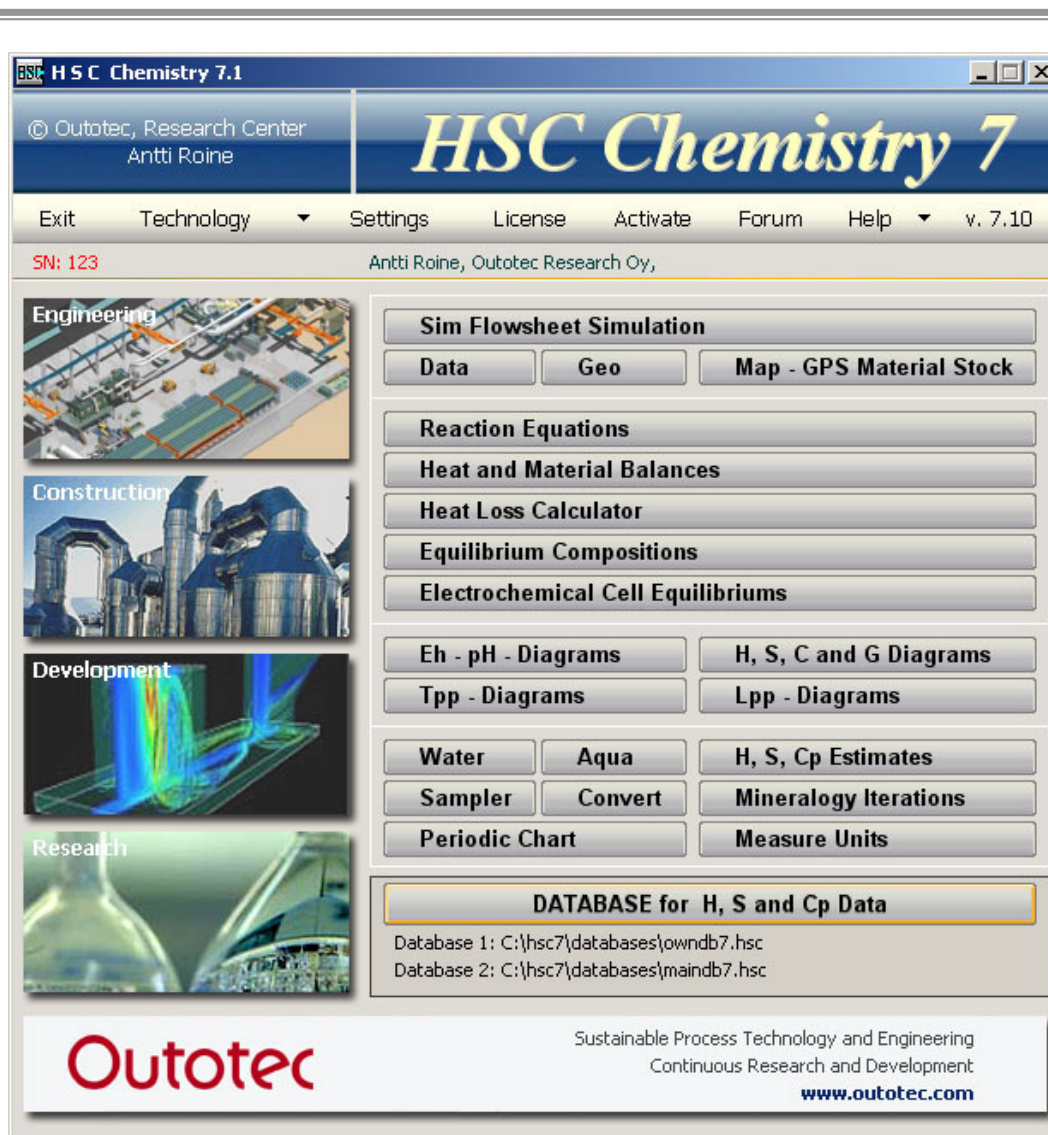


What's New in HSC 7.1



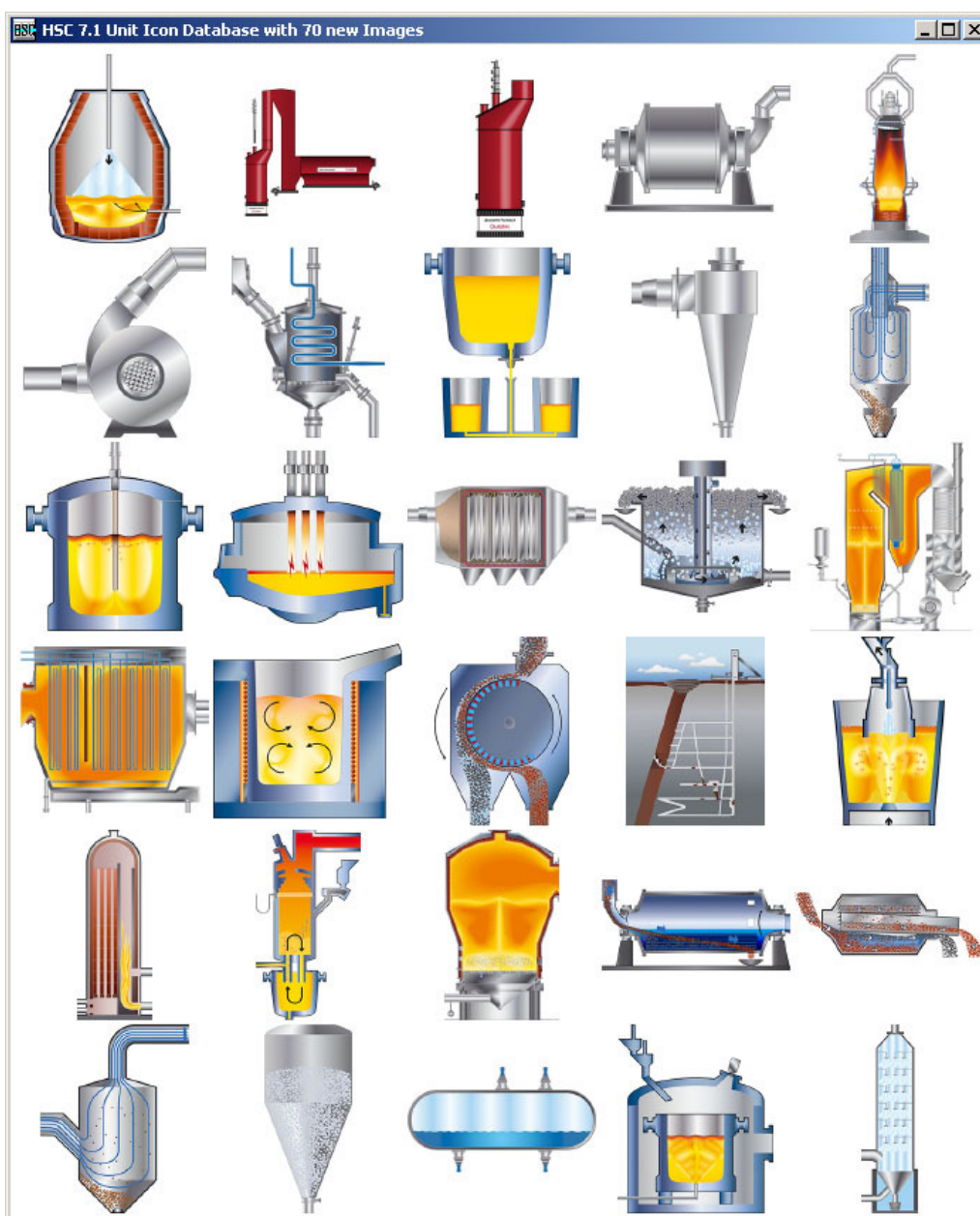
HSC Chemistry 7.1 is not only a process flowsheet simulation software program but it also contains 22 other useful calculation modules and 12 databases with an extensive number of thermochemical, heat transfer and mineralogical data on the same package.

HSC 7.1 contains mainly small fixes to the HSC 7.0, but also some new features have been added. The most important improvements are the more robust Sim flowsheet and Equilibrium modules. HSC 7.1 is a free upgrade for the registered HSC 7.0 customers.

