium         0.000383648         mol.1 <sup>-1</sup> 2         ftSc <sub>03</sub> ), pH           [K <sup>1</sup> ]         Potasium         0.0003830648         mol.1 <sup>-1</sup> 2         ftSc <sub>03</sub> ), pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [IY]         Proton         6.30597E.08         mol.12         2         pH           [OH]         Hydroxide ion         1.3014857         mol.12         2         pH           [INH]         Free ammonia         4.45681E07         mol.12         2         fH           [INH]         Tomogram         2.0642765         mol.12         2         fSt_wb.pH	[NH-3] [Ammonium] [ 7.09487E-05] mol 1 <sup>-1</sup> [ 2 [ ffS]; pH ]	[No,7]         Nirate         0.000358972         mol.1 <sup>4</sup> 2         pH           [H,CO]         Carbonic acid         0.000485861         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ; pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000485861         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ; pH           [CAT)         Sodium (strong cations)         0.000352416         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ; pH           [K]         Potasium         0.00038368         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ; pH           [K]         Potasium         0.0004230954         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ; pH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>4</sup> 2         fS <sub>col</sub> ; pH	[N0,7]         Nitrate         0.000358972         mol.1 <sup>4</sup> 2         PH           [H,C0,]         Carbonic acid         0.000688861         mol.1 <sup>4</sup> 2         fSt <sub>c0</sub> ); pH           [M4] <sup>2</sup> Mkgreisum ion         0.000157157         mol.1 <sup>4</sup> 2         fSt <sub>c0</sub> ); pH           [CAT         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         fSt <sub>c0</sub> ); pH           [K1]         Potassium         0.000383068         mol.1 <sup>4</sup> 2         fSt <sub>c0</sub> ); pH           [K2]         Potassium         0.000383068         mol.1 <sup>4</sup> 2         fSt <sub>c0</sub> ); pH           [K2]         Potassium         0.00433054         mol.1 <sup>4</sup> 2         fSt <sub>c0</sub> ); pH           [K4]         Forousion         1.790676:55         mol.1 <sup>4</sup> 2         fSt <sub>c0</sub> ); pH	[N0,7]         Nitrate         0.000358972         mol.1 <sup>4</sup> 2         pH           [H,C0,]         Carbonic acid         0.000685861         mol.1 <sup>4</sup> 2         fts <sub>col</sub> ; pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000151757         mol.1 <sup>4</sup> 2         fts <sub>col</sub> ; pH           [CAT         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         fts <sub>col</sub> ; pH           [K1         Potasium         0.00038648         mol.4 <sup>4</sup> 2         fts <sub>col</sub> ; pH           [K1         Choinde (strong anions)         0.00439249         mol.1 <sup>4</sup> 2         fts <sub>col</sub> ; pH           [Fe <sup>3</sup> ]         Ferrousion         1.79067E55         mol.4 <sup>4</sup> 2         fts <sub>col</sub> ; pH	[N0,7]         Nitrate         0.000358972         mol.1 <sup>4</sup> 2         pH           [H,C0,]         Carbonic acid         0.000688861         mol.1 <sup>4</sup> 2         fStop); pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000157157         mol.1 <sup>4</sup> 2         fStop); pH           [CAT)         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         fStop); pH           [K1]         Potassium         0.00038848         mol.1 <sup>4</sup> 2         fStop); pH           [K2]         Potassium         0.00038946         mol.1 <sup>4</sup> 2         fStop); pH           [K2]         Potassium         0.00048946         mol.1 <sup>4</sup> 2         fStop); pH           [K6]         Potassium         0.00428945         mol.1 <sup>4</sup> 2         fStop; pH           [K6]         Potassium         0.00428945         mol.1 <sup>4</sup> 2         fStop; PH	[No,7]         Nitrate         0.000356972         mol.1 <sup>4</sup> 2         PH           [H,CO]         Carbonic acid         0.0000586971         mol.1 <sup>4</sup> 2         flSc <sub>00</sub> ); pH           [Mg <sup>2</sup> ]         Magnetium inon         0.000617137         mol.1 <sup>4</sup> 2         flSc <sub>00</sub> ; pH           [CAT)         Sodium (strong cations)         0.001532416         mol.1 <sup>4</sup> 2         flSc <sub>00</sub> ; pH           [K]         Petawim         0.00035468         mol.1 <sup>4</sup> 2         flSc <sub>00</sub> ; pH           [K]         Ocide (strong anions)         0.004230954         mol.1 <sup>4</sup> 2         flS <sub>00</sub> ; pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [µ"]         Proton         6.3055760 & mol.1 <sup>10</sup> 2         pit           (QM)         Hydroxideion         1.30184.07 mol.1 <sup>10</sup> 2         pit           [NM]         Free ammonia         4.45681607 mol.1 <sup>10</sup> 2         pit           [NN], J         Free ammonia         4.45681607 mol.1 <sup>10</sup> 2         fitsmuch pit	[NH <sub>4</sub> ]  Ammonium 7.09487E-05 mol.L <sup>-1</sup> 2 f(S <sub>Nib</sub> ); pH	INO_0         Nitrate         0.000356972         mol.1         2         pH           IR_CO         Carbonic acid         0.000356872         mol.1         2         ft_{Sub}           IM_0 <sup>+</sup> Magnesium ion         0.00015857         mol.1         2         ft_{Sub}         PH           IM_0 <sup>+</sup> Magnesium ion         0.00015175         mol.1         2         ft_{Sub}         PH           IK1         Solumi Strong cationsi         0.00012416         mol.1         2         ft_{Sub}         PH           IK1         Potasium         0.00038648         mol.1         2         ft_{Sub}         PH           IK1         Potasium         0.000423054         mol.1         2         ft_{Sub}         PH           IK1         Chioride (strong anions)         0.00423054         mol.1         2         ft_{Sub}         PH           IFe <sup>1</sup> Fersos ion         1.79067755         mol.1         2         ft_{Sub}         PH	[No.7]         Wirzle         0.000356972         mol.1 <sup>4</sup> 2         pH           [H,C0]         Carbonic acid         0.00035681         mol.1 <sup>4</sup> 2         fStap:pH           [Mg <sup>2</sup> ]         Magnesium ion         0.00052416         mol.1 <sup>4</sup> 2         fStap:pH           [CAT]         Sodium (strong cations)         0.001532416         mol.1 <sup>4</sup> 2         fStap:pH           [K1]         Potassium         0.00033648         mol.1 <sup>4</sup> 2         fStap:pH           [K2]         Potassium         0.00033648         mol.1 <sup>4</sup> 2         fStap:pH           [K2]         Potassium         0.00033648         mol.1 <sup>4</sup> 2         fStap:pH           [K4]         Christian         0.00033648         mol.1 <sup>4</sup> 2         fStap:pH           [K4]         Potassium         0.00033648         mol.1 <sup>4</sup> 2         fStap:pH           [Fe <sup>3</sup> ]         Ferousion         1.79067655         mol.1 <sup>4</sup> 2         fStap:pH	[No.7]         Nitrate         0.000356972         mol.1 <sup>4</sup> 2         pH           [H <sub>2</sub> C0]         Carbonicatid         0.00005681         mol.1 <sup>4</sup> 2         fS <sub>02</sub> );pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000617157         mol.1 <sup>4</sup> 2         fS <sub>02</sub> ;pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         fS <sub>02</sub> ;pH           [K1]         Potassium         0.00038868         mol.1 <sup>4</sup> 2         fS <sub>02</sub> ;pH           [K2]         Potassium         0.00038808         mol.1 <sup>4</sup> 2         fS <sub>02</sub> ;pH           [K2]         Potassium         0.000423095         mol.1 <sup>4</sup> 2         fS <sub>12</sub> ;pH           [K4]         Potassium         0.00423095         mol.1 <sup>4</sup> 2         fS <sub>12</sub> ;pH           [K4]         Potassium         0.00423095         mol.1 <sup>4</sup> 2         fS <sub>12</sub> ;pH	[No.7]         Nurrate         0.000356972         mol.1 <sup>4</sup> 2         pH           [Hy.C0]         Carbonicatid         0.00035681         mol.1 <sup>4</sup> 2         [fSu <sub>2</sub> ):pH           [Mg <sup>2</sup> ]         Magnesium ion         0.00058581         mol.1 <sup>4</sup> 2         [fSu <sub>2</sub> ):pH           [CAT]         Sodium (strong cations)         0.001532416         mol.1 <sup>4</sup> 2         [fSu <sub>2</sub> ):pH           [K]         Potassium         0.00038368         mol.4 <sup>3</sup> 2         [fSu <sub>2</sub> ):pH           [K]         Potassium         0.00038368         mol.4 <sup>3</sup> 2         [fSu <sub>2</sub> ):pH           [Fe <sup>3</sup> T]         Ferousion         1.790676:55         mol.4 <sup>4</sup> 2         [fSu <sub>2</sub> ):pH	[No.7]         Wirzie         0.000356972         mol.1 <sup>4</sup> 2         pH           [H_CO]         Carbonic acid         0.00065861         mol.1 <sup>4</sup> 2         ftS <sub>sub</sub> :pH           [Mg <sup>2</sup> ]         Magnesium ion         0.000657157         mol.1 <sup>4</sup> 2         ftS <sub>sub</sub> :pH           [GAT]         Sodium (ktrong cations)         0.001522416         mol.1 <sup>4</sup> 2         ftS <sub>sub</sub> :pH           [K]         Petasium         0.0004230954         mol.1 <sup>4</sup> 2         ftS <sub>sub</sub> :pH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>4</sup> 2         ftS <sub>sub</sub> : pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [H"]         Proton         6.309576.08         mol. <sup>14</sup> 2         pH           [OV1]         Hydroxideion         1.301436.07         mol. <sup>14</sup> 2         pH           [Muh]         Freammonia         4.456516.07         mol. <sup>14</sup> 2         pH           [Nuh]         Freammonia         7.094876.05         mol. <sup>14</sup> 2         fSt <sub>sub</sub> .pH	[NH <sub>4</sub> ] Ammonium 7.09487E-05 mol.L <sup>-1</sup> 2 f(S <sub>trub</sub> ); pH	Line         Description         Description           [McO]         Carbonic acid         0.000685861         mol.t. <sup>4</sup> 2         ft <sub>Sol.</sub> ):pH           [Mc]         Magnesium ion         0.000617157         mol.t. <sup>4</sup> 2         ft <sub>Sol.</sub> ):pH           [CAT]         Sodium (strong carbon)         0.000512446         mol.t. <sup>4</sup> 2         ft <sub>Sol.</sub> ):pH           [K]         Potasium         0.00038564         mol.t. <sup>4</sup> 2         ft <sub>Sol.</sub> ):pH           [K]         Potasium         0.00038564         mol.t. <sup>4</sup> 2         ft <sub>Sol.</sub> ):pH           [AN]         Chloride (strong anions)         0.004230954         mol.t. <sup>4</sup> 2         ft <sub>Sol.</sub> ):pH           [AN]         Chloride (strong anions)         0.004230954         mol.t. <sup>4</sup> 2         ft <sub>Sol.</sub> ):pH	International         Description         Description         Description           [McC]         Carbonic acid         0.000681757         mol.1 <sup>-1</sup> 2         ft <sub>bcab</sub> ; pH           [McT]         Magnesium ion         0.000681757         mol.1 <sup>-1</sup> 2         ft <sub>bcab</sub> ; pH           [CAT]         Sodium fattors carbonic         0.00082846         mol.1 <sup>-1</sup> 2         ft <sub>bcab</sub> ; pH           [K]         Potasium         0.00083864         mol.1 <sup>-1</sup> 2         ft <sub>bcab</sub> ; pH           [K]         Potasium         0.000938648         mol.1 <sup>-1</sup> 2         ft <sub>bcab</sub> ; pH           [K]         Potasium         0.0004994         mol.1 <sup>-1</sup> 2         ft <sub>bcab</sub> ; pH           [K]         Potasium         0.0004994         mol.1 <sup>-1</sup> 2         ft <sub>bcab</sub> ; pH           [K]         Potasium         0.004994         mol.1 <sup>-1</sup> 2         ft <sub>bcab</sub> ; pH <td>International         Description         Description           [McG]         Curbonic acid         0.00068756         molt.<sup>1</sup>         2         ft<sub>Soub</sub>; pH           [McG]         Magnesium ion         0.00061757         molt.<sup>1</sup>         2         ft<sub>Soub</sub>; pH           [CAT]         Sodium fattors cationsi         0.00052446         molt.<sup>1</sup>         2         ft<sub>Soub</sub>; pH           [K]         Petassium         0.00038546         molt.<sup>1</sup>         2         ft<sub>Soub</sub>; pH           [K]         Delorationsi         0.0004230954         molt.<sup>1</sup>         2         ft<sub>Soub</sub>; pH           [K*]         Ferrous ion         1.79067455         molt.<sup>1</sup>         2         ft<sub>Soub</sub>; pH</td> <td>International         Description         Description           [McC0]         Carbonic acid         0.000681757         mol.1<sup>-1</sup>         2         ft<sub>bc0.1</sub>:pH           [McT]         Magnesium ion         0.000681757         mol.1<sup>-1</sup>         2         ft<sub>bc0.1</sub>:pH           [CAT]         Sodium fattors carbonic         0.00082846         mol.1<sup>-1</sup>         2         ft<sub>bc0.1</sub>:pH           [KN]         Potassium         0.000838648         mol.1<sup>-1</sup>         2         ft<sub>bc0.1</sub>:pH           [KN]         Chold (strong anons)         0.000938944         mol.1<sup>-1</sup>         2         ft<sub>bc0.1</sub>:pH           [KN]         Chold (strong anons)         0.00049944         2         ft<sub>bc0.1</sub>:pH</td> <td>Line         Docossist         Intra         2         Prime           [MgC]         Carbonic scid         0.00065268         molt.<sup>4</sup>         2         ft<sub>Sup</sub>: pH           [Mg<sup>2</sup>]         Magnesium ion         0.00015727         molt.<sup>4</sup>         2         ft<sub>Sup</sub>: pH           [CAT)         Sodium (strong cations)         0.001522416         molt.<sup>4</sup>         2         ft<sub>Sup</sub>: pH           [K]         Potasium         0.00035868         molt.<sup>4</sup>         2         ft<sub>Sup</sub>: pH           [AN]         Chloride (strong anions)         0.004230954         molt.<sup>4</sup>         2         ft<sub>Sup</sub>: pH</td>	International         Description         Description           [McG]         Curbonic acid         0.00068756         molt. <sup>1</sup> 2         ft <sub>Soub</sub> ; pH           [McG]         Magnesium ion         0.00061757         molt. <sup>1</sup> 2         ft <sub>Soub</sub> ; pH           [CAT]         Sodium fattors cationsi         0.00052446         molt. <sup>1</sup> 2         ft <sub>Soub</sub> ; pH           [K]         Petassium         0.00038546         molt. <sup>1</sup> 2         ft <sub>Soub</sub> ; pH           [K]         Delorationsi         0.0004230954         molt. <sup>1</sup> 2         ft <sub>Soub</sub> ; pH           [K*]         Ferrous ion         1.79067455         molt. <sup>1</sup> 2         ft <sub>Soub</sub> ; pH	International         Description         Description           [McC0]         Carbonic acid         0.000681757         mol.1 <sup>-1</sup> 2         ft <sub>bc0.1</sub> :pH           [McT]         Magnesium ion         0.000681757         mol.1 <sup>-1</sup> 2         ft <sub>bc0.1</sub> :pH           [CAT]         Sodium fattors carbonic         0.00082846         mol.1 <sup>-1</sup> 2         ft <sub>bc0.1</sub> :pH           [KN]         Potassium         0.000838648         mol.1 <sup>-1</sup> 2         ft <sub>bc0.1</sub> :pH           [KN]         Chold (strong anons)         0.000938944         mol.1 <sup>-1</sup> 2         ft <sub>bc0.1</sub> :pH           [KN]         Chold (strong anons)         0.00049944         2         ft <sub>bc0.1</sub> :pH	Line         Docossist         Intra         2         Prime           [MgC]         Carbonic scid         0.00065268         molt. <sup>4</sup> 2         ft <sub>Sup</sub> : pH           [Mg <sup>2</sup> ]         Magnesium ion         0.00015727         molt. <sup>4</sup> 2         ft <sub>Sup</sub> : pH           [CAT)         Sodium (strong cations)         0.001522416         molt. <sup>4</sup> 2         ft <sub>Sup</sub> : pH           [K]         Potasium         0.00035868         molt. <sup>4</sup> 2         ft <sub>Sup</sub> : pH           [AN]         Chloride (strong anions)         0.004230954         molt. <sup>4</sup> 2         ft <sub>Sup</sub> : pH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957E08         mol.1 <sup>1</sup> 2         pH           [OH]         Hydroxideion         1.30143E07         mol.1 <sup>1</sup> 2         pH           [MH]         Free ammonia         4.45681E07         mol.1 <sup>1</sup> 2         fSpub.pH           [MH]         Ammonium         7.09487E05         mol.1 <sup>1</sup> 2         fSpub.pH	[NH]         Ammonium         7.09487-605         mol.L <sup>1</sup> 2         fts_ms/pt           [NH]         0.00026073         mol.l <sup>1</sup> 2         nL         1	[HyCo]         Carbonic acid         0.000655861         mol.1 <sup>-1</sup> 2         [fScu)::PH           [Mg <sup>2</sup> ]         Magnesium ion         0.000627157         mol.1 <sup>-1</sup> 2         [fScu)::PH           [CAT]         Sodium (strong cations)         0.000522416         mol.1 <sup>-1</sup> 2         [fScu)::PH           [K]         Petasium         0.000332648         mol.1 <sup>-1</sup> 2         [fScu)::PH           [K]         Debosition         0.0004230954         mol.1 <sup>-3</sup> 2         [fScu)::PH           [K4 <sup>1</sup> ]         Ferrous ion         1.79067E-55         mol.1 <sup>-3</sup> 2         [fScu)::PH	[HyCo]         Carbonic acid         0.000655861         mol.1 <sup>-1</sup> 2         [RS <sub>table</sub> :PH           [Mg <sup>2</sup> ]         Magnesiumion         0.000651757         mol.1 <sup>-4</sup> 2         [RS <sub>table</sub> :PH           [CAT]         Sodium (trung cations)         0.001522416         mol.1 <sup>-4</sup> 2         [RS <sub>table</sub> :PH           [K]         Potasium         0.00033848         mol.1 <sup>-4</sup> 2         [RS <sub>table</sub> :PH           [K]         Potasium         0.000339548         Ol.1 <sup>-3</sup> 2         [RS <sub>table</sub> :PH           [K]         Potasium         0.000393954         mol.1 <sup>-4</sup> 2         [RS <sub>table</sub> :PH           [K]         Potasium         0.0004393954         mol.1 <sup>-4</sup> 2         [RS <sub>table</sub> :PH           [Fe] <sup>3</sup> Ferrousion         1.790678-55         mol.1 <sup>-4</sup> 2         [RS <sub>table</sub> :PH	[HyCo]         Carbonic acid         0.000655861         mol.1 <sup>-1</sup> 2         [FS <sub>culb</sub> :PH           [Mg <sup>2</sup> ]         Magnesiumion         0.000617157         mol.1 <sup>-1</sup> 2         [FS <sub>culb</sub> :PH           [CAT]         Sodum (trong cations)         0.0005122416         mol.1 <sup>-1</sup> 2         [FS <sub>culb</sub> :PH           [K]         Potasium         0.000332448         mol.1 <sup>-1</sup> 2         [FS <sub>culb</sub> :PH           [K]         Potasium         0.000339448         mol.1 <sup>-1</sup> 2         [FS <sub>culb</sub> :PH           [K]         Potasium         0.000393944         2         [FS <sub>culb</sub> :PH           [K]         Potasium         0.000439394         mol.1 <sup>-1</sup> 2         [FS <sub>culb</sub> :PH           [K]         Potasium         0.000439394         mol.1 <sup>-1</sup> 2         [FS <sub>culb</sub> :PH           [K] <sup>2</sup> Ferrous ion         1.790678:55         mol.1 <sup>-1</sup> 2         [FS <sub>culb</sub> :PH	[HyCo]         Carbonic acid         0.000655861         mol.1 <sup>-1</sup> 2         [FS <sub>culb</sub> :PH           [Mg <sup>2</sup> ]         Magnesiumion         0.000617157         mol.1 <sup>-1</sup> 2         [FS <sub>culb</sub> :PH           [CAT]         Sodum (trong cations)         0.001522416         mol.1 <sup>-1</sup> 2         [FS <sub>culb</sub> :PH           [K]         Potassium         0.00033848         mol.1 <sup>-1</sup> 2         [FS <sub>culb</sub> :PH           [K]         Potassium         0.000393848         mol.1 <sup>-3</sup> 2         [FS <sub>culb</sub> :PH           [K]         Potassium         0.000393848         mol.1 <sup>-3</sup> 2         [FS <sub>culb</sub> :PH           [Fe <sup>3</sup> ]         Ferrous ion         1.79067855         mol.1 <sup>-3</sup> 2         [FS <sub>culb</sub> :PH	[H <sub>2</sub> CO <sub>3</sub> ]         Carbonic acid         0.000685861         mol.L <sup>-1</sup> 2         ffS <sub>c01</sub> : pH           [Mg <sup>2</sup> ]         Magnesium ion         0.00051715         mol.L <sup>-1</sup> 2         ffS <sub>c01</sub> : pH           [CAT']         Sodium (strong cations)         0.001522416         mol.L <sup>-1</sup> 2         ffS <sub>c01</sub> : pH           [K)         Potasium         0.0004230954         mol.L <sup>-1</sup> 2         ffS <sub>c01</sub> : pH           [AN]         Chloride (strong anions)         0.004230954         mol.L <sup>-1</sup> 2         ffS <sub>c01</sub> : pH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957E-08         mol.1 <sup>-1</sup> 2         pH           [DH]         Hydroxide ion         1.301435-07         mol.1 <sup>-1</sup> 2         pH           [MH]         Free ammonia         4.45581E-07         mol.1 <sup>-1</sup> 2         ftSpace.pH           [MH]         Free ammonia         4.45581E-07         mol.1 <sup>-1</sup> 2         ftSpace.pH           [MH]         Armonium         7.09487E-05         mol.1 <sup>-1</sup> 2         ftSpace.pH           [No_J]         Nitrate         0.000357627         mol.1 <sup>-1</sup> 2         PH	[Net,]         Ammonium         7.094874-05         mol.1*         2         [Ess_b::DH           [No,]         Nirate         0.000356972         mol.1*         2         PH	Imput         Larbornic acro         U.NUMBERSENT         Imput         Z         Theory (D)           [Mg]*         Magnesiumion         0.000157157         mol.1.*         2         ftSp.cp.PH           [CAT]         Sodium (strong cations)         0.001522416         mol.1.*         2         ftSp.cp.H           [K]         Potassium         0.000383548         mol.1.*         2         ftSp.cp.H           [K]         Potassium         0.0004230954         mol.1.*         2         ftSp.cp.H           [K]         Ferrous ion         1.790676-55         mol.1.*         2         ftSp.cp.H	Imput         Larbornic action         U.V.UV0958041         mol.1.*         Z         Thco.j.: PM           [Mg]*         Magnesium ion         0.000157257         mol.1.*         Z         ftSp.j.: PM           [CAT]         Sodium (strong cations)         0.001522416         mol.1.*         Z         ftSp.j.: PM           [K]         Potasium         0.00038364         mol.1.*         Z         ftSp.j.: PM           [K]         Potasium         0.000439546         TtSp.j.: PM         TtSp.j.: PM           [Fe <sup>3</sup> ]         Ferrousion         1.79067555         mol.1.*         Z         ftSp.j.: PM	Imput         Larbornic action         U.NUMPERSENT         Imput         Impu	Imput         Larbornic action         U.NUMPSSAB1         mol.1.*         Z         Theory, EPH           [Mg]*         Magnesium ion         0.00015727         mol.1.*         Z         ftSpc,EPH           [CAT]         Sodium (strong cations)         0.001522416         mol.1.*         Z         ftSpc,EPH           [K]         Potassium         0.000383648         mol.1.*         Z         ftSpc,EPH           [K]         Potassium         0.0004382648         mol.1.*         Z         ftSpc,EPH           [K]         Ferrousion         1.79067Ex55         mol.1.*         Z         ftSpc,EPH	LPryCup         Larborni acro         U.UUU093801         mOL1*         Z         Thco.j. PH           [Mg*]         Magnesium ion         0.00015127         mOL1*         2         ftSp.j. PH           [EXT]         Sodium (storagecations)         0.001532416         moL1*         2         ftSp.j. PH           [K1]         Potasium         0.00033848         moL1*         2         ftSp.j. PH           [K1]         Potasium         0.00033848         moL1*         2         ftSp.j. PH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957E-08         mol.1 <sup>4</sup> 2         pH           [DH]         Hydroxide ion         1.301435-07         mol.1 <sup>4</sup> 2         pH           [IM]         Free ammonia         4.45681E-07         mol.1 <sup>4</sup> 2         fFe           [IM4,7]         Ammonium         7.09487E-05         mol.1 <sup>4</sup> 2         fSus.pH           [IM4,7]         Ammonium         0.000356972         mol.1 <sup>4</sup> 2         pH	[NH <sub>4</sub> ]         Ammonium         7.094876-05         mol.L <sup>-1</sup> 2         ftS <sub>mul</sub> : pH           [NO <sub>3</sub> ]         Nitrate         0.000356972         mol.L <sup>-1</sup> 2         pH	[Mg]*         Magnetium from         0.000017157         molt. <sup>4</sup> 2         ftsg./pH           [CAT]         Sodium (strong cations)         0.000157257         molt. <sup>4</sup> 2         ftsg./pH           [K]         Potassium         0.000038368         molt. <sup>4</sup> 2         ftsg./pH           [K]         Potassium         0.000383688         molt. <sup>4</sup> 2         ftsg./pH           [K]         Potassium         0.0004230954         molt. <sup>4</sup> 2         ftsg./pH           [K]         Ferousion         0.0004230954         molt. <sup>4</sup> 2         ftsg./pH	[Mg <sup>2</sup> ]         Magnetium ion         0.000517157         mol.L <sup>4</sup> 2         flog_j:PH           [CAT]         Sodium (strong cations)         0.001522416         mol.L <sup>4</sup> 2         flog_j:PH           [K]         Potassium         0.000338548         mol.L <sup>4</sup> 2         flog_j:PH           [Fe <sup>1</sup> ]         Ferrousion         1.790676:55         mol.L <sup>4</sup> 2         flog_j:PH	[Mg] <sup>2</sup> Magnetium inion         0.0000517357         mol.L <sup>4</sup> 2         flog_L/H           [CAT]         Sodium (strong cations)         0.001522416         mol.L <sup>4</sup> 2         flog_L/H           [K]         Potassium         0.000383648         mol.L <sup>4</sup> 2         flog_L/H           [K]         Potassium         0.000383648         mol.L <sup>4</sup> 2         flog_L/H           [K]         Potassium         0.000383648         mol.L <sup>4</sup> 2         flog_L/H           [K]         Potassium         0.000439094         mol.L <sup>4</sup> 2         flog_L/H           [K]         Potassium         0.00439094         mol.L <sup>4</sup> 2         flog_L/H           [K]         Potassium         0.00439094         mol.L <sup>4</sup> 2         flog_L/H           [K]         Potassium         0.00439094         mol.L <sup>4</sup> 2         flog_L/H           [K]         Ferrous ion         1.790678-55         mol.L <sup>4</sup> 2         flog_L/H	[Mg] <sup>2</sup> Magnetium ion         0.000051757         mol.L <sup>4</sup> 2         flog_j:PH           [CAT]         Sodium (strong cations)         0.001522416         mol.L <sup>4</sup> 2         flog_j:PH           [K]         Potassium         0.000383648         mol.L <sup>4</sup> 2         flog_j:PH           [K]         Potassium         0.000383648         mol.L <sup>4</sup> 2         flog_j:PH           [K]         Potassium         0.000383648         mol.L <sup>4</sup> 2         flog_j:PH           [K]         Potassium         0.00438954         mol.L <sup>4</sup> 2         flog_j:PH           [K]         Potassium         0.00438954         mol.L <sup>4</sup> 2         flog_j:PH           [K]         Potassium         0.00438954         mol.L <sup>4</sup> 2         flog_j:PH	[Mg] <sup>2</sup> Magnetium ion         0.000517157         mol.1 <sup>4</sup> 2         flsg.jbH           [CAT)         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         flsg.jbH           [K <sup>1</sup> )         Potasium         0.000382648         mol.1 <sup>4</sup> 2         flsg.jbH           [K <sup>1</sup> )         Potasium         0.00038648         mol.1 <sup>4</sup> 2         flsg.jbH           [ANI)         Choirde (strong anions)         0.00423054         mol.1 <sup>4</sup> 2         flsg.jbH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [\fr]         Proton         6.30597E.08         mol.1 <sup>3</sup> 2         pH           [OH]         Hydroxide ion         1.3014367         mol.1 <sup>3</sup> 2         pH           [\frac{\frac{1}{3}}{1041}]         Free ammonia         4.45681E07         mol.1 <sup>4</sup> 2         H           [\frac{\frac{1}{3}}{1041}]         Free ammonia         4.45681E07         mol.1 <sup>4</sup> 2         fSmab.pH           [\frac{\frac{1}{3}}{1041}]         Ammonium         7.09487E05         mol.1 <sup>4</sup> 2         fSmab.pH           [\frac{\frac{1}{3}}{1041}]         0.400556712         mol.1 <sup>4</sup> 2         fSmab.pH	[NH,]         Ammonium         7.09487£05         mol.L <sup>-1</sup> 2         ftS <sub>hub</sub> .pH           [NO,]         Nitrate         0.000356972         mol.L <sup>-1</sup> 2         pH	Indep         Magnesium ion         0.000617157         mol.1         2         fis <sub>kulk</sub> pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>-4</sup> 2         fis <sub>kulk</sub> pH           [CAT]         Potassium         0.00038264         mol.1 <sup>-4</sup> 2         fis <sub>kulk</sub> pH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>-4</sup> 2         fis <sub>kulk</sub> pH           [Fe <sup>1</sup> ]         Ferous ion         1.7967655         mol.1 <sup>-4</sup> 2         fis <sub>kulk</sub> pH	Indep         Magnesium ion         0.00061715         mol.1 <sup>4</sup> 2         ftsg.j; BH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         ftsg.j; BH           [K]         Potassium         0.000338648         mol.1 <sup>4</sup> 2         ftsg.j; BH           [K1]         Potassium         0.000338648         mol.1 <sup>4</sup> 2         ftsg.j; BH           [K2]         Potassium         0.000338648         mol.1 <sup>4</sup> 2         ftsg.j; BH           [K2]         Ferousion         1.790676:55         mol.1 <sup>4</sup> 2         ftsg.j; BH	Image         Magnesium ion         0.00061715         mol.1         2         flog_k); BH           [CAT]         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         flog_k); BH           [K']         Potassium         0.000383648         mol.1. <sup>4</sup> 2         flog_k); BH           [K']         Potassium         0.000383695         mol.1. <sup>4</sup> 2         flog_k); BH           [K']         Potassium         0.00423095         mol.1. <sup>4</sup> 2         flog_k); BH           [K']         Potassium         0.00423095         mol.1. <sup>4</sup> 2         flog_k); BH           [Fe <sup>3</sup> ]         Ferrousion         1.79067E-55         mol.1. <sup>4</sup> 2         flog_k); BH	Indep <sup>1</sup> Magnesium ion         0.00061715         mol.1 <sup>4</sup> 2         ftsg <sub>k</sub> ; pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         ftsg <sub>k</sub> ; pH           [K]         Potassium         0.000383648         mol.1 <sup>4</sup> 2         ftsg <sub>k</sub> ; pH           [K1]         Dotograminasing         0.00423054         mol.1 <sup>4</sup> 2         ftsg <sub>k</sub> ; pH           [K2]         Potassium         0.00423054         mol.1 <sup>4</sup> 2         ftsg <sub>k</sub> ; pH           [K2]         Potassium         0.00423054         mol.1 <sup>4</sup> 2         ftsg <sub>k</sub> ; pH           [K4]         Ferrousion         1.790676-55         mol.1 <sup>4</sup> 2         ftsg <sub>k</sub> ; pH	Image         Magnesium ion         0.00061715         mol.t <sup>-1</sup> 2         fts_{ch}; pH           [CAT)         Sodium (strong cations)         0.001522416         mol.t <sup>-1</sup> 2         fts_{ch}; pH           [K1]         Petasium         0.0004230954         mol.t <sup>-1</sup> 2         fts_{b}; pH           [AN]         Chloride (strong anions)         0.004230954         mol.t <sup>-1</sup> 2         fts_b; pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [IY]         Proton         6.30597E.08         mol.1 <sup>3</sup> 2         pH           [OH]         Hydroxide ion         1.30148507         mol.1 <sup>4</sup> 2         pH           [IM],         Free ammonia         4.45681E07         mol.1 <sup>4</sup> 2         pH           [IM-1]         Ammonium         7.00487605         mol.1 <sup>4</sup> 2         fStab           [IM-1]         Morialum         0.00365702         mol.1 <sup>4</sup> 2         pH	[NH,]         [Ammonium         7.09487£05         mol.L <sup>-1</sup> 2         ffSmuk.pH           [NO,1]         Nitrate         0.000356972         mol.L <sup>-1</sup> 2         pH	Magnesium ion         0.000617157         mol.1         2         fis_{abc} pH           [CAT)         Sodium (strong cations)         0.001522416         mol.1         2         fis_{abc} pH           [K')         Potassium         0.00038364         mol.1         2         fis_{abc} pH           [AN)         Chloride (strong anions)         0.004230954         mol.1         2         fis_{abc} pH           [Fe <sup>T</sup> )         Ferous ion         1.7967655         mol.1         2         fis_{abc} pH	[Mg]*         Magnesium ion         0.000617157         mol.1         2         ffSu,j: pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         ffSu,j: pH           [K']         Potassium         0.000338648         mol.1. <sup>4</sup> 2         ffSu,j: pH           [K']         Potassium         0.000338648         mol.1. <sup>4</sup> 2         ffSu,j: pH           [K']         Potassium         0.000338648         mol.1. <sup>4</sup> 2         ffSu,j: pH           [K']         Potassium         0.004330954         mol.1. <sup>4</sup> 2         ffSu,j: pH           [Fe <sup>4</sup> )         Ferrousion         1.790676:55         mol.1. <sup>4</sup> 2         ffSu,j: pH	[Mg]*         Magnesium ion         0.000617157         mol.1         2         ffSu,b; pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         ffSu,b; pH           [K']         Potassium         0.000383648         mol.1. <sup>4</sup> 2         ffSu,b; pH           [K']         Potassium         0.000383695         mol.1. <sup>4</sup> 2         ffSu,b; pH           [K']         Potassium         0.00423095         mol.1. <sup>4</sup> 2         ffSu,b; PH           [K']         Ferrousion         1.790676:55         mol.1. <sup>4</sup> 2         ffSu,b; PH	[Mg]*         Magnesium ion         0.000617157         mol.t. <sup>1</sup> 2         ffSu,b; pH           [CAT]         Sodium (strong cations)         0.001522416         mol.t. <sup>1</sup> 2         ffSu,b; pH           [K']         Potassium         0.000383648         mol.t. <sup>3</sup> 2         ffSl,b; pH           [K']         Potassium         0.000383658         mol.t. <sup>3</sup> 2         ffSl,b; pH           [Fe <sup>3</sup> ]         Ferrousion         1.790676:55         mol.t. <sup>4</sup> 2         ffSl,b; PH	[Mg?]         Magnesium ion         0.000617157         mol.1- <sup>3</sup> 2         ffSugl. pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1- <sup>3</sup> 2         ffSugl. pH           [K]         Petasium         0.000152446         mol.1- <sup>3</sup> 2         ffSugl. pH           [K]         Defasium         0.0004230954         mol.1- <sup>3</sup> 2         ffSugl. pH           [AN]         Chloride (strong anions)         0.004230954         mol.1- <sup>3</sup> 2         ffSugl. pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [IY]         Proton         6.30597E.08         mol.1 <sup>3</sup> 2         pH           [OH]         Hydroxide ion         1.30148507         mol.1 <sup>4</sup> 2         pH           [IM],         Free ammonia         4.45681E07         mol.1 <sup>4</sup> 2         pH           [IM-1]         Ammonium         7.00487605         mol.1 <sup>4</sup> 2         fStab           [IM-1]         Morialum         0.00365702         mol.1 <sup>4</sup> 2         pH	[NH,]         [Ammonium         7.09487£05         mol.L <sup>-1</sup> 2         ffSmuk.pH           [NO,1]         Nitrate         0.000356972         mol.L <sup>-1</sup> 2         pH	Image         Magnesium ion         0.000617157         mol.1         2         fis <sub>kub</sub> :pH           [CAT)         Sodium (strong cations)         0.001522416         mol.1         2         fis <sub>kub</sub> :pH           [K')         Potassium         0.00038364         mol.1         2         fis <sub>kub</sub> :pH           [AN)         Chloride (strong anions)         0.004230954         mol.1         2         fis <sub>kub</sub> :pH           [Fe <sup>*</sup> ]         Ferous ion         1.7967655         mol.1         2         fis <sub>kub</sub> :pH	Image         Magnesium ion         0.000617157         mol.1 <sup>-1</sup> 2         ffS <sub>kub</sub> :pH           [CAT)         Sodium (strong cations)         0.001522416         mol.1 <sup>-1</sup> 2         ffS <sub>kub</sub> :pH           [K']         Potassium         0.000332648         mol.1 <sup>-1</sup> 2         ffS <sub>kub</sub> :pH           [K']         Potassium         0.0003320948         mol.1 <sup>-1</sup> 2         ffS <sub>kub</sub> :pH           [Fe <sup>3</sup> T]         Ferousion         1.790676:55         mol.1 <sup>-1</sup> 2         ffS <sub>kub</sub> :pH	Imp         Magnesium ion         0.000617157         mol.1         2         ffsq.j. pH           [CAT)         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         ffsq.j. pH           [K']         Potassium         0.000383648         mol.1. <sup>4</sup> 2         ffsg.j. pH           [K']         Potassium         0.000383694         mol.1. <sup>4</sup> 2         ffsg.j. pH           [K']         Potassium         0.004230954         mol.1. <sup>4</sup> 2         ffsg.j. pH           [K']         Potassium         0.004230954         mol.1. <sup>4</sup> 2         ffsg.j. pH	Implicit         Magnesium ion         0.000617157         mol.1         2         ffsq.j. pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         ffsq.j. pH           [K']         Potassium         0.000383648         mol.1. <sup>4</sup> 2         ffsg.j. pH           [K']         Potassium         0.000383648         mol.1. <sup>4</sup> 2         ffsg.j. pH           [Fe <sup>3</sup> ]         Ferrousion         1.790676:55         mol.1. <sup>4</sup> 2         ffsq.j. pH	Implify         Magnesium ion         0.000617157         mol.t. <sup>3</sup> 2         ffsu,i; pH           [CAT)         Sodium (strong cations)         0.001522416         mol.t. <sup>3</sup> 2         ffsu,i; pH           [K]         Petasium         0.0004230954         mol.t. <sup>3</sup> 2         ffsu,i; pH           [AN]         Chloride (strong anions)         0.004230954         mol.t. <sup>3</sup> 2         ffsu,i; pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [IY]         Proton         6.30597E.08         mol.1 <sup>3</sup> 2         pH           [OH]         Hydroxide ion         1.30148507         mol.1 <sup>4</sup> 2         pH           [IM],         Free ammonia         4.45681E07         mol.1 <sup>4</sup> 2         pH           [IM-1]         Ammonium         7.00487605         mol.1 <sup>4</sup> 2         fStab           [IM-1]         Morialum         0.00365702         mol.1 <sup>4</sup> 2         pH	[NH,]         Ammonium         7.09487£05         mol.L <sup>-1</sup> 2         ftS <sub>mulk</sub> .pH           [NO,1]         Nitrate         0.000356972         mol.L <sup>-1</sup> 2         pH	Indep         Magnesium ion         0.00051757         mol.1         2         fis <sub>kul</sub> : pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>-4</sup> 2         fis <sub>kul</sub> : pH           [CAT]         Potassium         0.00038264         mol.1 <sup>-4</sup> 2         fis <sub>kul</sub> : pH           [AN]         Choride (strong anions)         0.004230954         mol.1 <sup>-4</sup> 2         fis <sub>kul</sub> : pH           [Fe <sup>1</sup> ]         Ferous ion         1.7967655         mol.1 <sup>-4</sup> 2         fis <sub>kul</sub> : pH	Mag         Magnesium ion         0.00061715         mol.1         2         fiscuit P           [CAT]         Sodium (strong cations)         0.001522416         mol.1.4         2         fiscuit P           [K]         Potassium         0.000338648         mol.1.4         2         fiscuit P           [K]         Potassium         0.000338648         mol.1.4         2         fiscuit P           [K]         Potassium         0.000330954         mol.1.4         2         fiscuit P           [K]         Ferousion         1.790676:55         mol.1.4         2         fiscuit PH	Mag <sup>1</sup> Magnesium ion         0.00061715         mol.1         2         fis <sub>kal</sub> ; pH           [CAT)         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         fis <sub>kal</sub> ; pH           [K')         Potassium         0.000383648         mol.1. <sup>4</sup> 2         fis <sub>kal</sub> ; pH           [K')         Potassium         0.000383695         mol.1. <sup>4</sup> 2         fis <sub>kal</sub> ; pH           [K')         Potassium         0.00423095         mol.1. <sup>4</sup> 2         fis <sub>kal</sub> ; pH           [K')         Potassium         0.00423095         mol.1. <sup>4</sup> 2         fis <sub>kal</sub> ; pH	Mag         Magnesium ion         0.00061715         mol.1         2         fisquit; BH           [CAT)         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         fisqui; BH           [K']         Potassium         0.000383648         mol.1. <sup>4</sup> 2         fisqui; BH           [K']         Potassium         0.000383658         mol.1. <sup>4</sup> 2         fisqui; BH           [K']         Potassium         0.000430554         mol.1. <sup>4</sup> 2         fisqui; BH           [K']         Potassium         0.000430554         mol.1. <sup>4</sup> 2         fisqui; BH           [Fe <sup>3</sup> ]         Ferrousion         1.790676:55         mol.1. <sup>4</sup> 2         fisqui; BH	Image         Magnesium ion         0.00061715         mol.t <sup>-1</sup> 2         fts_{ch}; pH           [CAT]         Sodium (strong cations)         0.001522416         mol.t <sup>-1</sup> 2         fts_{ch}; pH           [K]         Petasium         0.0004230954         mol.t <sup>-1</sup> 2         fts_{ch}; pH           [AN]         Chloride (strong anions)         0.004230954         mol.t <sup>-1</sup> 2         fts_{ch}; pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [YT]         Proton         6.30957E08         mol.1 <sup>3</sup> 2         pH           [OH]         Hydroxideion         1.3014577         mol.1 <sup>3</sup> 2         pH           [IMH,]         Free ammonia         4.45681807         mol.1 <sup>4</sup> 2         pH           [IMH,]         Ammonium         7.09487E05         mol.1 <sup>4</sup> 2         fSmb.PH           [INh,]         Nirate         0.000556972         mol.1 <sup>4</sup> 2         pH	[NH,]         [Ammonium]         7.094876-05         mol.L <sup>-1</sup> 2         f[S <sub>100</sub> ,pH]           [NO,1]         Nitrate         0.000356972         mol.L <sup>-1</sup> 2         pH	International         Declaration         Declaration         Declaration           [Mg <sup>2</sup> ]         Magnetium fon         0.00015175         mol.1 <sup>-1</sup> 2         flS <sub>kub</sub> ; pH           [CAT)         Sodium (strong cations)         0.0001522416         mol.1 <sup>-1</sup> 2         flS <sub>kub</sub> ; pH           [K1]         Potassium         0.00038364         mol.1 <sup>-1</sup> 2         flS <sub>kub</sub> ; pH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>-1</sup> 2         flS <sub>kub</sub> ; pH           [Fe <sup>1</sup> ]         Ferous ion         1.79067655         mol.1 <sup>-1</sup> 2         flS <sub>kub</sub> ; pH	International         Description         Description         Description           [CAT]         Sodium (strong cations)         0.00151251         mol.1 <sup>-4</sup> 2         ftSc <sub>ab</sub> ; BH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>-4</sup> 2         ftSc <sub>ab</sub> ; BH           [K1]         Potassium         0.000383648         mol.1 <sup>-4</sup> 2         ftSc <sub>ab</sub> ; BH           [K2]         Potassium         0.004383658         mol.1 <sup>-4</sup> 2         ftSc <sub>ab</sub> ; BH           [K2]         Ferousion         1.790676:55         mol.1 <sup>-4</sup> 2         ftSc <sub>ab</sub> ; BH	International Control Control         Control Control         Control Control         Control Control           [K4]*         Magnetium inion         0.00015175         mol.1 * 2         15%, bH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 * 2         15%, bH           [K1]         Potassium         0.000383648         mol.1 * 2         15%, bH           [K1]         Control Strong cations)         0.00423094         mol.1 * 2         15%, bH           [K2]         Potassium         0.00423094         mol.1 * 2         15%, bH           [K2]         Potassium         0.00423094         mol.1 * 2         15%, bH           [K2]         Ferrousion         1.790678-55         mol.1 * 2         15%, bH	International         Description         Description         Description           [CAT]         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         ftSc <sub>ub</sub> ; BH           [K]         Potassium         0.000382446         mol.1. <sup>4</sup> 2         ftSc <sub>ub</sub> ; BH           [K]         Potassium         0.000383648         mol.1. <sup>4</sup> 2         ftSc <sub>ub</sub> ; BH           [K]         Potassium         0.00423054         mol.1. <sup>4</sup> 2         ftSc <sub>ub</sub> ; BH           [K]         Forousion         1.790676:55         mol.1. <sup>4</sup> 2         ftSc <sub>ub</sub> ; BH	[Mg] <sup>2</sup> Megnetium ion         0.000017157         mol.1 <sup>4</sup> 2         flsg <sub>k</sub> } H           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         flsg <sub>k</sub> } H           [K <sup>4</sup> )         Potasium         0.00017157         mol.1 <sup>4</sup> 2         flsg <sub>k</sub> } H           [K <sup>4</sup> )         Potasium         0.00017207         mol.1 <sup>4</sup> 2         flsg <sub>k</sub> } H           [AN]         Choiride (strong anions)         0.004230954         mol.1 <sup>4</sup> 2         flsg <sub>k</sub> } H