Summary of the new Features

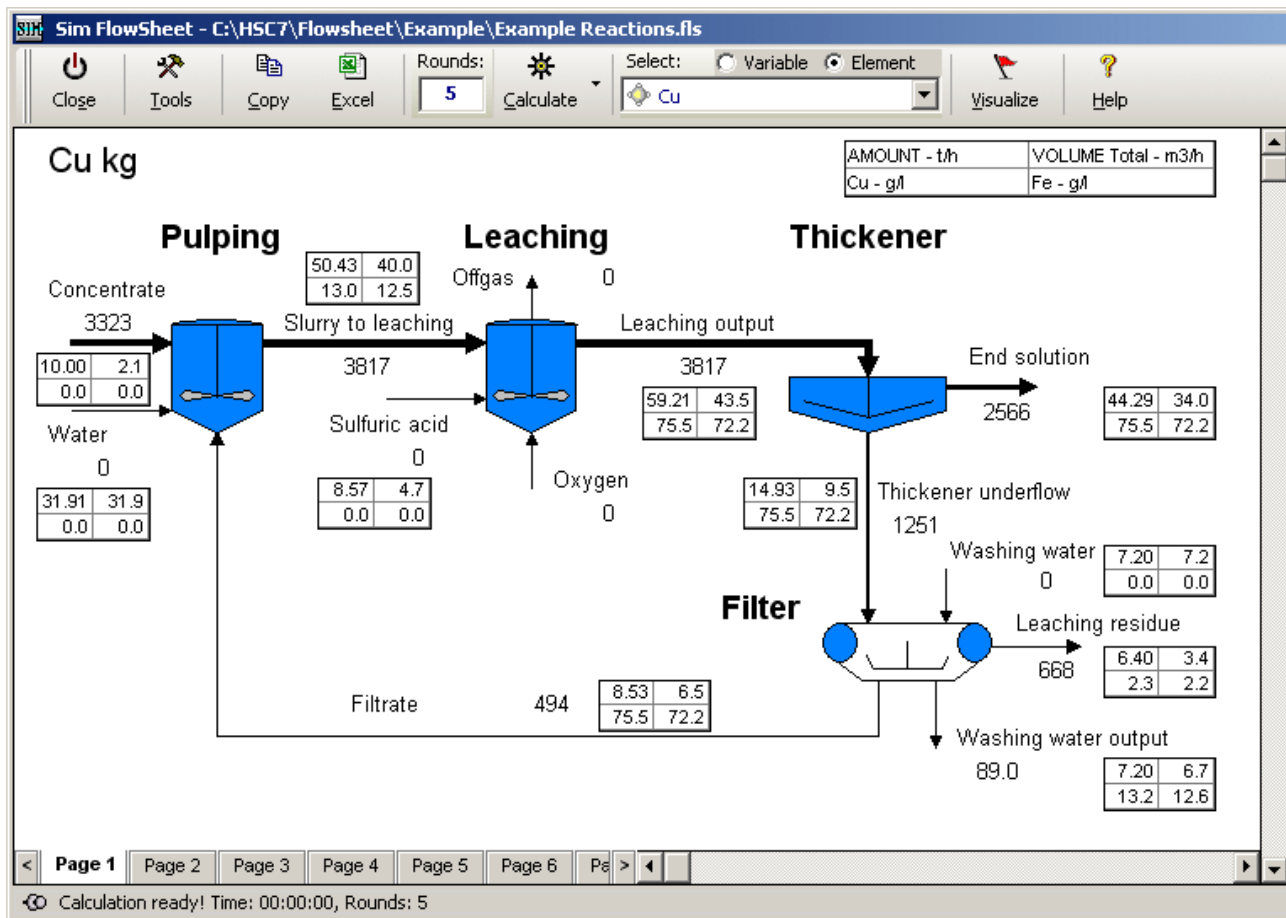
1. Installation

- HSC 7.1 compability with Windows 7 have been improved. New InstallShield 2011 tool is used for the HSC 7.1 installation instead of the old InstallShield 2009.
- Problems with some Unicode characters were fixed within the HSC activation.
- Data, Geo and Map modules operation problems with the old HSC 6.1 versions was fixed. Now all the HSC 6.1 and 7.1 modules may coexist in the same computer.