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [YT]         Proton         6.30957E08         mol.1 <sup>3</sup> 2         pH           [OH]         Hydroxideion         1.3014577         mol.1 <sup>3</sup> 2         pH           [IMH,]         Free ammonia         4.45681807         mol.1 <sup>4</sup> 2         pH           [IMH,]         Ammonium         7.09487E05         mol.1 <sup>4</sup> 2         fSmb.PH           [INh,]         Nirate         0.000556972         mol.1 <sup>4</sup> 2         pH	[NH,]         [Ammonium]         7.094876-05         mol.L <sup>-1</sup> 2         f[S <sub>100</sub> ,pH]           [NO,1]         Nitrate         0.000356972         mol.L <sup>-1</sup> 2         pH	International Magnetium ion         0.00051715         molt         2         140,4/2         150,4/2         160,4/2 </td <td>(Mg<sup>2</sup>)         Magnesium ion         0.000517157         mol.1         2         1%20,2H           [CAT)         Sodium (strong cations)         0.001522416         mol.1.<sup>4</sup>         2         f(S<sub>0,2</sub>); BH           [K')         Potassium         0.000382648         mol.1.<sup>4</sup>         2         f(S<sub>0,2</sub>); BH           [K')         Potassium         0.000383658         mol.1.<sup>4</sup>         2         f(S<sub>0,2</sub>); BH           [Fe<sup>2</sup>)         Ferrousion         1.790676:55         mol.1.<sup>4</sup>         2         f(S<sub>0,2</sub>); BH</td> <td>(Mg<sup>2</sup>)         Magnesium ion         0.000517157         mol.1         2         1%20,2H           [CAT)         Sodium (strong cations)         0.001522416         mol.1.<sup>4</sup>         2         (%2,2),2H           [K')         Potassium         0.000383648         mol.1.<sup>4</sup>         2         (%2,2),2H           [AN)         Choinde (strong anions)         0.00439294         mol.1.<sup>4</sup>         2         (%2,2),2H           [Fe<sup>3</sup>]         Ferrousion         1.790678:55         mol.1.<sup>4</sup>         2         (%2,2),2H</td> <td>(Mg<sup>2</sup>)         Magnesium ion         0.000517157         mol.1         2         1%20,2H           [CAT)         Sodium (strong cations)         0.001522416         mol.1.<sup>4</sup>         2         1%20,2H           [K')         Potassium         0.000383648         mol.1.<sup>4</sup>         2         1%20,2H           [K')         Potassium         0.000439054         mol.1.<sup>4</sup>         2         1%20,2H           [Fe<sup>3</sup>]         Ferrousion         1.790676:55         mol.1.<sup>4</sup>         2         1%30,2H</td> <td>[Mag<sup>+1</sup>]         Magnetium ion         0.000617157         mol.1<sup>-1</sup>         2         flsg<sub>k</sub>} H           [CAT]         Sodium (xtrong cations)         0.001522416         mol.1<sup>-1</sup>         2         flsg<sub>k</sub>} H           [K<sup>1</sup>]         Potasium         0.0004230954         mol.1<sup>-1</sup>         2         flsg<sub>k</sub>} H           [AN]         Choirde (strong anions)         0.004230954         mol.1<sup>-1</sup>         2         flsg<sub>k</sub>} H</td>	(Mg <sup>2</sup> )         Magnesium ion         0.000517157         mol.1         2         1%20,2H           [CAT)         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         f(S <sub>0,2</sub> ); BH           [K')         Potassium         0.000382648         mol.1. <sup>4</sup> 2         f(S <sub>0,2</sub> ); BH           [K')         Potassium         0.000383658         mol.1. <sup>4</sup> 2         f(S <sub>0,2</sub> ); BH           [Fe <sup>2</sup> )         Ferrousion         1.790676:55         mol.1. <sup>4</sup> 2         f(S <sub>0,2</sub> ); BH	(Mg <sup>2</sup> )         Magnesium ion         0.000517157         mol.1         2         1%20,2H           [CAT)         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         (%2,2),2H           [K')         Potassium         0.000383648         mol.1. <sup>4</sup> 2         (%2,2),2H           [AN)         Choinde (strong anions)         0.00439294         mol.1. <sup>4</sup> 2         (%2,2),2H           [Fe <sup>3</sup> ]         Ferrousion         1.790678:55         mol.1. <sup>4</sup> 2         (%2,2),2H	(Mg <sup>2</sup> )         Magnesium ion         0.000517157         mol.1         2         1%20,2H           [CAT)         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         1%20,2H           [K')         Potassium         0.000383648         mol.1. <sup>4</sup> 2         1%20,2H           [K')         Potassium         0.000439054         mol.1. <sup>4</sup> 2         1%20,2H           [Fe <sup>3</sup> ]         Ferrousion         1.790676:55         mol.1. <sup>4</sup> 2         1%30,2H	[Mag <sup>+1</sup> ]         Magnetium ion         0.000617157         mol.1 <sup>-1</sup> 2         flsg <sub>k</sub> } H           [CAT]         Sodium (xtrong cations)         0.001522416         mol.1 <sup>-1</sup> 2         flsg <sub>k</sub> } H           [K <sup>1</sup> ]         Potasium         0.0004230954         mol.1 <sup>-1</sup> 2         flsg <sub>k</sub> } H           [AN]         Choirde (strong anions)         0.004230954         mol.1 <sup>-1</sup> 2         flsg <sub>k</sub> } H
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [\fr]         Proton         6.30597E.08         mol.1 <sup>3</sup> 2         pH           [OH]         Hydroxide ion         1.30148507         mol.1 <sup>4</sup> 2         pH           [\frac{\frac}\\ \\ \\ret}\} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	[NH,]         [Ammonium         7.09487£05         mol.L <sup>-1</sup> 2         ffSmuk.pH           [NO,1]         Nitrate         0.000356972         mol.L <sup>-1</sup> 2         pH	Magnesium ion         0.000617157         mol.1         2         fis_{abc} pH           [CAT)         Sodium (strong cations)         0.001522416         mol.1         2         fis_{abc} pH           [K')         Potassium         0.00038364         mol.1         2         fis_{abc} pH           [AN)         Chloride (strong anions)         0.004230954         mol.1         2         fis_{abc} pH           [Fe <sup>T</sup> )         Ferous ion         1.7967655         mol.1         2         fis_{abc} pH	[Mg]*         Magnesium ion         0.000617157         mol.1         2         ffSu,j: pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         ffSu,j: pH           [K']         Potassium         0.000338648         mol.1. <sup>4</sup> 2         ffSu,j: pH           [K']         Potassium         0.000338648         mol.1. <sup>4</sup> 2         ffSu,j: pH           [K']         Potassium         0.000338648         mol.1. <sup>4</sup> 2         ffSu,j: pH           [K']         Potassium         0.004330954         mol.1. <sup>4</sup> 2         ffSu,j: pH           [Fe <sup>4</sup> )         Ferrousion         1.790676:55         mol.1. <sup>4</sup> 2         ffSu,j: pH	[Mg]*         Magnesium ion         0.000617157         mol.1         2         ffSu,b; pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> 2         ffSu,b; pH           [K']         Potassium         0.000383648         mol.1. <sup>4</sup> 2         ffSu,b; pH           [K']         Potassium         0.000383695         mol.1. <sup>4</sup> 2         ffSu,b; pH           [K']         Potassium         0.00423095         mol.1. <sup>4</sup> 2         ffSu,b; PH           [K']         Ferrousion         1.790676:55         mol.1. <sup>4</sup> 2         ffSu,b; PH	[Mg]*         Magnesium ion         0.000617157         mol.t <sup>-1</sup> 2         ffSu,b; pH           [CAT]         Sodium (strong cations)         0.001522416         mol.t <sup>-1</sup> 2         ffSu,b; pH           [K']         Potassium         0.000383648         mol.t <sup>-3</sup> 2         ffSl,b; pH           [K']         Potassium         0.000383658         mol.t <sup>-3</sup> 2         ffSl,b; pH           [Fe <sup>3</sup> T]         Ferrousion         1.790676:55         mol.t <sup>-4</sup> 2         ffSl,b; PH	[Mg?]         Magnesium ion         0.000617157         mol.1- <sup>3</sup> 2         ffSugl. pH           [CAT]         Sodium (strong cations)         0.001522416         mol.1- <sup>3</sup> 2         ffSugl. pH           [K]         Petasium         0.000152446         mol.1- <sup>3</sup> 2         ffSugl. pH           [K]         Defasium         0.0004230954         mol.1- <sup>3</sup> 2         ffSugl. pH           [AN]         Chloride (strong anions)         0.004230954         mol.1- <sup>3</sup> 2         ffSugl. pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [Ir]         Proton         6.30597608         mol. <sup>1,3</sup> 2         pH           [OH]         Hydroidelon         1.3014507         mol. <sup>1,4</sup> 2         pH           [Net]         Free ammonia         4.45581607         mol. <sup>1,4</sup> 2         pH           [Net]         Free ammonia         4.45581607         mol. <sup>1,4</sup> 2         fStaubpH           [Net]         Jononium         7.09487650         mol. <sup>1,4</sup> 2         fStaubpH           [Net]         Nitrate         0.000155927         mol. <sup>1,4</sup> 2         pH           [Net]         Otominium         0.000155927         mol. <sup>1,4</sup> 2         pH	[Nk,]         Ammonium         7.09487-05         mol.1 <sup>-1</sup> 2         ffSmub.pH           [No,]         Nitrate         0.000356972         mol.1 <sup>-1</sup> 2         pH           [Nc,0]         Extension         0.000356972         mol.1 <sup>-1</sup> 2         pH	[Mg <sup>2</sup> ]         Magnesium ion         0.000517157         mol.t <sup>-1</sup> 2         ffSugl: pH           [CAT)         Sodium (strong cations)         0.001522416         mol.t <sup>-1</sup> 2         ffSugl: pH           [K']         Potassium         0.00038368         mol.t <sup>-3</sup> 2         ffSugl: pH           [M1)         Chindré strong anions)         0.0042994         mol.t <sup>-3</sup> 2         ffSugl: pH           [Fe <sup>3</sup> ]         Ferrous ion         1.790676:55         mol.t <sup>-4</sup> 2         ffSugl: pH	[Mg <sup>2</sup> ]         Magnesium ion         0.000517157         mol.L <sup>1</sup> 2         ffSujt: PH           [CAT)         Sodium (ktrong cations)         0.001522416         mol.L <sup>1</sup> 2         ffSujt: PH           [K']         Potassium         0.000333648         mol.L <sup>1</sup> 2         ffSujt: PH           [K']         Potassium         0.000333054         mol.L <sup>1</sup> 2         ffSujt: PH           [K']         Potassium         0.00230954         mol.L <sup>1</sup> 2         ffSujt: PH           [K']         Potassium         0.004230954         mol.L <sup>1</sup> 2         ffSujt: PH           [Fe <sup>2</sup> ]         Ferrousion         1.790676:55         mol.L <sup>1</sup> 2         ffSujt: PH	[Mg <sup>2</sup> ]         Magnesium ion         0.000517157         mol.t <sup>-1</sup> 2         ftSugl: pH           [CAT)         Sodium (strong cations)         0.001522416         mol.t <sup>-1</sup> 2         ftSugl: pH           [K*]         Potassium         0.000333048         mol.t <sup>-1</sup> 2         ftSugl: pH           [Av)         Choirde (strong anions)         0.00433054         mol.t <sup>-1</sup> 2         ftSugl: pH           [Fe <sup>3</sup> T]         Ferrousion         1.790678-55         mol.t <sup>-1</sup> 2         ftSugl: pH	[Mg <sup>2</sup> ]         Magnesium ion         0.000517157         mol.t <sup>-1</sup> 2         ffSugb PH           [CAT)         Sodium (strong cations)         0.001522416         mol.t <sup>-1</sup> 2         ffSugb PH           [K <sup>1</sup> ]         Potassium         0.000333648         mol.t <sup>-1</sup> 2         ffSugb PH           [AN]         Choirde (strong anions)         0.00233094         mol.t <sup>-1</sup> 2         ffSugb PH           [Fe <sup>3</sup> ]         Ferrousion         1.790676:55         mol.t <sup>-1</sup> 2         ffSugb PH	[Mg <sup>2</sup> ]         Magnesium ion         0.000617157         mol. <sup>1</sup> 2         ftS <sub>aul</sub> : pH           [CAT)         Sodium (ktrong cations)         0.00152246         mol. <sup>1</sup> 2         ftS <sub>cul</sub> : pH           [K)         Petasium         0.0004230954         mol. <sup>1</sup> 2         ftS <sub>cul</sub> : pH           [AN]         Chloride (strong anions)         0.004230954         mol. <sup>1</sup> 2         ftS <sub>cul</sub> : pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [µ"]         Proton         6.3055705         mol. <sup>1,4</sup> 2         pit           [QM]         Hydroidelon         1.30145407         mol. <sup>1,4</sup> 2         pit           [NM], Free ammonia         4.45681607         mol. <sup>1,4</sup> 2         pit           [NM, ]         Ammonium         7.0948765         mol. <sup>1,4</sup> 2         fitsm./pit           [NM, ]         Ammonium         0.000356932         mol. <sup>1,4</sup> 2         fitsm./pit           [NG, ]         Nitrate         0.000356932         mol. <sup>1,4</sup> 2         pit	[Nk,]         Ammonium         7.09487±05         mol.1 <sup>-1</sup> 2         f(S <sub>mab</sub> )±Pi           [No,1]         Nitrate         0.000356972         mol.1 <sup>-1</sup> 2         pH           [NLC0]         Carbonic acid         0.000356801         mol.1 <sup>-1</sup> 2         pH	[Mk] <sup>2</sup> <t< td=""><td>[Mg<sup>2</sup>]         Magnesium ion         0.000517157         mol.L<sup>1</sup>         2         f(S<sub>ku)</sub>;pH           [KC]         Potasium         0.00152246         mol.L<sup>2</sup>         2         f(S<sub>ku)</sub>;pH           [K]         Potasium         0.000338648         mol.L<sup>3</sup>         2         f(S<sub>ku)</sub>;pH           [AN]         Chloride (strong anions)         0.004230954         mol.L<sup>3</sup>         2         f(S<sub>ku)</sub>;pH           [Fe<sup>3</sup>]         Ferousion         1.79067555         mol.L<sup>4</sup>         2         f(S<sub>ku)</sub>;pH</td><td>[Mg<sup>2</sup>]         Magnesium ion         0.000617157         mol.L<sup>1</sup>         2         f(S<sub>ku)</sub>;pH           [CAT)         Sodium (strong cations)         0.00152246         mol.L<sup>1</sup>         2         f(S<sub>ku)</sub>;pH           [K]         Potassium         0.000333068         mol.L<sup>1</sup>         2         f(S<sub>ku)</sub>;pH           [AN]         Choirdé (strong anions)         0.00230954         mol.L<sup>1</sup>         2         f(S<sub>ku)</sub>;pH           [Fe<sup>3</sup>]         Ferrousion         1.790678:55         mol.L<sup>4</sup>         2         f(S<sub>ku)</sub>;pH</td><td>[Mg<sup>2</sup>]         Magnesium ion         0.000617157         mol.L<sup>1</sup>         2         f(S<sub>ku)</sub>;pH           [GAT]         Sodium (strong cations)         0.00152246         mol.L<sup>1</sup>         2         f(S<sub>ku)</sub>;pH           [K]         Potassum         0.000333648         mol.L<sup>1</sup>         2         f(S<sub>ku)</sub>;pH           [AN]         Choirde (strong anions)         0.00433054         mol.L<sup>1</sup>         2         f(S<sub>ku)</sub>;pH           [Fe<sup>3</sup>]         Ferousion         1.790676:55         mol.L<sup>1</sup>         2         f(S<sub>ku</sub>);pH</td><td>[Mg<sup>2</sup>]         Magnesium ion         0.00051737         mol.t<sup>-1</sup>         2         fls<sub>up</sub>:pH           [CAT)         Sodium (strong cations)         0.001522416         mol.t<sup>-1</sup>         2         fls<sub>up</sub>:pH           [K)         Potsatum         0.0004230954         mol.t<sup>-1</sup>         2         fls<sub>up</sub>:pH           [AN]         Chloride (strong anions)         0.004230954         mol.t<sup>-1</sup>         2         fls<sub>up</sub>:pH</td></t<>	[Mg <sup>2</sup> ]         Magnesium ion         0.000517157         mol.L <sup>1</sup> 2         f(S <sub>ku)</sub> ;pH           [KC]         Potasium         0.00152246         mol.L <sup>2</sup> 2         f(S <sub>ku)</sub> ;pH           [K]         Potasium         0.000338648         mol.L <sup>3</sup> 2         f(S <sub>ku)</sub> ;pH           [AN]         Chloride (strong anions)         0.004230954         mol.L <sup>3</sup> 2         f(S <sub>ku)</sub> ;pH           [Fe <sup>3</sup> ]         Ferousion         1.79067555         mol.L <sup>4</sup> 2         f(S <sub>ku)</sub> ;pH	[Mg <sup>2</sup> ]         Magnesium ion         0.000617157         mol.L <sup>1</sup> 2         f(S <sub>ku)</sub> ;pH           [CAT)         Sodium (strong cations)         0.00152246         mol.L <sup>1</sup> 2         f(S <sub>ku)</sub> ;pH           [K]         Potassium         0.000333068         mol.L <sup>1</sup> 2         f(S <sub>ku)</sub> ;pH           [AN]         Choirdé (strong anions)         0.00230954         mol.L <sup>1</sup> 2         f(S <sub>ku)</sub> ;pH           [Fe <sup>3</sup> ]         Ferrousion         1.790678:55         mol.L <sup>4</sup> 2         f(S <sub>ku)</sub> ;pH	[Mg <sup>2</sup> ]         Magnesium ion         0.000617157         mol.L <sup>1</sup> 2         f(S <sub>ku)</sub> ;pH           [GAT]         Sodium (strong cations)         0.00152246         mol.L <sup>1</sup> 2         f(S <sub>ku)</sub> ;pH           [K]         Potassum         0.000333648         mol.L <sup>1</sup> 2         f(S <sub>ku)</sub> ;pH           [AN]         Choirde (strong anions)         0.00433054         mol.L <sup>1</sup> 2         f(S <sub>ku)</sub> ;pH           [Fe <sup>3</sup> ]         Ferousion         1.790676:55         mol.L <sup>1</sup> 2         f(S <sub>ku</sub> );pH	[Mg <sup>2</sup> ]         Magnesium ion         0.00051737         mol.t <sup>-1</sup> 2         fls <sub>up</sub> :pH           [CAT)         Sodium (strong cations)         0.001522416         mol.t <sup>-1</sup> 2         fls <sub>up</sub> :pH           [K)         Potsatum         0.0004230954         mol.t <sup>-1</sup> 2         fls <sub>up</sub> :pH           [AN]         Chloride (strong anions)         0.004230954         mol.t <sup>-1</sup> 2         fls <sub>up</sub> :pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [W]         Proton         6.30957E08         mol.L <sup>1</sup> 2         pH           [OH]         Hydroxile ion         1.30143E07         mol.L <sup>1</sup> 2         pH           [Mh]         Free ammonia         4.4561E07         mol.L <sup>1</sup> 2         fSmb pH           [Nh], Tree ammonia         0.000556972         mol.L <sup>1</sup> 2         fSmb pH           [No], Nitrate         0.000556972         mol.L <sup>1</sup> 2         pH           [Nc], Nitrate         0.000556951         mol.L <sup>1</sup> 2         pH	[Nkr,]         Ammonium         7.09487-05         mol.1 <sup>-1</sup> 2         ( $R_{Supl.}$ ) PH           [No,]         Nitrate         0.000356972         mol.1 <sup>-1</sup> 2 $PH$ [Nc,O]         Carbonic acid         0.000058681         mol.1 <sup>-1</sup> 2 $R_{Supl.}$ ) PH	[Mg]         wagnesum ion         0.0005/1/3         Click         2         [Skg], pH           [CAT]         Sodium (strong cation)         0.00152446         mol.1 <sup>-1</sup> 2         [Skg], pH           [K]         Potasium         0.00038564         mol.1 <sup>-1</sup> 2         [Skg], pH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>-1</sup> 2         [Skg], pH           [Fe <sup>1</sup> ]         Forsion in         1.79677-55         mol.1 <sup>-1</sup> 2         [Skg], pH	[Mg]         Magnesum ino         U.UUUUL1/12         mol.L <sup>1</sup> Z         [TS <sub>bcl</sub> : PH           [CAT]         Sodium (strong cations)         0.001522416         mol.L <sup>1</sup> Z         [TS <sub>bcl</sub> : PH           [K]         Potsaium         0.000152648         mol.L <sup>11</sup> Z         [TS <sub>bcl</sub> : PH           [AN]         Chloride (strong anions)         0.004230954         mol.L <sup>11</sup> Z         [TS <sub>bcl</sub> : PH           [Fe <sup>2</sup> ]         Ferousion         1.79067E-55         mol.L <sup>11</sup> Z         [TS <sub>bcl</sub> : PH	[Mg]         wagnesum no         0.00021/15/         mol.1*         2         TSu,bH           [CAT]         Solum (tranc action)         0.0012244         mol.1*         2         ftSu,bH           [K]         Potasium         0.00038548         mol.1*         2         ftSu,bH           [K]         Choride (strong anions)         0.004230954         mol.1*         2         ftSu,bH           [K*]         Ferros ion         1.79067655         mol.1*         2         ftSu,bH	[Mg]         wagnesum no         U.0000 Jr.15/         mol.1 <sup>-1</sup> 2         TSu,b, PH           [CAT]         Sodium (strong cation)         0.00523446         mol.1 <sup>-1</sup> 2         ftSu,c, DH           [K]         Petasium         0.00038548         mol.1 <sup>-1</sup> 2         ftSu,c, DH           [AN]         Choride (strong anions)         0.00495455         mol.1 <sup>-1</sup> 2         ftSu,c, DH           [Fe <sup>*</sup> ]         Ferros ion         1.79067655         mol.1 <sup>-1</sup> 2         ftSu,c, DH	[Mg]         Magnesum ino         U.00001/13/2         [Ch]         Z         [TS <sub>bal</sub> ); PH           [CAT]         Sodium (strong cations)         0.001522416         mol.1. <sup>4</sup> Z         [TS <sub>bal</sub> ); PH           [K]         Potasium         0.000152646         mol.1. <sup>4</sup> Z         [TS <sub>bal</sub> ); PH           [AN]         Chloride (strong anions)         0.004230954         mol.1. <sup>4</sup> Z         [TS <sub>bal</sub> ); PH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957608         mol.1 <sup>1</sup> 2         pH           [OH]         Hydroxideion         1.30143627         mol.1 <sup>1</sup> 2         pH           [MH,]         Free ammonia         4.45681E-07         mol.1 <sup>1</sup> 2         fS <sub>mb</sub> ,pH           [NH,]         Ammonium         7.09487E05         mol.1 <sup>1</sup> 2         fS <sub>mb</sub> ,pH           [NH,]         Ammonium         7.09487E05         mol.1 <sup>1</sup> 2         fS <sub>mb</sub> ,pH           [NH,Q]         Carbonic acid         0.000685861         mol.1 <sup>1</sup> 2         fS <sub>mb</sub> ,pH	[NH],         Ammonium         7.09487+05         mol.1 <sup>4</sup> 2         [fS <sub>mb</sub> :pH]           [NO_]         Nirate         0.00058952         mol.4 <sup>4</sup> 2         pH           [HcQ]         Carbonic acid         0.00068861         mol.4 <sup>4</sup> 2         fS <sub>col</sub> :pH	Imput         L         L         Imput	Imput         L         L         I hough mit           [CAT]         Solum (trong cations)         0.001522416         mol.L <sup>1</sup> 2         ftSpbH           [K]         Potassium         0.000383648         mol.L <sup>1</sup> 2         ftSpbH           [K]         Cholde (strong axions)         0.004293094         mol.L <sup>3</sup> 2         ftSpbH           [Far]         Ferrous ion         1.790678-55         mol.L <sup>3</sup> 2         ftSpbH	Imput         L         L         I hogge hr           [CAT]         Solum (trong cations)         0.001522416         mol.L <sup>1</sup> 2         ftSp2bH           [K]         Potassium         0.000383648         mol.L <sup>1</sup> 2         ftSp2bH           [AN]         Chloride (strong anions)         0.00493954         a         2         ftSp2bH           [Fe <sup>2</sup> ]         Ferrous ion         1.790678-55         mol.L <sup>4</sup> 2         ftSp2bH	Imput         L         L         I hogge her           [CAT]         Solum (trong cations)         0.001522416         mol.L <sup>1</sup> 2         ftS <sub>0-2</sub> bH           [K]         Potassium         0.000383648         mol.L <sup>1</sup> 2         ftS <sub>0-2</sub> bH           [K]         Potassium         0.000393964         10.L <sup>1</sup> 2         ftS <sub>0-2</sub> bH           [K]         Potassium         0.000393964         10.L <sup>1</sup> 2         ftS <sub>0-2</sub> bH           [K]         Forrous ion         1.790678-55         mol.L <sup>4</sup> 2         ftS <sub>0-2</sub> bH	[CAT]         Sodium (strong cations)         0.0052241         mitcl.         4         194g/bit           [CAT]         Sodium (strong cations)         0.00522416         molt. <sup>4</sup> 2         ftS <sub>cub</sub> :pH           [K]         Potassium         0.0033848         molt. <sup>4</sup> 2         ftS <sub>cub</sub> :pH           [AN]         Chloride (strong anions)         0.004230954         molt. <sup>4</sup> 2         ftS <sub>sub</sub> :pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [N]         Proton         6.30957608         mol.1 <sup>4</sup> 2         pH           [OH]         Hydroideion         1.3014567         mol.1 <sup>4</sup> 2         pH           [NH]         Free ammonia         4.45681E07         mol.1 <sup>4</sup> 2         f(S <sub>muk</sub> ) pH           [NH]         Free ammonia         0.000567565         mol.1 <sup>4</sup> 2         f(S <sub>muk</sub> ) pH           [Nu]         Nirrate         0.0000565561         mol.1 <sup>4</sup> 2         f(S <sub>muk</sub> ) pH           [HyCo]         Carbonic acid         0.000056561         mol.1 <sup>4</sup> 2         f(S <sub>muk</sub> ) pH	[Net,]         Ammonium         7.094874-05         mol.1 <sup>4</sup> 2         (Fis); PH           [No,]         Nitrate         0.00055927         mol.1 <sup>4</sup> 2         PH           [No,2]         Nitrate         0.00055927         mol.1 <sup>4</sup> 2         PH           [No,0]         Carbonicacid         0.00058561         mol.1 <sup>4</sup> 2         [Stap); PH	[CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>-4</sup> 2         ftSc.ab; pH           [V]         Potassium         0.000383648         mol.1 <sup>-4</sup> 2         ftSc.ab; pH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>-4</sup> 2         ftSc.ab; pH           [Fe <sup>1</sup> ]         Ferrous ion         1.790676-55         mol.1 <sup>-4</sup> 2         ftSc.ab; pH	[CAT]         Sodium (strong cations)         0.001522416         mol. <sup>1</sup> 2         ftSc.pl; pH           (r)         Potassium         0.00038364         mol.1 <sup>-1</sup> 2         ftSj; pH           (AN)         Cholned strong anions)         0.00243094         mol.1 <sup>-1</sup> 2         ftSj; pH           (Fe <sup>3</sup> )         Ferrousion         1.790676-55         mol.1 <sup>-4</sup> 2         ftSi; pH	[CAT]         Sodium (strong cations)         0.001522416         mol.L <sup>4</sup> 2         ftSc.gb, pH           (V)         Potassium         0.00038364         mol.L <sup>4</sup> 2         ftSj, pH           (AN)         Chloride (strong anions)         0.00423094         mol.L <sup>4</sup> 2         ftSj, pH           (Fa <sup>3</sup> )         Ferrousion         1.79067E55         mol.L <sup>4</sup> 2         ftSn, pH	[CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>-1</sup> 2         ftSc.pl; pH           (r)         Potasaium         0.00038364         mol.1 <sup>-1</sup> 2         ftSj; pH           (AN)         Cholnode strong anions)         0.00423094         mol.1 <sup>-1</sup> 2         ftSj; pH           (Fe) <sup>3</sup> Ferrousion         1.79067E-55         mol.4 <sup>-1</sup> 2         ftSn; pH	[CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>-1</sup> 2         (§5 <sub>2,01</sub> ); PH           [K1]         Potassium         0.000383648         mol.1 <sup>-3</sup> 2         (§5 <sub>1,01</sub> ); PH           [AN]         Choirde (strong anions)         0.004330954         mol.1 <sup>-3</sup> 2         (§5 <sub>1,01</sub> ); PH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [IY]         Proton         6.30957E-06         mol.1 <sup>1,4</sup> 2         pH           [OH]         Hydroideion         1.3014570         mol.1 <sup>1,4</sup> 2         pH           [NM,]         Free ammonia         4.45681E07         mol.1 <sup>1,4</sup> 2         fH           [NM,]         Ammonium         7.09487E05         mol.1 <sup>1,4</sup> 2         fS <sub>3mb</sub> .pH           [NM,]         Ammonium         0.00055551         mol.1 <sup>1,4</sup> 2         fS <sub>3mb</sub> .pH           [Moj.]         Nitrate         0.00055551         mol.1 <sup>1,4</sup> 2         pH           [Me <sup>2</sup> M]         Manedumi on 0.0005777         mol.1 <sup>1,4</sup> 2         fS <sub>3mb</sub> .pH	[NH:1]         Ammonium         7.94487£405         mol.1. <sup>4</sup> 2         ffSuul; PH           [No,1]         Nitrate         0.00058952         mol.1. <sup>4</sup> 2         PH           [Ni:0]         Carbonic acid         0.00068561         mol.1. <sup>4</sup> 2         PH           [Mi:0]         Maintenium ion         0.000619561         2         PH	[CAT]         Sodium (strong cations)         0.001522416         mol. <sup>1</sup> 2         ffS <sub>202</sub> ; pH           [K"]         Potassium         0.00038364         mol. <sup>1</sup> 2         ffS <sub>202</sub> ; pH           [AN]         Chloride (strong anions)         0.00423095         mol. <sup>1</sup> 2         ffS <sub>202</sub> ; pH           [Fe*]         Fervasion         1.79067E55         mol. <sup>1</sup> 2         ffS <sub>202</sub> ; pH	[CAT]         Sodium (ktong cations)         0.001532416         molt. <sup>1</sup> 2         ffsc.jb; PI           [K1]         Potassium         0.000338648         molt. <sup>2</sup> 2         ffsb; PI           [K1]         Foldsetting anions)         0.00423098         molt. <sup>21</sup> 2         ffsb; PI           [Fe <sup>3</sup> ]         Ferrousion         1.790676:55         molt. <sup>21</sup> 2         ffsb; PI	[CAT]         Sodium (ktrong cations)         0.001522416         mol.1 <sup>4</sup> 2         ffSc.pb; PH           [K <sup>1</sup> ]         Potassium         0.000383648         mol.1 <sup>4</sup> 2         ffSc.pb; PH           [AN]         Choirde (strong anions)         0.00423095         mol.1 <sup>4</sup> 2         ffSc.pb; PH           [Fe <sup>3</sup> ]         Ferrousion         1.79067E-55         mol.1 <sup>4</sup> 2         ffSc.pb; PH	[CAT]         Sodium (ktong cations)         0.001522416         mol.1 <sup>-1</sup> 2         ffSc.jb; PI           [K <sup>1</sup> ]         Potassium         0.000383648         mol.1 <sup>-1</sup> 2         ffSc.jb; PI           [AN]         Choirdé (strong anions)         0.00423095         mol.1 <sup>-1</sup> 2         ffSc.jb; PI           [Fe <sup>3</sup> ]         Ferousion         1.790676:55         mol.1 <sup>-1</sup> 2         ffSc.jb; PI	[CAT]         Sodium (strong cations)         0.001522416         mol.1         2         (TS <sub>0.0</sub> ): PH           [K]         Potasium         0.00035846         mol.1         2         (TS <sub>0.0</sub> ): PH           [AN]         Choirde (strong anions)         0.004230954         mol.1         2         (TS <sub>0.0</sub> ): PH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [H]         Proton         6.30575760         Mult         2         pH           [OM1         Hydroideion         1.30145407         mol.1 <sup>13</sup> 2         pH           [Nh1,]         Freammonia         4.45681507         mol.1 <sup>14</sup> 2         pH           [Nh1,]         Freammonia         4.45681507         mol.1 <sup>14</sup> 2         fH           [Nh1,]         Amonium         7.09497505         mol.1 <sup>14</sup> 2         fHspail.pH           [Nh1,]         Amonium         0.000356921         mol.1 <sup>14</sup> 2         fHspail.pH           [H_0,]         Nitrate         0.000557571         mol.1 <sup>14</sup> 2         fHspail.pH           [H_0,]         Carbonic acid         0.000557571         mol.1 <sup>14</sup> 2         fHspail.pH	[Nk1]         Ammonium         7.094874-05         mol.1 <sup>-1</sup> 2         ffSwp; PH           [No,1]         Nitrate         0.000556972         mol.4 <sup>-1</sup> 2         PH           [HcO]         Carbonic acid         0.00061757         mol.1 <sup>-1</sup> 2         ffSwp; PH           [Mg <sup>2</sup> ]         Magnesium ion         0.000617157         mol.1 <sup>-1</sup> 2         ffSwp; PH	Lot 1         Source accords         Out 3224240         Tel: 1         P Tel: 1	LOT 1         Solution getting control         UVX1322410         Tinle L <sup>2</sup> P           [K']         Potassium         0.000333648         mol.1 <sup>-1</sup> 2         ff Sq.; pH           [AN]         Cholride (strong anions)         0.004332495         mol.1 <sup>-1</sup> 2         ff Sq.; pH           [Fe <sup>3</sup> ]         Ferrousion         1.79067E-55         mol.1 <sup>-1</sup> 2         ff Sq.; pH	Lot 1         Solution groups causing         UNUS22410         Tini L <sup>2</sup> 4         Theory BP           [K]         Potassium         0.000333648         mol.1 <sup>-2</sup> 2         fts_1; pH           [K]         Dolorde (strong anions)         0.004322495         mol.1 <sup>-2</sup> fts_1; pH           [Fe <sup>3</sup> ]         Ferrousion         1.79067E-55         mol.1 <sup>-1</sup> 2         fts <sub>10</sub> ; pH	Lot 1         Solution groups control         UVUS224/10         Tini L <sup>2</sup> 4         Theory BH           [K']         Potassium         0.000333648         mol.1         2         ff Sc); pH           [KN]         Cholride (strong anions)         0.004322495         mol.1         2         ff Sc); pH           [Fe <sup>3</sup> ]         Ferrousion         1.79067E-55         mol.1         2         ff Sc); pH	[CV1]         sourcemptores entormy         uovisizerate         mol.t.         2         mbc.gb pH           [K1]         Potasium         0.000433648         mol.t. <sup>2</sup> 2         fls_jb jH           [AN]         Chloride (strong anions)         0.004230954         mol.t. <sup>2</sup> 2         fls_jb jH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.3057506         Mult         2         pH           [M]         fydroxideion         1.3014507         mol.1 <sup>4</sup> 2         pH           [Nit]         Free ammonia         4.45581507         mol.1 <sup>4</sup> 2         pH           [Nit]         Free ammonia         7.0947505         mol.1 <sup>4</sup> 2         fSmult           [Nit]         Normonium         7.0947505         mol.1 <sup>4</sup> 2         fSmult         mol.1 <sup>10</sup> [Not]         Nitrate         0.000559521         mol.1 <sup>4</sup> 2         gH         [Mit]           [Mg <sup>2</sup> ]         Magnetium ion         0.000551571         mol.1 <sup>4</sup> 2         fSmult         [Mit]	[Nit_]         Parmonium         7.09487E45         mol.1 <sup>4</sup> 2         P[Sup]; PI           [No,1]         Nitrate         0.000356972         mol.1 <sup>4</sup> 2         PH           [Nitrate         0.0003568958         mol.1 <sup>4</sup> 2         PH           [Mitrate]         0.000617157         mol.1 <sup>4</sup> 2         ffSup; PH           [Mg <sup>2</sup> ]         Magnesium ion         0.000617157         mol.1 <sup>4</sup> 2         ffSup; PH	[K']         Potasium         0.000383648         mol.1 <sup>-1</sup> 2         ffS <sub>0</sub> ;pH           [AM]         Cholride (strong anions)         0.004330548         mol.1 <sup>-1</sup> 2         ffS <sub>0</sub> ;pH           [Fe <sup>2</sup> ]         Ferrousion         1.79067855         mol.1 <sup>-1</sup> 2         ffS <sub>0</sub> ;pH	[K]         Potasium         0.000383648         mol.L <sup>3</sup> 2         ffS <sub>20</sub> ; H           [AN]         Chloride (strong anions)         0.004230954         mol.L <sup>3</sup> 2         ffS <sub>20</sub> ; H           [Fe <sup>3</sup> ]         Ferrousion         1.79067E-55         mol.L <sup>3</sup> 2         ffS <sub>102</sub> ; pH	[K1]         Potasium         0.000383648         mol.1 <sup>-1</sup> 1         formula           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>-1</sup> 2         ffs <sub>m</sub> ); pH           [Fe <sup>3</sup> ]         Ferrousion         1.790675-55         mol.1 <sup>-1</sup> 2         ffs <sub>m</sub> ); pH	[K]         Potasium         0.000383648         mol.1 <sup>-1</sup> 2         ffS <sub>20</sub> ; H           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>-1</sup> 2         ffS <sub>20</sub> ; H           [Fe <sup>3</sup> ]         Ferrousion         1.790675-55         mol.1 <sup>-1</sup> 2         ffS <sub>102</sub> ; H	IKT         Potassium         0.000383648         mol.1 <sup>-1</sup> 2         fts_b;p           IANI         Chloride (strong anions)         0.004230954         mol.1 <sup>-1</sup> 2         fts_b;p
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Protom         6.30575768         Imol. <sup>1,2</sup> 2         PH           [OH]         Hydroxidetion         1.30145607         Imol. <sup>1,2</sup> 2         PH           [Nh]         Free ammonia         4.45681E07         Imol. <sup>1,4</sup> 2         PH           [Nh]         Ammonium         7.09487E05         Imol. <sup>1,4</sup> 2         PH           [Nh]         Ammonium         7.09487E05         Imol. <sup>1,4</sup> 2         Imol. <sup>1,4</sup> [Nh]         Attraction control         0.000558921         Imol. <sup>1,4</sup> 2         Imol. <sup>1,4</sup> [No]         Nitrate         0.000517571         Mol. <sup>1,2</sup> 2         Imol. <sup>1,4</sup> [No]         Magnetum inn         0.000517571         2         Imol. <sup>1,4</sup> 2         Imol. <sup>1,4</sup>	[Nit_1]         Ammonium         7.09487E-05         mol.L <sup>1</sup> 2         ftSmb,DH           [NO_1]         Nitrate         0.000356972         mol.L <sup>1</sup> 2         pH           [HC_0]         Carbonic acid         0.000658561         mol.L <sup>2</sup> 2         ftSmb,DH           [Mg]*         Magnetium inn         0.000617157         mol.L <sup>2</sup> 2         ftSmb,DH           [Mg]*         Magnetium inn         0.000157157         mol.L <sup>2</sup> 2         ftSmb,DH	[K]         Potassium         0.000383648         mol.L <sup>-1</sup> 2         ft5j;;;pH           [AN]         Chloride (strong anions)         0.004230954         mol.L <sup>-1</sup> 2         ft5j;;pH           [Fe <sup>*</sup> ]         Ferrosion         1.73067655         mol.L <sup>-1</sup> 2         ft5j;;pH	[K"]         Potassium         0.000383648         mol.L <sup>1</sup> 2         f(s); pH           [AN]         Chloride(strong anions)         0.004230954         mol.L <sup>1</sup> 2         f(s); pH           [Fe <sup>3</sup> T]         Ferrousion         1.79067E-55         mol.L <sup>1</sup> 2         f(s); pH	[K"]         Potassium         0.000383648         mol.L <sup>1</sup> 2         f(s); pH           [AN]         Chloride (strong anions)         0.004230954         mol.L <sup>1</sup> 2         f(s); pH           [Fe <sup>3</sup> T]         Ferrousion         1.79067E-55         mol.L <sup>1</sup> 2         f(s); pH	[K"]         Potassium         0.000383648         mol.L <sup>1</sup> 2         f(s); pH           [AN]         Chloride (strong anions)         0.004230954         mol.L <sup>1</sup> 2         f(s); pH           [Fe <sup>3</sup> T]         Ferrousion         1.79067E-55         mol.L <sup>1</sup> 2         f(s); pH	[K"]         Potassium         0.000383648         mol.L <sup>1</sup> 2         f(s,); pH           [AN]         Chloride (strong anions)         0.004230954         mol.L <sup>1</sup> 2         f(s <sub>m</sub> ); pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [H]         Proton         6.30957E08         mol.1 <sup>4</sup> 2         pH           [OH]         Hydroideion         1.3014567         mol.1 <sup>4</sup> 2         pH           [NH]         Free ammonia         4.45681E07         mol.1 <sup>4</sup> 2         fS <sub>sub</sub> .pH           [NH]         Free ammonia         0.00052757         mol.1 <sup>4</sup> 2         fS <sub>sub</sub> .pH           [Nh]         Irrate         0.000657257         mol.1 <sup>4</sup> 2         fS <sub>sub</sub> .pH           [H <sub>6</sub> Ca]         Carbonic acid         0.00057157         mol.1 <sup>4</sup> 2         fS <sub>sub</sub> .pH           [M <sub>6</sub> T)         Magnetium ion         0.00057157         mol.1 <sup>4</sup> 2         fS <sub>sub</sub> .pH	[Nit.]         Ammonium         7.94487£45         mol.1 <sup>4</sup> 2         [%]sub.2H           [Nij.]         Nitrate         0.00058722         mol.1 <sup>4</sup> 2         PH           [Nij.Coj.]         Carbonic acid         0.000685861         mol.1 <sup>4</sup> 2         ff[Ssub.2H]           [Mig."]         Magnesium ion         0.00051757         mol.1 <sup>4</sup> 2         ff[Ssub.2H]           [CAT]         Sodium (strong cations)         0.00051246         mol.1 <sup>4</sup> 2         ff[Ssub.2H]	[V]         Potassium         0.00033848         mol.1         2         f[S <sub>2</sub> ); H           [AN]         Chloride (strong anions)         0.004230954         mol.1         2         f[S <sub>2</sub> ); H           [Fe*]         Ferrous ion         1.7906755         mol.1         2         f[S <sub>2</sub> ); B	[V]         Potasulum         0.00238548         mol.1 <sup>3</sup> 2         155,pH           [AN]         Childred getong anional)         0.00423054         mol.1 <sup>3</sup> 2         155,pH           [Fe <sup>3</sup> ]         Ferousion         0.17906755         mol.1 <sup>4</sup> 2         155,pH	[V]         Potassium         0.00038364         mol.1 <sup>3</sup> 2         [15], p.H           [AN]         Chindré strong anionsi         0.00423095         mol.1 <sup>3</sup> 2         [15], p.H           [Fe <sup>3</sup> ]         Ferrousion         1.79067E55         mol.1 <sup>3</sup> 2         [15], p.H	[V]         Potassium         0.00038364         mol.1 <sup>3</sup> 2         155,pH           [AN]         Childred gtong anionsi)         0.00423054         mol.1 <sup>3</sup> 2         155,pH           [F6 <sup>3</sup> )         Ferrousion         1.79067E55         mol.1 <sup>4</sup> 2         155,pH	[K"]         Potassium         0.000383648         mol.L <sup>-1</sup> 2         ft[5 <sub>0</sub> ; pH           [AN]         Chloride(strong anions)         0.004230954         mol.L <sup>-1</sup> 2         ft[5 <sub>w</sub> ]; pH
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [W]         Proton         6.30957E.08         mol.1 <sup>4</sup> 2         pH           [OHI         Hydroxideion         1.3014567         mol.1 <sup>4</sup> 2         pH           [IMH]         Free ammonia         4.45681E07         mol.1 <sup>4</sup> 2         fH           [IMH]         Free ammonia         4.45681E07         mol.1 <sup>4</sup> 2         fSmb pH           [IMH]         Free ammonia         0.0006585677         mol.1 <sup>4</sup> 2         fSmb pH           [IMO_]         Nitrate         0.000565851         mol.1 <sup>4</sup> 2         fSmb pH           [IMC]         Carbonic acid         0.000657577         mol.1 <sup>4</sup> 2         fSmb pH           [IMC]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         fSmb pH	[Net, ]         Ammonium         7.094874-05         mol.1 <sup>4</sup> 2         [f5 <sub>mab</sub> :pH]           [No, ]         Nirate         0.00055827         mol.1 <sup>4</sup> 2         PH           [Ng, ]         Nirate         0.00065861         mol.1 <sup>4</sup> 2         If5 <sub>mab</sub> :pH           [Mg <sup>2</sup> ]         Magnesiumion         0.000152246         2         Sh <sub>ab</sub> :pH           [CAT)         Solum (trans cations)         0.00152246         mol.1 <sup>4</sup> 2         If5 <sub>mab</sub> :pH	IANI         Chloride (strong anions)         0.004230954         molL <sup>1</sup> 2         RS <sub>ki</sub> ; pH           Ip <sup>2</sup> Ferrousion         1.79067E-55         molL <sup>4</sup> 2         RS <sub>ki</sub> ; pH	IANI         Chloride (strong anions)         0.004230954         mol.1         2         fStat.2H           [re <sup>3</sup> )         Ferrousion         1.790676:55         mol.1 <sup>-1</sup> 2         fStat.2H	IANI         Chloride (strong anions)         0.004230954         mol.1 <sup>-1</sup> 2         ftspill; ftspill;         H           Ipe <sup>2</sup> T         Ferrousion         1.79067E-55         mol.1 <sup>-1</sup> 2         ftspill;         H	IANI         Chloride (strong anions)         0.004230954         mol.1         2         ffs <sub>kik</sub> ;pH           If Fe <sup>2</sup> y         Ferrousion         1.79067E-55         mol.1 <sup>A</sup> 2         ffs <sub>kik</sub> ;pH	IANI         Chloride (strong anions)         0.004230956         mol. 1 <sup>3</sup> 2         If Sum; p.H