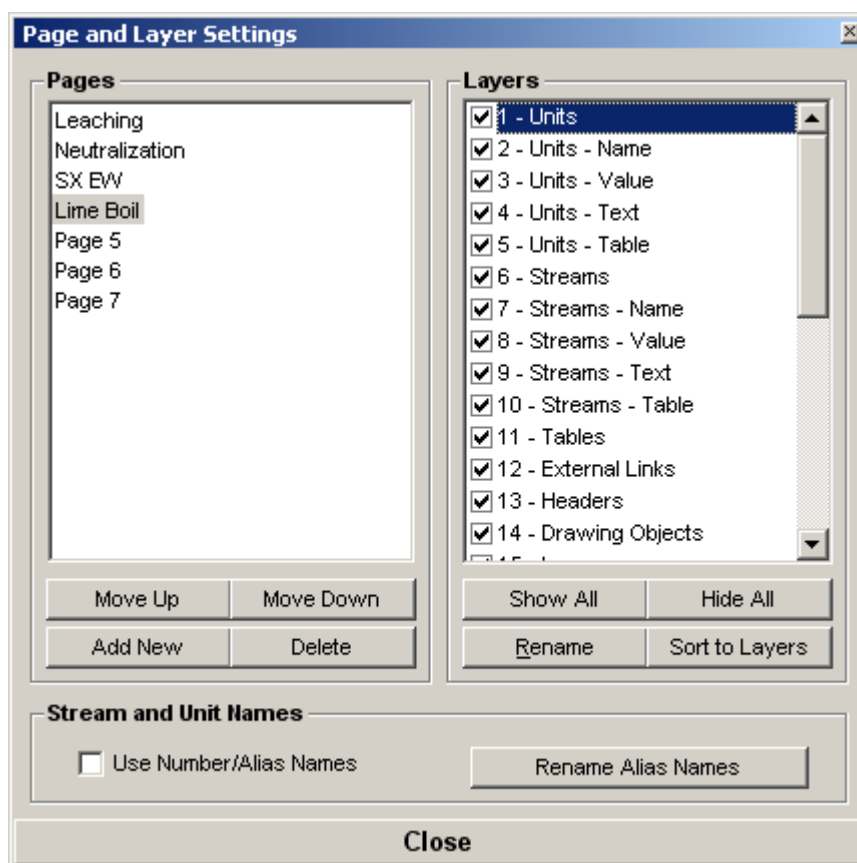


- More than 70 new unit icons was added to Iron-Steel, Roasting, Filter, Pyro_Ausmelt and Energy folders of the Sim Flowsheet module unit icon database.

2. Sim Flowsheet Module



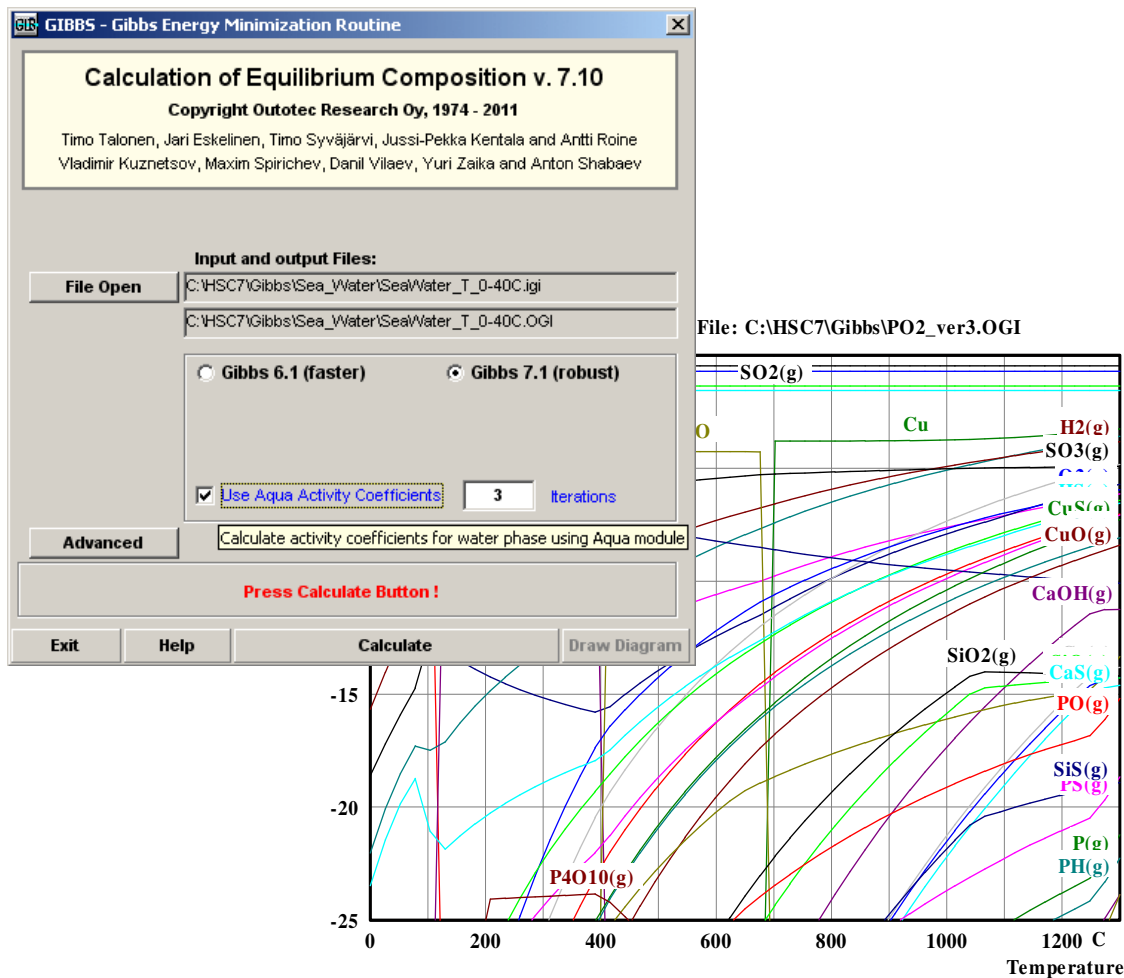
- Improved process calculation speed.
- Sim user interface remembers the size and location of the forms.
- Find Errors: Circular reference test added to "Find Errors" dialog and also some other problems was fixed.
- Find Errors: Warns also of external controls and Sync area errors.
- Find Errors: Total error test was added and error limit tests were improved.
- Find Errors: Problem with missing units fixed.
- Find errors: Dialog has been updated. External controls are also checked, mass balances are shown for the whole process and mass balance error calculation for one unit is corrected.
- Circular References: Ten recalculations will be carried out if circular references are detected, this improves accuracy, but slows down calculation speed.
- Controls: Possible user errors in the controls (#REF) do not crash calculation.
- Controls: Simple reverse/direct control operation has been improved.
- Reaction Wizard: new distribution 100% test has been added.
- Reaction Wizard: improved balance routine messages.
- List Streams: small bug in listing was fixed.