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.3057506         mol.1 <sup>13</sup> 2         pH           [ONI         Hydroideion         1.30143607         mol.1 <sup>13</sup> 2         pH           [INI, J         Free ammonia         4.45681E07         mol.1 <sup>14</sup> 2         pH           [INI, J         Ammonium         7.09487657         mol.1 <sup>14</sup> 2         fStash.pH           [INI, J         Ammonium         0.000358927         mol.1 <sup>14</sup> 2         pH           [INi, J         Ammonium         0.000358972         mol.1 <sup>14</sup> 2         pH           [INi, J         Ammonium         0.00055757         mol.1 <sup>14</sup> 2         fStash.pH           [INi, J         Ammonium         0.00055757         mol.1 <sup>14</sup> 2         fStash.pH           [IK] </td <th>[Nit,7]         Ammonium         7.09487£95         mol.1<sup>4</sup>         2         1 (Shu); PH           [NiC,1]         Nitrate         0.000356972         mol.1<sup>4</sup>         2         PH           [MiC,0]         Carbonic acid         0.000356972         mol.1<sup>4</sup>         2         ft_Su); PH           [MiC,0]         Carbonic acid         0.000637157         mol.1<sup>4</sup>         2         ft_Su); PH           [Mig<sup>2</sup>]         Magnesiumion         0.001522416         mol.1<sup>4</sup>         2         ft_Su); PH           [K1]         Potadum         0.00152466         mol.1<sup>4</sup>         2         ft_Su); PH</th> <td>[AN]         Chloride (strong anions)         0.004230954         mol.t.<sup>3</sup>         2         ft5<sub>30</sub>; pH           [Fe<sup>3</sup>)         Ferrousion         1.79067E-55         mol.t.<sup>4</sup>         2         ft5<sub>10</sub>; pH</td> <td>[AN]         Chloride (strong anions)         0.004230954         mol.L<sup>-1</sup>         2         ftS<sub>30</sub>; pH           [Fe<sup>2</sup>]         Ferrous ion         1.79067E55         mol.L<sup>-1</sup>         2         ftS<sub>100</sub>; pH</td> <td>[AN]         Chloride (strong anions)         0.004230954         mol.L<sup>-1</sup>         2         fts_m); pH           [Fe<sup>2</sup>]         Ferrousion         1.79067E-55         mol.L<sup>-1</sup>         2         ftSm); pH</td> <td>[AN]         Chloride (strong anions)         0.004230954         mol.L<sup>-1</sup>         2         ftS<sub>M</sub>); pH           [Fe<sup>2</sup>]         Ferrousion         1.79067E:55         mol.L<sup>-1</sup>         2         ftS<sub>m</sub>); pH</td> <td>[AN]         Chloride (strong anions)         0.004230954         mol.L<sup>-1</sup>         2         f(\$_{N_N}); pH</td>	[Nit,7]         Ammonium         7.09487£95         mol.1 <sup>4</sup> 2         1 (Shu); PH           [NiC,1]         Nitrate         0.000356972         mol.1 <sup>4</sup> 2         PH           [MiC,0]         Carbonic acid         0.000356972         mol.1 <sup>4</sup> 2         ft_Su); PH           [MiC,0]         Carbonic acid         0.000637157         mol.1 <sup>4</sup> 2         ft_Su); PH           [Mig <sup>2</sup> ]         Magnesiumion         0.001522416         mol.1 <sup>4</sup> 2         ft_Su); PH           [K1]         Potadum         0.00152466         mol.1 <sup>4</sup> 2         ft_Su); PH	[AN]         Chloride (strong anions)         0.004230954         mol.t. <sup>3</sup> 2         ft5 <sub>30</sub> ; pH           [Fe <sup>3</sup> )         Ferrousion         1.79067E-55         mol.t. <sup>4</sup> 2         ft5 <sub>10</sub> ; pH	[AN]         Chloride (strong anions)         0.004230954         mol.L <sup>-1</sup> 2         ftS <sub>30</sub> ; pH           [Fe <sup>2</sup> ]         Ferrous ion         1.79067E55         mol.L <sup>-1</sup> 2         ftS <sub>100</sub> ; pH	[AN]         Chloride (strong anions)         0.004230954         mol.L <sup>-1</sup> 2         fts_m); pH           [Fe <sup>2</sup> ]         Ferrousion         1.79067E-55         mol.L <sup>-1</sup> 2         ftSm); pH	[AN]         Chloride (strong anions)         0.004230954         mol.L <sup>-1</sup> 2         ftS <sub>M</sub> ); pH           [Fe <sup>2</sup> ]         Ferrousion         1.79067E:55         mol.L <sup>-1</sup> 2         ftS <sub>m</sub> ); pH	[AN]         Chloride (strong anions)         0.004230954         mol.L <sup>-1</sup> 2         f(\$_{N_N}); pH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30575768         Minl. <sup>12</sup> 2         pH           [OM]         Hydroxidetion         1.30145607         mol. <sup>12</sup> 2         pH           [Nul, ]         Free ammonia         4.45681607         mol. <sup>14</sup> 2         pH           [Nul, ]         Ammonium         7.0948765         mol. <sup>14</sup> 2         [% <sub>mul</sub> , pH           [Nul, ]         Ammonium         0.000559572         mol. <sup>14</sup> 2         [% <sub>mul</sub> , pH           [No], I         Nitrate         0.000559721         mol. <sup>14</sup> 2         [% <sub>mul</sub> , pH           [No]         Magnesium Ion         0.00051757         mol. <sup>14</sup> 2         [% <sub>mul</sub> , pH           [K]         Pdisultific for exclassion         0.00051757         mol. <sup>14</sup> 2         [% <sub>mul</sub> , pH           [K]         Pdisultific for exclassion         0.00051757         mol. <sup>14</sup> 2         [% <sub>mul</sub> , pH	[Nit]         Ammonium         7.09487E-05         mol.1 <sup>1</sup> 2         [Tisma]: PH           [Nij]         Nitrate         0.00058725         mol.1 <sup>1</sup> 2         PH           [Nij]         Nitrate         0.00058725         mol.1 <sup>1</sup> 2         P[Stop]: PH           [Mij]         Magnesium ion         0.000587157         mol.1 <sup>1</sup> 2         P[Stop]: PH           [Mij]         Magnesium ion         0.000587157         mol.1 <sup>1</sup> 2         P[Stop]: PH           [Mij]         Sodium (strong cations)         0.000587157         mol.1 <sup>1</sup> 2         P[Stop]: PH           [CAT]         Sodium (strong cations)         0.00058745         mol.1 <sup>1</sup> 2         P[Stop]: PH	[fer]         [strain]         0.00000000000000000000000000000000000	[Fe <sup>3</sup> ]         Ferrousion         1.79067E55         mol.L <sup>4</sup> 2         П5 <sub>167</sub> .pH	[Fe <sup>3</sup> ]         Construction (monty)         Construction (monty)         Construction (monty)         Construction (monty)           [Fe <sup>3</sup> ]         Ferrousion         1.79067E55         mont,1         2         ffS <sub>Feb</sub> , pH	[Fe <sup>2</sup> ]         Ferrousion         1.79067E-55         mol.L <sup>1</sup> 2         ffS <sub>162</sub> .pH	International and the second s
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [W]         Proton         6.30957E-08         mol. <sup>13</sup> 2         pH           [OHI         Hydroideion         1.30148-07         mol. <sup>13</sup> 2         pH           [NH]         Free ammonia         4.45881E-07         mol. <sup>12</sup> 2         ftS <sub>mab</sub> .pH           [NH]         Free ammonia         4.45881E-07         mol. <sup>12</sup> 2         ftS <sub>mab</sub> .pH           [Nh]         Free ammonia         4.45881E-07         mol. <sup>12</sup> 2         ftS <sub>mab</sub> .pH           [Nh]         Ammonium         7.09487E-05         mol. <sup>12</sup> 2         ftS <sub>mab</sub> .pH           [Nh]         Ammonium         0.000557521         mol. <sup>13</sup> 2         ftS <sub>mab</sub> .pH           [H]         On00557551         mol. <sup>13</sup> 2         ftS <sub>mab</sub> .pH           [M]         Magnesiumion         0.00057157         mol. <sup>13</sup> 2         ftS <sub>mab</sub> .pH           [CAT)         Soluting trong action of         0.000572416         mol. <sup>13</sup> 2         ftS <sub>mab</sub> .pH           [K]         Potassium         0.0003848         mol. <sup>13</sup> 2         ftS <sub>mab</sub> .pH	[Nit]         Ammonium         7.09487E49         mol.1 <sup>1</sup> 2         [Fism], PH           [Nit]         Intrate         0.00058927         mol.1 <sup>1</sup> 2         PH           [Nit]         Carbonic acid         0.00068561         mol.1 <sup>1</sup> 2         P[Sou], PH           [Mit]         Magnetium inon         0.000617157         mol.1 <sup>1</sup> 2         P[Sou], PH           [Mit]         Magnetium inon         0.000617157         mol.1 <sup>11</sup> 2         P[Sou], PH           [Mit]         Magnetium inon         0.00051737         mol.1 <sup>11</sup> 2         P[Sou], PH           [Vit]         Potasium         0.00053846         mol.1 <sup>11</sup> 2         P[Sou], PH           [Vit]         Potasium         0.00053846         mol.1 <sup>11</sup> 2         P[Sou], PH	[Fe <sup>3</sup> "] Ferrousion 1.79067E-55 mol.L <sup>1</sup> 2 [f5 <sub>rel</sub> ); pH	[Fe <sup>3</sup> ]         Ferrousion         1.79067£55         mol.L <sup>1</sup> 2         ffSmol.PH	[Fe <sup>3</sup> ]         Ferrousion         1.79087E-SS         mol.1 <sup>4</sup> 2         4[Se <sub>10</sub> k.pH]	[Fe <sup>3</sup> ]         Ferrousion         1.79067E-55         mol.L <sup>1</sup> 2         ffSmol.PH	
Symbol         Name         Value         Unit         Decimals         Rule         Principle/comment           [IT]         Proton         6.30957E-06         mol. <sup>1,1</sup> 2         pH           [OH]         Hydroideion         1.3014367         mol. <sup>1,4</sup> 2         pH           [IN4,]         Free ammonia         4.45681607         mol. <sup>1,4</sup> 2         PH           [IN4,]         Ammonium         7.09487E-05         mol. <sup>1,4</sup> 2         fS <sub>304</sub> , pH           [IN4,]         Ammonium         7.09487E-05         mol. <sup>1,4</sup> 2         fS <sub>304</sub> , pH           [IN6,]         Nitrateid         0.00058551         mol. <sup>1,4</sup> 2         fS <sub>304</sub> , pH           [IN6,]         Gatomic acid         0.00058551         mol. <sup>1,4</sup> 2         fS <sub>304</sub> , pH           [IN6]         Magnesium ion         0.000512777         mol. <sup>1,4</sup> 2         fS <sub>504</sub> , pH           [IA7]         Sodium (strong cations)         0.001522416         mol. <sup>1,4</sup> 2         fS <sub>504</sub> , pH           [IA1]         Choide strong anono         0.00038484         mol. <sup>1,4</sup> 2         fS <sub>504</sub> , pH           [IA1]         Dotode strong anono         0.000384564         mol. <sup>1,4</sup> <	[Nit_2]         Ammonium         7.94487£49         mol.1 <sup>1,1</sup> 2         f Subj.pH           [Nit_2]         Intrate         0.000258207         mol.1 <sup>1,1</sup> 2         PH           [Nit_2]         Carbonic acid         0.00045861         mol.1 <sup>1,1</sup> 2         f Subj.pH           [Mit_2]         Magnesiumion         0.00045861         mol.1 <sup>1,1</sup> 2         f Subj.pH           [CAT)         Solum (trong cations)         0.001522416         mol.1 <sup>1,1</sup> 2         f Subj.pH           [K]         Potasium         0.00038864         mol.1 <sup>1,2</sup> 2         f Subj.pH           [K]         Octobergtrong anonon         0.000458964         mol.1 <sup>1,2</sup> 2         f Subj.pH	[Fe <sup>z</sup> ]  Ferrousion 1.79067E-55 mol.L <sup>-1</sup> 2 [fS <sub>re2</sub> ); pH	[Fe*"]         Ferrousion         1.79067E-55         mol.L <sup>1</sup> 2         If Strag2; pH	[Fe <sup>*7</sup> ] Ferrousion 1.79067E-55 mol.L <sup>1</sup> 2 f(S <sub>FG</sub> ); pH	[Fe*"]         Ferrousion         1.79067E-55         mol.L <sup>-1</sup> 2         [¶5 <sub>icb</sub> ); pH	
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [IY]         Proton         6.30957E-08         mol.1 <sup>-1</sup> 2         pH           [OH]         Hydroxide ion         1.301452-07         mol.1 <sup>-1</sup> 2         pH           [IM],         Free ammonia         4.45681E-07         mol.1 <sup>-1</sup> 2         pH           [IM],         Free ammonia         4.45681E-07         mol.1 <sup>-1</sup> 2         fSmub.pH           [IM],         Ammonium         7.09487455         mol.1 <sup>-1</sup> 2         fSmub.pH           [IM],         Ammonium         0.000356972         mol.1 <sup>-1</sup> 2         fSmub.pH           [IM],         Nitrate         0.000085861         mol.1 <sup>-1</sup> 2         fSmub.pH           [IM],         Carbonic acid         0.000085861         mol.1 <sup>-1</sup> 2         [fSmub.pH           [IM],         Mirgenium ion         0.000152216         mol.1 <sup>-1</sup> 2         [fSmub.pH           [IK]         Sodium (strong cations)         0.001522416         mol.1 <sup>-1</sup> 2         [fSmb.pH           [IK]         Potasium         0.000383648         mol.1 <sup>-1</sup> 2         [f	[Net, ]         Ammonium         7.09487405         mol.1 <sup>4</sup> 2         [fSug]: PH           [No, ]         Nitrate         0.0005872         mol.1 <sup>4</sup> 2         PH           [H,CQ]         Carbonic acid         0.00068861         mol.1 <sup>4</sup> 2         fSug]: PH           [Mg <sup>2</sup> )         Magnetium ion         0.00068861         mol.1 <sup>4</sup> 2         fSug]: PH           [EAT]         Sodium (strong cations)         0.001532416         mol.1 <sup>4</sup> 2         fSug]: PH           [K1]         Potasium         0.00038364         mol.1 <sup>4</sup> 2         fSug]: PH           [K1]         Potasium         0.00038364         mol.1 <sup>4</sup> 2         fSug]: PH	[re] reiousion 2./300/033 mol.c 2 1992/97	[16] Lettonatorit 71/2001.023 UDI'T 7 dol/5/1/6.1	[Le] Leitonion Y13001.523 LIDI'T 7 4 495% htt	[Le] Leuronsion Truson.com III'r T Leiden.	1700575.55 mal 1 2 (15.) nH
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [N]         Proton         6.30957c9         mol. <sup>1</sup> 2         pH           [OH]         Hydroxide ion         1.30148-607         mol. <sup>1</sup> 2         pH           [NH]         Ammonium         7.0987c5         mol. <sup>1</sup> 2         fSpm.pH           [NH]         Free ammonia         4.45681607         mol. <sup>1</sup> 2         fSpm.pH           [NH]         Ammonium         7.0987c56         mol. <sup>1</sup> 2         fSpm.pH           [MG]         Nitrate         0.00035972         mol. <sup>1</sup> 2         fSpm.pH           [Mg]         Magnetium ion         0.000051377         mol. <sup>1</sup> 2         fSpm.pH           [CAT)         Sodium (strong cations)         0.000358972         mol. <sup>1</sup> 2         fSpm.pH           [CAT)         Sodium (strong cations)         0.000358972         mol. <sup>1</sup> 2         fSpm.pH           [CAT)         Sodium (strong cations)         0.00035886         mol. <sup>1</sup> 2         fSpm.pH           [AN]         Chloride (strong anions)         0.000428954         1         5         fSpm.pH <th>[Nhc]         Ammonium         7.094874-05         mol.1<sup>4</sup>         2         1 (Sh<sub>mab</sub>, PH           [Nhc]         Nitrate         0.00058792         mol.1<sup>4</sup>         2         f(Sh<sub>mab</sub>, PH           [McG]         Carbonic acid         0.000685861         mol.1<sup>4</sup>         2         f(Sh<sub>cab</sub>, PH           [McG]         Magnesium ion         0.00051757         mol.1<sup>4</sup>         2         f(Sh<sub>cab</sub>, PH           [CAT]         Sodium (strong cations)         0.001522416         mol.1<sup>4</sup>         2         f(Sh<sub>cab</sub>, PH           [CK]         Potasium         0.00033954         mol.1<sup>4</sup>         2         f(Sh<sub>cab</sub>, PH           [AN]         Chloride (strong anions)         0.004230954         mol.1<sup>4</sup>         2         f(Sh<sub>cab</sub>, PH</th> <td></td> <td></td> <td></td> <td></td> <td>[Fe"] [Ferrousion 1./906/t-55 mol.L" 2 [15re]; PM</td>	[Nhc]         Ammonium         7.094874-05         mol.1 <sup>4</sup> 2         1 (Sh <sub>mab</sub> , PH           [Nhc]         Nitrate         0.00058792         mol.1 <sup>4</sup> 2         f(Sh <sub>mab</sub> , PH           [McG]         Carbonic acid         0.000685861         mol.1 <sup>4</sup> 2         f(Sh <sub>cab</sub> , PH           [McG]         Magnesium ion         0.00051757         mol.1 <sup>4</sup> 2         f(Sh <sub>cab</sub> , PH           [CAT]         Sodium (strong cations)         0.001522416         mol.1 <sup>4</sup> 2         f(Sh <sub>cab</sub> , PH           [CK]         Potasium         0.00033954         mol.1 <sup>4</sup> 2         f(Sh <sub>cab</sub> , PH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>4</sup> 2         f(Sh <sub>cab</sub> , PH					[Fe"] [Ferrousion 1./906/t-55 mol.L" 2 [15re]; PM
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [N]         Proton         6.30057-08         mol. <sup>1</sup> 2         pH           [OH]         Hydroxideion         1.30148-07         mol. <sup>1</sup> 2         pH           [NH]         Ammonium         7.09487-05         mol. <sup>1</sup> 2         fS <sub>mub</sub> .pH           [NH]         Ammonium         7.09487-05         mol. <sup>1</sup> 2         fS <sub>mub</sub> .pH           [NH]         Ammonium         0.00035972         mol. <sup>1</sup> 2         fS <sub>mub</sub> .pH           [Mg]         Magnesium ion         0.000358971         mol. <sup>1</sup> 2         fS <sub>mub</sub> .pH           [Mg]         Magnesium ion         0.00058971         mol. <sup>1</sup> 2         fS <sub>mub</sub> .pH           [CAT]         Sodium (trong cations)         0.001522416         mol. <sup>1</sup> 2         fS <sub>mub</sub> .pH           [K]         Petaulum         0.00035868         mol. <sup>1</sup> 2         fS <sub>mub</sub> .pH           [CAT]         Sodium (trong cations)         0.001522416         mol. <sup>1</sup> 2         fS <sub>mub</sub> .pH           [K]         Potaulum         0.000335954         mol. <sup>1</sup> 2         fS <sub>mub</sub> .pH <th>[Nh], Ammonium         7.09487+05         mol.1<sup>4</sup>         2         [%]s_{0.1} bH           [Nh], Nirrate         0.00058752         mol.1<sup>4</sup>         2         0         H           [Nh, O], Nirrate         0.00058752         mol.1<sup>4</sup>         2         0         H           [Nh, O], Nirrate         0.00058751         mol.1<sup>4</sup>         2         0         S_{0.01} BH           [Nh, O], Nirrate         0.00051757         mol.1<sup>4</sup>         2         0         S_{0.01} BH           [CAT)         Sodium Strong cations)         0.000512416         0         1         2         0           [K]         Potassium         0.00038648         mol.1<sup>3</sup>         2         0         S_{0.01} H           [K]         Othoride (strong anions)         0.004230954         mol.1<sup>3</sup>         2         0         S_{0.01} H           [Ka<sup>1</sup>)         Chloride (strong sinons)         0.204230954         mol.1<sup>3</sup>         2         0         S_{0.01} H</th> <td></td> <td></td> <td></td> <td></td> <td>the first second difference of the second seco</td>	[Nh], Ammonium         7.09487+05         mol.1 <sup>4</sup> 2         [%]s_{0.1} bH           [Nh], Nirrate         0.00058752         mol.1 <sup>4</sup> 2         0         H           [Nh, O], Nirrate         0.00058752         mol.1 <sup>4</sup> 2         0         H           [Nh, O], Nirrate         0.00058751         mol.1 <sup>4</sup> 2         0         S_{0.01} BH           [Nh, O], Nirrate         0.00051757         mol.1 <sup>4</sup> 2         0         S_{0.01} BH           [CAT)         Sodium Strong cations)         0.000512416         0         1         2         0           [K]         Potassium         0.00038648         mol.1 <sup>3</sup> 2         0         S_{0.01} H           [K]         Othoride (strong anions)         0.004230954         mol.1 <sup>3</sup> 2         0         S_{0.01} H           [Ka <sup>1</sup> )         Chloride (strong sinons)         0.204230954         mol.1 <sup>3</sup> 2         0         S_{0.01} H					the first second difference of the second seco
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957E-08         mol.1 <sup>4</sup> 2         pH           [GH]         Hydroxide ion         1.301452-07         mol.1 <sup>4</sup> 2         pH           [MH]         Free ammonia         4.45581E-07         mol.1 <sup>4</sup> 2         ftSpace.pH           [MH]         Free ammonia         4.45581E-07         mol.1 <sup>4</sup> 2         ftSpace.pH           [MH]         Ammonium         7.09487E-05         mol.1 <sup>4</sup> 2         ftSpace.pH           [MO_]         Nitrate         0.00050927         mol.1 <sup>4</sup> 2         ftSpace.pH           [MG]         Magnesiumion         0.00068581         mol.1 <sup>4</sup> 2         ftSpace.pH           [MG]*         Magnesiumion         0.0006352416         mol.1 <sup>4</sup> 2         ftSpace.pH           [CAT)         Solumitstrong cations)         0.000232464         mol.1 <sup>4</sup> 2         ftSpace.pH           [KN]         Petasium         0.000338648         mol.1 <sup>4</sup> 2         ftSpace.pH           [AN]         Chloride (strong anions)         0.004230954         mol.1 <sup>4</sup> 2 <th>[Nh], Ammonium         7.09487+05         mol.1<sup>3</sup>         2         [Sh<sub>mb</sub>, PH           [No], Nitrate         0.00055927         mol.1<sup>4</sup>         2         flS<sub>mb</sub>, PH           [Nf, CD], Carbonic acid         0.00058961         mol.1<sup>4</sup>         2         flS<sub>mb</sub>, PH           [Mg]         Magnesium ion         0.00051379         mol.1<sup>4</sup>         2         flS<sub>mb</sub>, PH           [CAT)         Solumi Kromçatalon         0.00052146         mol.1<sup>4</sup>         2         flS<sub>mb</sub>, PH           [K]         Petasium         0.000383648         mol.1<sup>4</sup>         2         flS<sub>mb</sub>, PH           [K]         Debolic acid         0.000383648         mol.1<sup>4</sup>         2         flS<sub>mb</sub>, PH           [K]         Debolic acid         0.000383648         mol.1<sup>4</sup>         2         flS<sub>mb</sub>, PH           [K]         Chloride (strong anions)         0.004230954         mol.1<sup>4</sup>         2         flS<sub>mb</sub>, PH           [K<sup>2</sup>]         Perous ion         1.79667455         mol.1<sup>4</sup>         2         flS<sub>mb</sub>, PH</th> <td></td> <td></td> <td></td> <td></td> <td></td>	[Nh], Ammonium         7.09487+05         mol.1 <sup>3</sup> 2         [Sh <sub>mb</sub> , PH           [No], Nitrate         0.00055927         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH           [Nf, CD], Carbonic acid         0.00058961         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH           [Mg]         Magnesium ion         0.00051379         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH           [CAT)         Solumi Kromçatalon         0.00052146         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH           [K]         Petasium         0.000383648         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH           [K]         Debolic acid         0.000383648         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH           [K]         Debolic acid         0.000383648         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH           [K]         Chloride (strong anions)         0.004230954         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH           [K <sup>2</sup> ]         Perous ion         1.79667455         mol.1 <sup>4</sup> 2         flS <sub>mb</sub> , PH					
Symbol         Nome         Value         Unit         Decimals         Rule         Principle/comment           [M]         Proton         6.30957E-08         mol.1 <sup>4</sup> 2         pH           [GH]         Hydroxide ion         1.30145207         mol.1 <sup>4</sup> 2         pH           [Mu]         Free ammonia         4.45681E-07         mol.1 <sup>4</sup> 2         fFee           [Mu,]         Free ammonia         4.45681E-07         mol.1 <sup>4</sup> 2         fFee           [Mu,]         Ammonium         7.09487E-05         mol.1 <sup>4</sup> 2         fSus.bH           [Mu,]         Ammonium         0.000556972         mol.1 <sup>4</sup> 2         fSus.bH           [Mu]         Mengesumion         0.000556972         mol.1 <sup>4</sup> 2         fSus.bH           [Mu]         Mengesumion         0.000556972         mol.1 <sup>4</sup> 2         fSus.bH           [GAT]         Sodium (strong cations)         0.000535215         mol.1 <sup>4</sup> 2         fSus.bH           [K]         Petasium         0.000383648         mol.1 <sup>4</sup> 2         fSus.bH           [K]         Petasium         0.000383648         mol.1 <sup>4</sup> 2         fSus.bH	[Net, ]         Ammonium         7.09487+05         mol.1 <sup>4</sup> 2         [Shap, bH           [Mo, ]         Nitrate         0.00055927         mol.1 <sup>4</sup> 2         BH           [Mg <sup>2</sup> ]         Magnesiumion         0.00065851         mol.1 <sup>4</sup> 2         BS <sub>ap</sub> , bH           [Mg <sup>2</sup> ]         Magnesiumion         0.0005272         mol.1 <sup>4</sup> 2         BS <sub>ap</sub> , bH           [Mg <sup>2</sup> ]         Magnesiumion         0.00061757         mol.1 <sup>4</sup> 2         BS <sub>ap</sub> , bH           [M7]         Solum (trong cations)         0.001522416         mol.1 <sup>4</sup> 2         BS <sub>ap</sub> , bH           [K1]         Potasium         0.00033848         mol.1 <sup>4</sup> 2         BS <sub>ap</sub> , bH           [K1]         Forousion         0.00403954         2         BS <sub>ap</sub> , bH           [Fe <sup>3</sup> ]         Ferrousion         1.79067855         mol.1 <sup>4</sup> 2         BS <sub>ap</sub> , bH					

Figure 24 The **pH** and **Species** worksheets of the Sumo1 model. Please note that some rows are hidden.

Process units can reference the content of these worksheets with shortcut symbols and the triplet notation. Figure 25 show the pH calculation section of a process unit:

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a pl	H calculation						
95							
96		Equilibrium calculated variables	Codelocation(Equilibrium)				
97	Symbol	Name	Expression	Unit	Decimals	Rule	Principle/comment
98	VMODEL.pH.Symbol,SPC[]	Coefficient for MODEL.SPC.Name involvement in MODEL.pH.Name	MODEL.pH.SPC[]			[n]; Type(Equilibrium)	
99	CVAR[]	MODEL.CVAR.Name	MODEL.CVAR.Expression[]	MODEL.CVAR.Unit		[n]; Type(Equilibrium)	Equilibrium calculated va
00							
01		Equilibrium species	Codelocation(Equilibrium)				
02	Symbol	Name	Expression	Unit	Decimals	Rule	Principle/comment
03	SPC[]	MODEL.Species.Name	MODELpH.Symbol,SPC	MODEL.Species.Unit		[n]; Type(Equilibrium); sum(MODEL.pH.Symbol)	
14			_				
05		Charge balance and ionic strength	Codelocation(Equilibrium)				
06	Symbol	Name	Expression	Unit	Decimals	Rule	Principle/comment
07	MODEL.pH.Symbol[]	MODEL.pH.Name	MODEL.pH.SPC*SPC[]	MODEL.pH.Unit		sum(SPC); Type(Chargebalance); [n]	
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*Figure 25 The pH calculation section on the Code sheet of a process unit.* 