- Improved dialog has been added for maintenance of Alias Names.
- Convenient new method was added to the "Tree View" of the process - just keep the left mouse button down and you will see the different streams of the selected unit.
- Sim Menu selection "Arrange, Make Same Size,..." has been improved.
- Duplicate streams synchronization within File Links and Info Toolbars was improved.
- Save dialog opens when Sim is closed from the top-right cross if changes has been made. Sim also remembers the last folder when closed from the top-right cross.
- Remote Control: Ergonomy of the Remote Control dialog have been improved. Occasional remote control bug was fixed.
- New DLL-unit interface and option has been added to menu. This makes possible to replace the visible unit calculation model with the DLL-file. These DLL-models read data from Input sheet and return results to Output sheet. User may create these DLL-files using C++, VB6, Delphi, etc.
- Sim registers the unit DLL files automatically in the folder:
C:\HSC7\Sim\Wizards\Unit-DLL
- Table object: Copy-Paste and cell-formula bugs were fixed with cell reference links.
- Table object: Save and Open bug was fixed with cell comments.
- Table object: Visual problems with zoom was fixed.
- Table object: Editing problems in Run window fixed.
- Table object and Reaction Wizard: Ctrl-C and Ctrl-V keys enabled.
- Select Stream Tables problem was fixed.

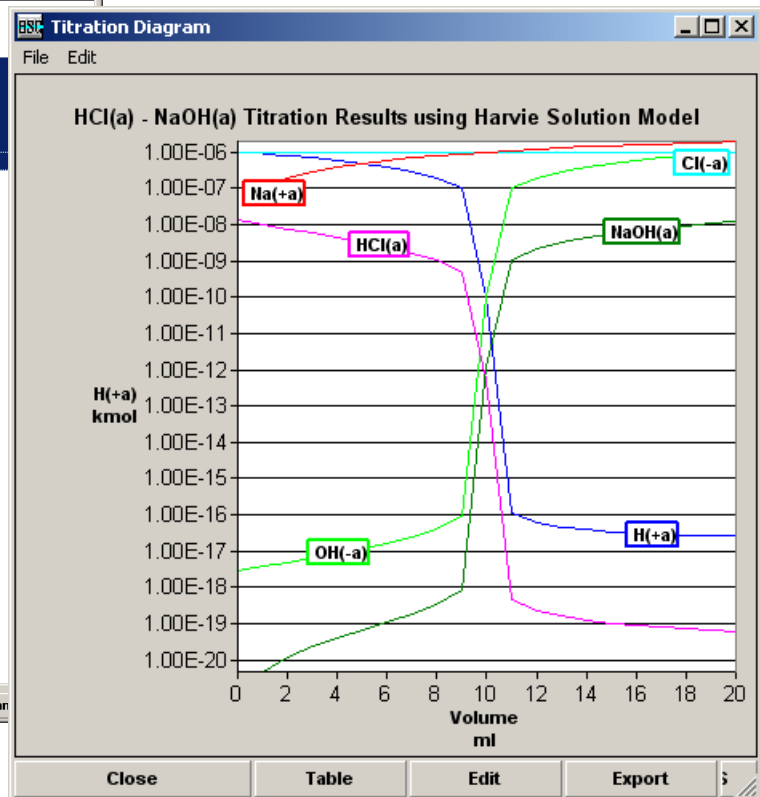
- Duplicate Stream Table bug was fixed.
- Stream Stick ends bug with unit selection was fixed.
- Occasional bug with Sim mode changes was fixed.
- Bug with "File, Import Model,..." dialog was fixed in case of invalide file formats.
- New "Edit, Copy and paste to all streams,..." option was added to Reaction and Particle modes.
- New "File, Import Variable List" option was added to file menu in Reaction and Particle modes.
- Distribution mode (Pyro): User may complete and end the stream drawing with "Enter" key. In the old Sim 7.0 only mouse double click completed the stream drawing.
- Distribution mode (Pyro): External control problem was fixed.
- Distribution mode: Link label problem was fixed.
- Distribution mode: Element amount = 0 -> division by zero bug fixed.
- Distribution mode: New option "Fixed Input" in the Dist sheet.
- Distribution mode: New option "Refresh Cell Formats" in the Format sheet.
- Distribution mode: Sync problem with row delete operation fixed.
- Distribution mode: Limitation of 20 streams was removed. View all shows now all rows.
- Distribution mode: Problem with "Find Streams" in Run window fixed.
- Distribution mode: New drop down list for the measure units.
- Two Sim system memory leaks was fixed.
- Cell Defined Name problems in the spreadsheet was fixed.
- Spreadsheet: cosmetic cell number format problem was fixed: 0.00E-01 -> 0.00E+00
- Spreadsheet: Cell comments problem with save-method fixed.
- Element balances: Red color highlights negative amounts.
- "Refresh All Formulas" tool does not change the background colour of the values. This way links will show better in the streams.
- Improvements in mass balancing and data reconciliation module to speed up the solution in complex cases.
- New model fitting module enabling to give additional constraints and use data organized in the experimental mode directly to derive model parameters for flotation, classification and general polynomial, exponential and log functions.
- Wizards: small improvements was done to the Excel wizards. StreamEQ- and StreamEQA-wizards was updated.
- Old, unnecessary menu options was removed: "Save snapshot", "Manage Snapshots", etc.
- Report form/Particle mode: % Solids balance calculation fixed.

3. Equilibrium Module



- More robust equilibrium calculation routine Gibbs 7.1 has been added to HSC Equilibrium module. This routine is also faster and more accurate especially for very small element amounts.
- Aqua option was added to Gibbs 7.1. This makes possible automatically calculate activity coefficients of the water mixture phases.
- Activity coefficient formulas was enabled on Gibbs 7.1.
- Limitation of 20 elements in IGI-files has been removed.
- New View, Element Matrix, option was added. This makes possible to check element amounts given in the raw materials, etc.
- Element search dialog do not add anymore duplicate N2(g) species.
- Ergonomics of the Pic.exe diagram drawing routine was improved.
- etc.

4. Aqua Module



- New titration options.
- Improved calculation speed.
- New properties: Boiling point elevation, freezing point depression, osmotic pressure estimation, water vapor pressure estimations, relative humidity estimations.

5. Add-In Functions

The screenshot shows the Microsoft Excel interface with the HSC Add-In menu open. The menu options are: Change measurement units..., Set HSC Database Location..., and Set Mineral Database Location... The spreadsheet displays the results of a StreamEQA function. The data is organized into columns for Input, Activity Coefficient (AC), and Output. The output column shows the amount of each species in kmol.