The three tables contain the following advanced expansions:

• in row 598 *Symbol* contains two expandables: MODEL.pH.Symbol and SPC. The *Name* column contains also two matching expandables which will not cause any problem. Expression has two expandables in the tricky way, explained in the previous section. This indicates that the result will be the same bloated table of assignments as in the previous example:

Nr.	Symbol	Name	Expression
1	V <sub>dissH2O,[H+]</sub>	Coefficient for Proton involvement in	10^(-pH)
		Dissociation of water	
12	VmapSFerrous,[H+]	Coefficient for Proton involvement in ferrous	
		ions dissociated	
13	VdissH2O,[OH-]	Coefficient for Hydroxide ion involvement in	KW/[H+]
		Dissociation of water	
24	VmapSFerrous,[OH-]	Coefficient for Hydroxide ion involvement in	
		ferrous ions dissociated	
240	VmapSFerrous,[Fe2+]	Coefficient for Ferrous ion involvement in	S <sub>Fe2</sub> /(AM <sub>Fe</sub> *1000)
		ferrous ions dissociated	

Table 6 Result of expanding row 598.

- in row 599 a simple expansion can be performed with a simple result set like in the Table 2, but instead of state variables the result will contain calculated variables of type Equilibrium.
- in row 603 *Symbol* contains one expandable, but *Expression* contains a matching and a non-matching expandable. The non-matching should be eliminated by a rule, in the case by the rule sum(MODEL.pH.Symbol). First, the summation result will be:

SPC[] = VdissH20,SPC[] + ... + VmapSFerrous,SPC[]

and after expansion the result is the following list:

Nr.	Symbol	Name	Expression	Unit
1	[H+][]	Proton	$V_{dissH2O,[H+]}[] + + V_{mapSFerrous,[H+]}[]$	mol.L-1
20	[Fe2+][]	Ferrous ion	$V_{dissH2O,[Fe2+]}[] + + V_{mapSFerrous,[Fe2+]}[]$	mol.L-1
		T-11.7 D	11 . (	

Table 7 Result of expanding row 603.

• in row 607 *Symbol* contains one expandable, but *Expression*, again, contains a matching and a non-matching expandable. The elimination of the non-matching expandable is performed by the sum(SPC) rule. First, the summation result will be:

MODEL.pH.Symbol[] = MODEL.pH.[H+] \* [H+][] + ... + MODEL.pH.[Fe2+] \*
[Fe2+][]

The Type(Chargebalance) rule selects the second table on the pH worksheet and the resulting list of assignments will be:

Nr.	Symbol	Name	Expression	Unit
1	chargebalance[]	Charge balance	1 * [H+][] + + 2 * [Fe2+][]	mol.L-1
2	IScalc[]	Ionic strength	$f_{mono,IS,cat} * [H+][] + + f_{di,IS,cat} * [Fe2+][]$	mol.L-1
		E 11 2 B		

Table 8 Result of expanding row 607.

## 6.4 Event handling

Events in SumoSlang are represented by a chain of function calls. An event function is defined in the Event code location. The name of the function is the section part of the Codelocation(...) argument. The event function has one argument usually to pass timing information.

The event function can be called in process code by setting *Symbol* to the function name, *Expression* to the function argument and specifying a Call rule, as the next example shows:

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но	me Insert	Page Layout Formulas	Data Review View Add-Ins				🔄 Share 🗸
26		$\checkmark f_x$					
A	В	c	D	E	F	G	
		Controller initialization	Codelocation(ZeroTime)				
	Symbol	Name	Expression	Unit	Decimals	Rule	Principle/comment
	MV	Manipulated variable	MV,0	MVunit			
١.	CVerr history[]	Controlled variable error history	0	CVunit		[n]	
	controltime 🗨	Call the controller code	Now			Call	
		· · · · · · · · · · · · · · · · · · ·					-
		Controller evaluation	Codelocation(Event, controltime)				
	Symbol	Name	Expression	Unit	Decimals	Rule	Principle/comment
	t <sub>control</sub>	Control time period	t <sub>control,s</sub> / c <sub>s,d</sub>	d			
	CV <sub>err</sub>	Controlled variable error	CV <sub>setp</sub> - CV	CVunit			
	dCV <sub>err</sub>	Controlled variable error derivative	(CV <sub>err</sub> - CV <sub>err,histore</sub> [1])/t <sub>control</sub>	CVunit.d <sup>1</sup>			
	$\mathrm{CV}_{\mathrm{err,history,status}}$	Controlled variable error history update	MoveAndPrepend(CV <sub>err,history</sub> ; CV <sub>err</sub> )	CVunit			
	CV <sub>err,integ</sub>	Controlled variable error integrate	Average(CV <sub>ort,history</sub> ) * t <sub>control</sub> * n	CVunit.d			
	dMV_dt	Manipulated variable change	direction * K <sub>P,PID</sub> * (CV <sub>err</sub> + K <sub>I,PID</sub> * CV <sub>err,integ</sub> + K <sub>D,PID</sub> * dCV <sub>err</sub> )	MVunit.d <sup>-1</sup>			
	MV	Manipulated variable	Hardbound(MV + dMV_dt; MV <sub>min</sub> ; MV <sub>max</sub> )	MVunit			
Ι.	t <sub>lastcalled</sub>	Last call time	Time / c <sub>mad</sub>	d			
	controltime	Call the controller code	Time + t <sub>control,s</sub> * c <sub>ms,s</sub>			Call	
	Help	Unit Parameters	Code Display Popup +				-
1							

#### Figure 26 Event call example.

In this example the event function is defined in the table named Controller evaluation, and it is called in two places: in row 6 of the Controller initialization table with the argument Now, and in row 18 of the function definition table with the timing argument. The latter means that the event calls form an infinite loop. Now and Time are keywords representing the time at the start of the simulation and the current time at every call.

## 7 Namespaces

Namespaces are qualifiers or prefixes of symbols used in assignments. These prefixes usually are not visible in the process code, only in the generated XML file. One exception is the plantwide code file, where fully qualified symbols could be used (see 2.4.1 Plantwide code). There are two types of namespacing

- implicit—performed automatically by the SMT behind the scenes
- explicit—declared in process code by the author of the process code to alter the automatic namsespacing

## 7.1 Implicit namespaces

The modeled plant may contain equations where symbols are coming from different process unit instances of the same kind. The generated XML contains equations from all process units. To make the symbols unique and to place them in the context of their containing process unit, they are qualified or decorated with the path from the plant root to their process unit (see Figure 6).

The path elements are delimited with double underscore "\_\_\_". For example, the following assignment in PU<sub>1,2</sub>:

$$SV = SV_0$$

will be generated as

Sumo\_Plant\_PU1\_PU1\_2\_SV = Sumo\_Plant\_PU1\_PU1\_2\_SV\_0

in the XML file. The first segment, Sumo, is fixed. The root of the hierarchy is represented by Plant which is the second segment and is provided by the Sumo software. The other segments are the names of process units which lead to PU<sub>1,2</sub>, finally comes the variable name.

The process unit names are defined on the *Structure* worksheet of the root. Please remember that the root is a virtual (invisible) process unit provided by the Sumo software, which provides the plant name as well.

There is one more segment automatically included in case of model parameters: the model name. When parameter inheritance is ON, process units will contain the following equation:

PAR = Parent..PAR

which in process unit PU<sub>1,2</sub> will expand as the following (only the first model parameter of Type(Kinetic) is shown, see *Parameters* worksheet in Sumo1.xlsm file and the Parent.. construct in the next section.):

Sumo\_Plant\_PU1\_PU1\_2\_Sumo1\_muOHO = Sumo\_Plant\_PU1\_Sumo1\_muOHO

where the model parameters are prefixed with the model name Sumo1 (Sumo1\_muOHO).

## 7.2 Explicit namespaces

Explicit namespacing is visible in the process code. The namespace should be placed as a prefix to a symbol delimited with double dot ".." characters. The namespace can be one of the following elements:

- **Parent**—keyword representing the direct parent process unit. At the moment, only the direct parent unit can be referenced.
- **Root**—keyword representing the root of the hierarchy. With this prefix process units can reference variables directly from the root.
- **port name**—one of the port names listed on the *Unit* worksheet of the process unit. This allows calculations in pipes connecting process units.
- **model ID**—the ID specified on the *Unit* worksheet of the process unit. This can be useful for process units using multiple models (see 8 Using multiple models).
  - model name if the process unit is restricted to a specific model, the model name can be used in namespacing. The restriction is made on the *Unit* worksheet of the process unit, in the table with type Model and in column *Valid*. The model names listed in the *Valid* column can be used in namespacing.
- **process unit name**—this should be a process unit name defined on the Structure worksheet of a process unit. This means that this construct can reference symbols only from child process units (a process unit knows the names of its children but does not know the name of its parent).

The namespacing elements listed above are used as relative paths, but they will be extended to absolute paths in the XML file. For example, on Figure 6 the process unit PU<sub>1</sub> may contain a symbol PU<sub>1,2</sub>...Q (referencing a symbol from one of its child process units). It will end up as Sumo\_\_Plant\_\_PU1\_PU1\_2\_\_Q in the XML file. To access a symbol from the direct parent process unit the Parent keyword should be used, because a process unit does not know the name of its parent.

# 8 Using multiple models

The SMT can handle scenarios where more than one process models are used in a plant. The following picture shows the process unit hierarchy using two models:



Figure 27 Process unit hierarchy with 2 models.

The graphical user interface does not handle yet multi-model plants. To understand how the SMT handles multi-model projects, see 9.1 SMT command line usage.

Process units contain model identifiers on their *Unit* sheet. These are not model names—it would mean that the units would be tied to one model. The identifiers are like local variables in a structured programming language; they can be used in the whole process unit to refer to a given model. *Given* here means that actual model names are coming somehow from the outside and they are mapped to the model identifiers during a simulation (see this too in section 9.1).

## 8.1 Default model

The model ID specified on the *Unit* sheet represents, or in other words is mapped to, the model used in the plant. It means that every expandable will be expanded from that model. If the plant uses one model, there is no confusion. When more than one models are specified there is need for clarification: it should be obvious which model is mapped to which ID.

The first model ID specified on the *Unit* worksheet is the default, and it will be used in shorthand expansions. Further model IDs can be specified if the user would like to switch to other models during expansion.

In this case the symbols should be namespaced explicitly with the other model ID (see 7.2 Explicit namespaces). A missing namespace prefix, again, means default model usage in expansions.

The model names coming from outside are mapped to the plant class in the order of the model identifiers on the *Unit* worksheet, i.e. M<sup>1</sup> in the root will be mapped to A, and M<sup>2</sup> to B. This affects the expansion and the namespacing processes: expandables will be expanded and model parameters will be namespaced from the correct model.

The order of model mapping from a composite process unit to its components is specified on the *Structure* worksheet. The following picture shows the root process units from Figure 27.

4	$  \times \sqrt{f_x}$	PU1 file name												
A	В	с	D	E	F	G	н	1	J	к	L	м	N	0
			_											
		Plant example												
	Unit component	Unit name	Label	Reactive	InheritkinPAR	InheritstoPAR	InheritequPAR	Models						
	PU1 file name	PU1	PU1		TRUE	TRUE	TRUE	M1						
	PU2 file name	PU2	PU2		TRUE	TRUE	TRUE	M1						
	PU3 file name	PU3	PU3		TRUE	TRUE	TRUE	M1						
	PU4 file name	PU4	PU4		FALSE	FALSE	FALSE	M2						
					TRUE	TRUE	TRUE	M1						
	Internal connection	Internal												
	Symbol	Label	From	То										
	<b>F</b> • • • • • • • • • • • • • • • • • • •	Enternal												

Figure 28 Root of the hierarchy shown as a process unit.

Row 7 contains a trick, it "pushes down" M<sub>2</sub> first then M<sub>1</sub> in row 8, meaning that the first model ID in PU<sub>4</sub> will be mapped to the content of M<sub>2</sub> from the root (i.e. B), and the second model ID in PU<sub>4</sub> will be mapped to A. Thus, B will be the default model in PU<sub>4</sub>.

The model IDs are used to write model independent process code. Not just that, but it allows shuffling the models in child process units which would not be possible if model names were used directly to identify the models.

## 8.2 Using non-default models

Section 5.1 Expandable symbols explains how shorthand keywords like SV, PAR, CVAR, SPC could be substituted by a corresponding triplet notation, for example SV is a shorthand of MODEL.SV.Symbol, where MODEL is the default identifier specified on the *Unit* worksheet of the process unit. The shorthand notation cannot be used if non-default models are needed in the process code. In that case the full triplet syntax should be used.

Figure 29 shows an example of multiple model usage for parameter inheritance in the fictive plant depicted in Figure 27.

1.1	- Incoret D		Data Daview	Maria Aalal							here i
Home	e insert P	age Layout Formulas	Data Review	view Add-	ins					LT 5	nare
21	$ $ $\times$ $\checkmark$	fx									
Α	В	с	D	E	F	G	н	1	J	K L	
Mo	del parame	eter inheritance									
		Model parameters (default)	Codelocation(Integrated)								
	Symbol	Name	Expression	Unit	Decimals	Rule	Principle/comment				
	PAR	MODEL.PAR.Name	ParentPAR	MODEL.PAR.Unit		Reactive; Type(Kinetic); InheritkinPAR					
	PAR	MODEL.PAR.Name	ParentPAR	MODEL.PAR.Unit		Type(Stoichiometric); InheritstoPAR					
_	PAR	MODEL.PAR.Name	ParentPAR	MODEL.PAR.Unit		Type(Equilibrium); InheritequPAR					
-											
_		Model parameters (M2)	Codelocation(Integrated)								
	Symbol	Name	Expression	Unit	Decimals	Rule	Principle/comment				
	M <sub>2</sub> .PAR.Symbol	M <sub>2</sub> .PAR.Name	ParentM <sub>2</sub> .PAR.Symbol	M <sub>2</sub> .PAR.Unit		Reactive; Type(Kinetic); InheritkinPAR					
	M <sub>2</sub> .PAR.Symbol	M <sub>2</sub> .PAR.Name	ParentM <sub>2</sub> .PAR.Symbol	M <sub>2</sub> .PAR.Unit		Type(Stoichiometric); InheritstoPAR					
	M <sub>2</sub> .PAR.Symbol	M <sub>2</sub> .PAR.Name	ParentM2.PAR.Symbol	M <sub>2</sub> .PAR.Unit		Type(Equilibrium); InheritequPAR					
[	Unit	Parameters Code	+								

Figure 29 Parameter inheritance with two models.

The first PAR triplet shows the shorthand notation representing the default model, while the second PAR triplet shows the usage of the full triplet syntax (please remember that the shorthand can be used only for *Symbol*, *Name* and *Unit* must use the full syntax in both cases).

## 9 Advanced topics

This chapter contains descriptions of some deeper usage and translation mechanics in relation to the SMT. This knowledge is not required in everyday modeling and the Sumo software, but it is good to know nonetheless.

## 9.1 SMT command line usage

The SMT can be used as a standalone executable program. It is useful to quickly test the correctness of the process code representing one or more process units. Figure 30 shows the help information when the SMT is started in a command line window.



#### Figure 30 The SMT used from the command line.

In case of command line usage, the user should reproduce the root element of the process unit hierarchy (provided automatically when the SMT is used through the Sumo software). Moreover, some initialization data is required to reproduce the Sumo software functionality where user settings are forwarded to the SMT, also automatically.

In addition to the folder structure shown on Figure 1 the command line user should add a new folder named Plant classes. This should contain the process code files representing the root element of a plant hierarchy. The root element is a composite process unit like the example shown on Figure 5, i.e., it should list its components on a *Structure* worksheet. Figure 31 shows an example with two process units linked together where the link is represented in the Internal connection table. The *Unit component* column contains the process unit file names without extension.

The *Models* column contains a single symbol, MODEL, which is the model identifier containing the actual model name and it is declared on the *Unit* worksheet. The model identifier is initialized with the correct model name by a separate file explained below. This separation allows the reuse of the same plant root with different initialization data.

•	Autosave Continent E E P	0 +			CS	TR class.xlsx						Q	<ul> <li>Search</li> </ul>	Sheet		C
m	e Insert Page Layout Formul	as Data	Review	view /	Add-ins										🛃 S	hare
	$\frac{1}{2}$ × $\checkmark$ fx															
	В	с	D	E	F	G	н	1	J	к		L		м		N
		CSTR class	1													
	Unit component	Unit name	Label	Reactive	InheritkinPAR	InheritstoPAR	InheritequPAR	Models	Soz	S <sub>NDx</sub>						
	State influent	Influent	Influent			FALSE	TRUE	MODEL	Integrated	Integrated						
	CSTR with diffused aeration and calculated DO	CSTR	CSTR	TRUE	TRUE	TRUE	TRUE	MODEL	Integrated	Integrated						
	Internal connection Symbol	CSTR class pipes Label	From	То	1											
	infpipe		Influentoutp	CSTRinp												
	External connection	CSTR class pipes	1													
	Symbol	Label	From	То	]											
▶	Help Unit Parameter	s Structure	Code	+												
	N.										m n	ப	-		-	110%

Figure 31 The root process unit representing a simple CSTR test plant.

The other initialization file contains global settings available to the whole plant. This file should be placed in a subfolder with arbitrary name under the **Process code** folder. It is called a plant instance file and its main purpose is to specify the model, some attributes and state variable handlings globally used in the plant. Figure 32 shows the initialization file of the previous CSTR test plant.

	A	√ fr										
	B	с	D	E	F	G	н	1	J	к	L	м
	Instance	CSTR instance										
1	Symbol	Name	Class	Comments								
1	Plant	Plant	CSTR class									
	Attribute	CSTR attributes										
	Symbol	Name	Default	Rule	Comments							
	pН	pH calculated	TRUE									
	Handling	Handlings	Scope(Instance)									
	Symbol	Name	Default	Rule	Comments							
_	G.SV	Gas phase	Integrated									
-	Model	Biokinetic model				-						
+	Symbol	Name	Value	Rule	Comments	-						
4	M <sub>1</sub>	Biokinetic model	Sumo1									
-	Handling	Handlings	Scope(M <sub>1</sub> )			-						
+	Symbol	Name	Default	Rule	Comments	-						
+	S <sub>02</sub>		Set									
-	S <sub>NOx</sub>		Set									
4	S <sub>NHx</sub>		Set			1						
	Help	Unit Pa	ameters Cod	e <b>+</b>								

Figure 32 Initialization information for the simple CSTR example.

The table types and names speak for themselves, the only new element is the *Scope* tag in handlings. The *Scope*(*Instance*) tag means that the listed state variable handlings are enforced in all models while the handlings listed in  $Scope(M_1)$  are enforced only in the model identified by the argument (row 16 contains the model ID used in scoping). In this example there is only one model identifier, but more than one can be specified if needed (see 8 Using multiple models).

Please note that the Process code folder is not required to be the one installed by Sumo. In fact, for testing purposes, it is a good practice to prepare a separate process code folder somewhere else then copy the content of the installed Process code folder in it. Sumo provides such a test folder named My Process Code which has the benefit of being taken in consideration by the Sumo software, but for simple testing with the SMT the test folder can be anywhere.

## 9.2 Attribute and handling propagation

In the simple CSTR example the root *Structure* worksheet contains state variable handlings after the *Models* column which will be enforced in all component process units. Root handlings, on the other hand, will be overridden by handlings from the initialization file with Scope(Instance) or  $Scope(M_1)$ . The latter overrides the root handlings only if a component uses the model specified by the scope argument.

Attributes propagate like handlings, but without the complication of scoping. As a general rule the root will override the attributes and handlings of its components while the initializer overrides the attributes and handlings in the whole plant. Otherwise the attributes and handlings specified on the *Unit* sheet of the individual process units will prevail.

## 9.3 Algebraic loops

When the plant contains feedback loops some equations in the participating process units contain circular dependencies called algebraic loops. To solve such an equation system the Sumo numeric engine uses an iterative process described later in this section.