Species	Input	AC	Output
Temperature			25 °C
Pressure			1 bar
SPHASE 1:	25.000		2.50E+01 °C
N2(g)	1.000	1.000	1.00E+00 kmol
H2O(g)		1.000	9.78E-02 kmol
O2(g)	0.000	1.000	1.00E-05 kmol
CO2(g)	3.000	1.000	1.99E+00 kmol
SPHASE 2:	25.000		2.50E+01 °C
H2O	55.500	1.000	5.64E+01 kmol
CO3(-2a)		0.554	2.02E-06 kmol
C2O4(-2a)		0.554	1.13E-47 kmol
Ca(+2a)	1.000	0.596	8.02E-03 kmol
CaOH(+a)		0.863	1.31E-09 kmol
H(+a)		0.854	7.75E-07 kmol
HCO2(-a)		0.863	2.06E-41 kmol
HCO3(-a)		0.895	1.60E-02 kmol
HO2(-a)		0.863	1.19E-26 kmol
OH(-a)	2.000	0.836	1.92E-08 kmol
SPHASE 3:	25.000		2.50E+01 °C
CaCO3		1.000	9.92E-01 kmol
SPHASE 4:	25.000		2.50E+01 °C
Ca(OH)2		1.000	0.00E+00 kmol

- New functions: StreamEQAqua, StreamEQ6, StreamEQA6, StreamEQAqua6, StreamExTkg, StreamExTNm3, ExPh, StreamExPkg, StreamExPNm3, ExCh, StreamExCkg, StreamExCNm3, AquaAC, AquaH, AquaCp, StreamEQA.
- Several StreamEQ and StreamEQA issues was fixed:
 - StreamEQ recalculation problem was fixed.
 - The negative input amounts to StreamEQ are automatically converted to zero. If the \$! flag is used then negative input amounts create error.
 - Element amount may also be zero in StreamEQ ja StreamEQA functions.
 - Limit of 20 elements have been removed, now the limit is 100 elements.
 - In Excel the new "HSC, Set HSC Database Location..." dialog makes possible to see and change H, S and Cp database paths.
 - StreamEQ ja StreamEQA error messageboxes do not fire any more.
 - Section mark § stands for ordinary phase in StreamEQ and StreamEQA functions, however "\$!" flag string puts the error messages ON.
 - Double section mark §§ in the last phase converts this to invariant phase, which means that the species are regarded as pure substances.
- New database option in HSC menu of the Excel.
- New document "27 Creating HSC Add-Ins.doc" was added to the manual. This gives instructions to create custom made Add-In functions to Sim.

6. H, S and Cp Estimation Module

	A	B	C	D	E	F	G	H	I
1	DB	ROUGH ESTIMATES	T (Cp)	H (25°C)	kcal/mol	S (25°C)	cal/(mol*K)	Cp	cal/(mol*K)
2	No	Chemical Formula	°C	Estimate	Database	Estimate	Database	Estimate	Database
3	2	MgSO4	25.00	-307.58	-301.58	22.12	21.89	23.48	23.04
4	2	MgCO3*3H2O	25.00	-461.12	-472.58	44.72	46.76	47.19	56.93
5	2	U2O3(g)	25.00	-228.48	-205.29	95.09	89.12	22.34	22.16
6	2	Ni(OH)2(g)	25.00	-50.74	-58.21	68.60	68.80	14.93	18.49
7	2	C22H32(2DNg)	25.00	-33.47	-29.76	189.57	186.05	98.05	98.13
8	2	C5H10O2(M2MPRg)	25.00	-105.76	-110.90	94.66	93.69	32.16	34.52
9	2	B3O3HF2(g)	25.00	-478.79	-475.00	81.38	78.63	25.76	24.75
10	2	Ag2CO3	25.00	-104.59	-121.87	44.58	40.80	30.16	26.68
11	2	Cu5FeS4	25.00	-92.62	-90.90	75.01	86.60	58.09	58.70
12	2	CuH(g)	25.00	84.29	69.14	47.77	46.96	5.72	6.99

- The HSC 7.0 estimation methodology makes it possible to estimate the enthalpy, entropy, and heat capacity values of any chemical substance, and no information of the geometrical bond structure is needed. Given species do not need to exist in HSC database.
- HSC 7.1 improves estimates with updated estimation parameters.
- HSC 7.1 improves especially Cp temperature function estimates.

7. H, S and Cp Database

- Some 200 bug fixes was made to HSC 7 database based on the Estimation module results.

8. Heat and Material Balance Module

- Spreadsheet: Duplicate cell Defined Name "PrintArea" problem was fixed.