The next picture illustrates a simple algebraic loop:



#### Definitions

- an equation system is represented by a directed graph
- nodes—represent variables
- vertices—represent the equations dependencies as a variable pair (vfrom, vto)
- the direction of the vertices is from the right-hand side to the left-hand side. In case of the equation b = a + 2 this means  $b \leftarrow a$  or a goes to b.
- an algebraic loop is equivalent to a directed loop in the graph

#### Default sorter behavior

- break the loop at an arbitrary node (represented by the dashed lines)
- define that node as a loop breaker variable

#### Figure 33 Simple algebraic loop.

The SMT contains an equation sorter module which recognizes algebraic loops and tries to flatten (break) them at one of the vertices and declare the left-hand side variable as loop breaker which will be calculated with the iterative process.

Calculating the arbitrarily chosen loop breaker may or may not produce a satisfactory result (since the iterative process should be converging). The process code author should be able to intervene and define a better loop breaker manually. This is a trial and error process: if the automatic loop breaking does not give a result or it is calculated slowly, the author determines which algebraic loop is the culprit and intervenes by giving a better loop breaker.

The SumoSlang allows this intervention; the author declares a loop breaker variable and gives its properties (initial value, minima, maxima) with the help of a SolverConfiguration table (see section 9.3.3). Figure 34 shows the abstract representation of this:



Figure 34 The same loop with a loop breaker given from outside.

#### 9.3.1 1 Solving the equation system

Solving an algebraic loop involves calculating its loop breaker with an iterative process. To do this, the original equation is transformed to an error function and the loop breaker is calculated by minimizing the error through the iterative process. This requires a convergent error function and the value of the loop breaker will be the one where the error is the closest to 0.

Breaking the loop, then defining the error function, then applying the iterative process to minimize it, is done by the SMT behind the scenes or more precisely it prepares the instructions for the Sumo numerical engine to do the iteration properly.

Figure 35 shows the abstract representation of this process:



The error function is generated automatically from the equation a = 1 - c/2. Calculating the error is equivalent to solving the equation a - 1 + c/2 = 0.

All equations are calculated for different *a* values during the iteration.

Note that this is not an algebraic loop because the vertices do not form a directed loop.

Figure 35 Solving the loop by introducing an error function depending on the loop breaker variable.

9.3.2 Process code example for automatic loop breaking

The equations from Figure 33 can be written in SumoSlang as follows:

6	🔶 🔶 😓 🗧	x Variable c														
,	А В	С	D	E		F	G	н	1		1		J		к	
	Simple algebr	aic loop														
	entiple alleen	Equation system	Codelocation(Integrated)			should	be provided	tion dependit - error(lb).	ng on the lo	op br	eaker va	ariable				
	Symbol	Name	Expression	Unit	Deci	The loo	p breaker is	determined b	by the sorte	r, and	its equi	ation				
	a	Variable a	1 - c/2		$\square$	should	be replaced	with the erro	r equation	auton	natically					
1	b	Variable b	a + 2													
		Variable c	b/5							1						

Figure 36 Process code representation of the simple equation system.

#### **Expected XML output**

The <variabledefinitions>...</variabledefinitions> block of the XML file should contain the highlighted entry:

• • • •				Win	dows Server 2016				•
e Edit View	Project Build Deb	ıg Team XML	Tools Test A	nalyze Windo	w Help 🖁 Full Scr	een	💙 🛃 Quick	Launch (Ctrl+Q)	P Sign in
gebraic loop test.x	rml ≄ ×								
675	<variable cname="S&lt;/td&gt;&lt;td&gt;umoNREALT&lt;/td&gt;&lt;td&gt;ASM1fB0D5B&lt;/td&gt;&lt;td&gt;ODult" name<="" td=""><td>space="SumoNRE_</td><td>_ALT" name="ASM1</td><td></td><td>type="REAL" role="</td><td>Parameter"</td></variable>	space="SumoNRE_	_ALT" name="ASM1		type="REAL" role="	Parameter"			
676	<variable cname="S&lt;/td&gt;&lt;td&gt;umoPlantNam&lt;/td&gt;&lt;td&gt;e" dataty<="" name="&lt;/td&gt;&lt;td&gt;PlantName" namespace="S&lt;/td&gt;&lt;td&gt;umo" td=""><td>/pe="STRING" role</td><td>="SystemParameter" f</td><td>ormatstring="" uni</td><td>t="" /&gt;</td></variable>	/pe="STRING" role	="SystemParameter" f	ormatstring="" uni	t="" />				
677	<variable <mark="" cname="S&lt;/td&gt;&lt;td&gt;umoStepCont&lt;/td&gt;&lt;td&gt;rolStateVar">na</variable>	mespace="Su	mo" name="StepCor	ntrolStateVar" da	tatype="STRING" role	="SystemParameter"	formatstri		
678	<variable cname="S&lt;/td&gt;&lt;td&gt;umoMaxAbsDe&lt;/td&gt;&lt;td&gt;rName" namespac<="" td=""><td>e="Sumo" na</td><td>me="MaxAbsDerName</td><td>e" datatype="STRI</td><td>NG" role="SystemPara</td><td>meter" formatstrin</td><td>g="" unit="</td></variable>	e="Sumo" na	me="MaxAbsDerName	e" datatype="STRI	NG" role="SystemPara	meter" formatstrin	g="" unit="		
679	<variable cname="S&lt;/td&gt;&lt;td&gt;umoNRErrorM&lt;/td&gt;&lt;td&gt;sg_AlgebraicLoo&lt;/td&gt;&lt;td&gt;p" namespac<="" td=""><td>e="Sumo" name="N</td><td>RErrorMsg_Algebra</td><td>icLoop" datatype="ST</td><td>RING" role="System</td><td>Parameter"</td></variable>	e="Sumo" name="N	RErrorMsg_Algebra	icLoop" datatype="ST	RING" role="System	Parameter"			
680	<variable <="" cname="S&lt;/td&gt;&lt;td&gt;umoNRErrorM&lt;/td&gt;&lt;td&gt;sg_SteadyState" td=""><td>namespace=</td><td>"Sumo" name="NRE</td><td><pre>rrorMsg_SteadySta</pre></td><td>te" datatype="STRING</td><td>" role="SystemPara</td><td>meter" form</td></variable>	namespace=	"Sumo" name="NRE	<pre>rrorMsg_SteadySta</pre>	te" datatype="STRING	" role="SystemPara	meter" form		
681	<variable <="" cname="S&lt;/td&gt;&lt;td&gt;umoNRErrorM&lt;/td&gt;&lt;td&gt;sg_Equilibrium" td=""><td>namespace=</td><td>"Sumo<mark>" name="NR</mark>Er</td><td>rrorMsg_Equilibri</td><td>um" datatype="STRING</td><td>" role="SystemPara</td><td>meter" form</td></variable>	namespace=	"Sumo <mark>" name="NR</mark> Er	rrorMsg_Equilibri	um" datatype="STRING	" role="SystemPara	meter" form		
682	<variable cname="S&lt;/td&gt;&lt;td&gt;umoNREALT&lt;/td&gt;&lt;td&gt;&lt;pre&gt;a" namespace="&lt;/pre"></variable>	"SumoNRE_	_ALT' name="a" da	atatype="REAL" ro	Le="SystemState" sum	osymbol="a" format	string="" u		
683	<variable cname="S&lt;/td&gt;&lt;td&gt;umoNREALT&lt;/td&gt;&lt;td&gt;&lt;u&gt;aii&lt;/u&gt;" namespac<="" td=""><td>e="SumoNR</td><td>EALT name= ai:</td><td>i" datatype="REAL</td><td><pre>" role="SystemState"</pre></td><td>sumosymbol="aii"</td><td>formatstrin</td></variable>	e="SumoNR	EALT name= ai:	i" datatype="REAL	<pre>" role="SystemState"</pre>	sumosymbol="aii"	formatstrin		
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685	<variable cname="S&lt;/td&gt;&lt;td&gt;umoNREALT&lt;/td&gt;&lt;td&gt;&lt;u&gt;avi&lt;/u&gt;" namespac<="" td=""><td>e="SumoNR</td><td>EALT" name="av</td><td>i" datatype="REAL</td><td><pre>" role="SystemState"</pre></td><td>sumosymbol="<mark>avi</mark>"</td><td>formatstrin</td></variable>	e="SumoNR	EALT" name="av	i" datatype="REAL	<pre>" role="SystemState"</pre>	sumosymbol=" <mark>avi</mark> "	formatstrin		
686	<variable cname="S&lt;/td&gt;&lt;td&gt;umoNREALT&lt;/td&gt;&lt;td&gt;&lt;u&gt;_bvi" namespac<="" u=""></variable>	e="SumoNR	EALT" name="bv:	i" datatype="REAL	<pre>" role="SystemState"</pre>	sumosymbol="bvi"	formatstrin		
687	<variable cname="S&lt;/td&gt;&lt;td&gt;umoNREALT&lt;/td&gt;&lt;td&gt;&lt;u&gt;evi&lt;/u&gt;" namespac<="" td=""><td>e="SumoNR</td><td>EALT" name="ev:</td><td>i" datatype="REAL</td><td><pre>" role="SystemState"</pre></td><td>sumosymbol="evi"</td><td>formatstrin</td></variable>	e="SumoNR	EALT" name="ev:	i" datatype="REAL	<pre>" role="SystemState"</pre>	sumosymbol="evi"	formatstrin		
688	<variable cname="S&lt;/td&gt;&lt;td&gt;umoNREALT&lt;/td&gt;&lt;td&gt;&lt;pre&gt;_av" namespace<="" pre=""></variable>	="SumoNRE	ALT" name="av"	datatype="REAL"	role="SystemState" s	umosymbol="av" for	matstring="		
689	<variable cname="S&lt;/td&gt;&lt;td&gt;umoNREALT&lt;/td&gt;&lt;td&gt;aiv" namespac<="" td=""><td>e="SumoNR</td><td>EALT" name="aiv</td><td>/" datatype="REAL</td><td><pre>" role="SystemState"</pre></td><td>sumosymbol="aiv"</td><td>formatstrin</td></variable>	e="SumoNR	EALT" name="aiv	/" datatype="REAL	<pre>" role="SystemState"</pre>	sumosymbol="aiv"	formatstrin		
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Figure 37 Variable 'a' in the variabledefinitions block

The ZeroTime/1 section should contain the highlighted entry to keep the SMT sorter happy (avoid the variable Sumo\_NRE\_ALT\_a was not found in the error equation). This is inserted automatically by the SMT.

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2230 ]]	>											
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2235	<code><!--</td--><td><b>FCDATAF</b></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></code>	<b>FCDATAF</b>										
2236 50	mo NRE ALT	a = Sumo	LoopB	reakerD	efault:							
2237 Su	mo NRE ALT	aii = Sum	o Loo	pBreake	rDefaul	t:						
2238 Su	mo NRE ALT	aiii = Su	imo Lo	opBreak	erDefau	ilt:						
2239 Su	mo NRE ALT	avi = Sum	o Loo	oBreake	rDefaul	t:						
2240 Su	mo NRE ALT	bvi = Sum	lo Loo	pBreake	rDefaul	t:						
2241 Su	mo NRE ALT	evi = Sum	o Loo	pBreake	rDefaul	t:						
2242 Su	mo_NRE_ALT_	av = 1;				,						
2243 Su	mo_NRE_ALT_	aiv = 1;										
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The AlgebraicLoop/1 section should contain the blue highlighted entry and the Integrated/1 section the yellow highlighted entry where the function call name is derived from

the block name and section name of the algebraic loop. The blue highlighted entry contains information for the solver where its input is the loop breaker variable *a* and its output is the error value. The code section inside solver contains the flattened equation system and the error calculation equation inserted by the SMT.



Figure 39 XML overview showing the AlgeraicLoop and Integrated blocks to solve the equation system in the example.

## 9.3.3 Process code example for manual loop breaking

Figure 40 shows how the process code author can manually declare a loop breaker for the simple equation system used in the previous sections as example (the worksheet contains many examples with the same variables which requires a distinction between them. In the different examples the variables are suffixed with roman numerals.)

A	В	c	D		E	F	G	н	1	I		к
Si	imple algebi	raic loop with solv	ver configuration			A Ru be p	le may specify laced. The defi	explicitly the code se ault code section nam	ection where the ne is the loop bre	loop will eaker		
6	SolverConfiguration	Solver configuration I	Codelocation(Integrated)			sym	Joi. The sectio	n snould be namespa	iced.			
5	Symbol	Name	Target	Valu	ue	Minimum	Maximum	Unit	Decimals	Rule	Principle/con	nment
2	ai	Loop breaker	err_ai		1		0 100			Section(section)	User defined	loop breaker
0 00 00	<b>Symbol</b> bi ci	Variable bi Variable ci	Expression ai + 2 bi/5	Unit	it	Deci: The	err_ai symbol	error(	ble: (ai) = ai - 1 + ci/2 g the function va	lue and it should	match the	
ē	err_ai	Error function ai	ai - 1 + ci/2	1		nam	e specified in t	the Target column of tion is the same as the	the solver config	guration table. (No	ote that in this	
	Note that The loop b automatic giving grea	the loop is formed including the reaker equation is a "fake" equ steps mentioned in the simple ater flexibility in choosing both t	e SolverConfiguration table. ation to trigger a loop in the SMT so case, are explicitly written in the pr the loop breaker and the error func	orter. T rocess c ction. Th	The code, he fa	The unit	error function (e.g. child pro	can be in the model, cess units)	or another proc	ess unit visible to t	this process	

Figure 40 Solver configuration used to specify a loop breaker.

Please note that the loop breaker equation

a = 1 - c/2

is not present in the *Equation system I* table, it is replaced by the error equation. This error equation is automatically provided by the SMT in the default mode discussed previously.

The sorter module recognizes the loop breaker variable and would not complain when it is used on the right-hand side of other equations. The SMT will use the information in the SolverConfiguration table at a later stage to provide input and output symbols to the solver used to calculate the error (see Figure 39).

#### **Expected XML output**

The AlegbraicLoop block now contains a custom section name Sumo\_NRE\_ALT\_section specified in the *Rule* column of the SolverConfiguration table and namespaced according to the container process unit.



*Figure 41 XML overview showing the AlgeraicLoop and Integrated blocks in case of manual loop breaker definition. The outcome is the same.* 

#### 9.3.4 4 Complex equation system

Figure 42 shows the graph representation of a complex equation system containing multiple loops:



Figure 42 Complex equation system with many algebraic loops and "manually" chosen loop breakers.

The lighter colored vertices represent the manually chosen loop breakers. Solving this equation system require introducing 3 error functions (in default mode the SMT will choose the loop breakers and the error equations) as shown in the following picture:



Figure 43 Solving the complex loop.

#### Process code example for the default method:

G H	I J	К
Rule Principle/comment		
	_	
	_	
	_	
	4	
	4	
	Rule Principle/comment	Rule Principle/comment

Figure 44 Process code example of the complex equation system.

The process code author relies on the SMT to solve the algebraic loop. If it is not satisfactory, a manual intervention is required. Figure 45 shows the XML representation of the default method, where the loop breakers chosen by the SMT are *a*, *b*, *e*. In this example the section name **7** is given automatically and it is a plant wide unique sequence number.



Figure 45 XML representation of the default algebraic loop solution.

#### Process code example for the manual method:

The process code author lists the manually chosen loop breakers in the SolverConfiguration table and the loop breaker equations are replaced manually with the error equations.

$  =   \times \checkmark f$	c									
В	с	D	E	F	G	н	1		J	к
Many related	algebraic loops wit	h solver configurat	ion							
SolverConfiguration	Solver configuration VII	Codelocation(Integrated)								
Symbol	Name	Target	Value	Minimum	Maximum	Unit	Decimals	Rule		Principle/comment
bvii	Loop breaker bvii	err_bvii	1	0	100					User defined loop breaker
evii	Loop breaker evii	err_evii	1	0	100					User defined loop breaker
hvii	Loop breaker hvii	err_hvii	1	0	100					User defined loop breaker
	Equation system VII	Codelocation(Integrated)						Th	e section namin	ng is <b>undefined</b> . The loop
Symbol	Equation system VII Name	Codelocation(Integrated) Expression	Unit	Decimals	Rule	Principle/comment		Theq	e section namin uations should l	ng is <b>undefined</b> . The loop be placed in the same code
Symbol avii	Equation system VII Name Variable avii	Codelocation(Integrated) Expression 1 - cvii/2	Unit	Decimals	Rule	Principle/comment		Th eq sec	e section namin uations should ction.	ng is <b>undefined</b> . The loop be placed in the same code
Symbol avii cvii	Equation system VII Name Variable avii Variable cvii	Codelocation(Integrated) Expression 1 - cvli/2 dvii + bvii/5	Unit	Decimals	Rule	Principle/comment		Th eq sec	e section namin uations should ction.	ng is <b>undefined</b> . The loop be placed in the same code
Symbol avii cvii dvii	Equation system VII Name Variable avii Variable avii Variable cvii Variable dvii	Codelocation(Integrated) Expression 1 - cvii/2 dvii + bvii/5 ivii + evii/4	Unit	Decimals	Rule	Principle/comment		Th eq sec	e section namin uations should ction.	ng is <b>undefined</b> . The loop be placed in the same code
Symbol avii cvii dvii fvii	Equation system VII Name Variable avii Variable dvii Variable dvii Variable fvii	Codelocation(Integrated) Expression 1 c cvii/2 dvii + bvii/5 ivii + evii/4 bvii - avii/2	Unit	Decimals	Rule	Principle/comment		Th eq sec	e section namin uations should ction.	ng is <b>undefined</b> . The loop be placed in the same code
Symbol avii cvii dvii fvii gvii	Equation system VII Name Variable avii Variable cvii Variable dvii Variable fvii Variable gvii	Codelocation(Integrated)           Expression           1 - cvii/2           dvii + bvil/5           ivii + evii/4           bvii - avii/2           evi - 1/fvii	Unit	Decimals	Rule	Principle/comment		Th eq sec	e section namin uations should ction.	ng is <b>undefined</b> . The loop be placed in the same code
Symbol avii cvii dvii dvii fvii gvii ivii	Equation system VII Name Variable avii Variable cvii Variable dvii Variable fvii Variable fvii Variable svii	Codelocation(Integrated)           Expression           1 - cvil/2           dvii + bvii/5           ivii + evii/4           bvii - avii/2           evi - 1/fvii           3 + hvii/4	Unit	Decimals	Rule	Principle/comment		Th eq sec	e section namin uations should ction.	ng is <b>undefined</b> . The loop be placed in the same code
Symbol avii cvii dvii dvii fvii gvii ivii err_bvii avii	Equation system VII Name Variable avii Variable dvii Variable fvii Variable fvii Variable fvii Zvariable nii Error function for bvii Error function for bvii	Codelocation(Integrated)           Expression           1 - cvii/2           dvii + bvii/5           ivii + evii/4           bvii - avii/2           evi - 1/fvii           3 + hvii/4           bvii - avii - evi/2	Unit	Decimals	Rule	Principle/comment		Th- eq sec	e section namin uations should i ction.	rg is undefined. The loop be placed in the same code
Symbol avii cvii dvii fvii gvii gvii gvii ivii err_bvii err_bvii err_evii	Equation system VII Name Variable avii Variable dvii Variable dvii Variable dvii Variable pvii Variable pvii Error function for bvii Error function for evii	Codelocation(Integrated)           Expression           1 - cvil/2           dvil + bvil/5           Ivil + evil/4           bvil - avil/2           evi - 1/tvii           3 + tivi/4           bvil - avil/2           evil - 1/tvii           bvil - avil/2           evil - 1/tvii           bvil - avil/2           evil - 1/tvii	Unit	Decimals	Rule	Principle/comment		Th- eq sec	e section namin uations should i ction.	rg is undefined. The loop be placed in the same code

Figure 46 Complex equation system with user defined algebraic loop handling.

The section name in the AlgebraicLoop block is undefined in this case but it should be different from the default mode. One solution is to use one of the loop breaker variable names as section name. In the following example the last variable name is chosen: *hvii*. Being a variable name (i.e. not a plant wide unique name), it should be namespaced according to the container process unit.

Figure 47 shows the XML representation of the manual loop breaker selection:



Figure 47 XML representation of the manual algebraic loop solution.

The examples can be found in the references subfolder of the documentation installed with the Sumo software.