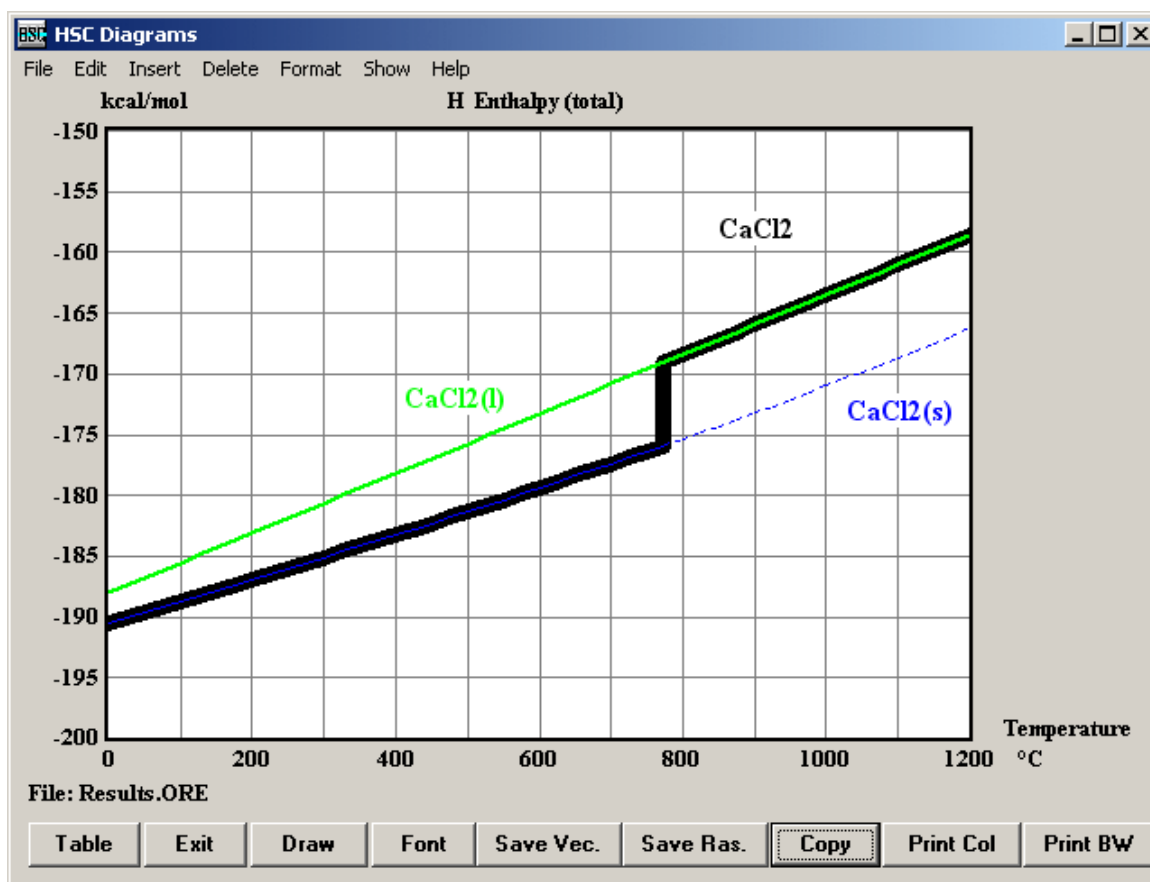
9. Measure Units Module

- Sampler routine was added, this may be used to estimate sampling errors in the experimental work.

10. Help Module

- Rendering of images was improved, this improves the quality of the images but also the scrolling speed of the Help files.

11. General Fixes



- New force to solid (s) method. This makes possible to force HSC calculation modules to use solid data for species at any temperature.

In earlier HSC versions user may force HSC to use liquid data at all temperatures with (l)-suffix in the formula. For example, **CaCl2(l)** will force HSC to use liquid calcium chloride data in all temperatures. HSC saves (l) data to the active Own-database.

Now with (s)-suffix the user may force HSC 7.1 to use solid data in all temperatures. For example, **CaCl2(s)** force HSC to use solid calcium chloride data in all temperatures. HSC do not save (s) data to Own-database but uses only s-records in Main-database and skips l-records.

This new feature may be used, for example, in equilibrium module to illustrate melting points.

- Bug with table printing to some PDF printer fixed.
- In some computers the default font of the HSC modules caused cosmetic problems. Now Windows standard "Arial"-font is used as default HSC font in most of the modules.
- "Outotec Research Oy" was integrated to "Outotec (Finland) Oy at the beginning of 2011. The name "Outotec Research Oy" was changed to ""Outotec, Research Center"
- + Large number of small cosmetic fixes and improvements.