

# 47. Sim Species Converter Units

The screenshot displays the HSC Sim8 software interface. On the left, a process flow diagram shows a 'Mineral Stream' entering a 'Species Converter Unit' (blue box), which then connects to a 'Distribution Unit' (red box), resulting in an 'Output Stream'. The main window shows the configuration for the 'Species Converter Unit'.

**Species Converter Unit Configuration**

Name	Value	Unit	Limits	Description
Output temperature	298.15	Kelvins	>=0	Temperature of d

**Species list**

Species	Weight	Ccp	Gn	Py	Qtz
1 CuFeS2	1	-1	-1	-1	-1
2 Cu2S	1	-1	-1	-1	-1
3 FeS2	1	-1	-1	-1	-1
4 PbS	1	-1	-1	-1	-1
5 SiO2	1	-1	-1	-1	-1
6 Ag2S	1	-1	-1	-1	-1
7 Al2O3	1	-1	-1	-1	-1
8 Bi2S3	1	-1	-1	-1	-1

**Mineral to species conversion targets and weights**

Mineral	Weight	Ccp	Gn	Py	Qtz
19 CuFeS2	1	-1	-1	-1	-1
20 Cu2S	1	-1	-1	-1	-1
21 FeS2	1	-1	-1	-1	-1
22 PbS	1	-1	-1	-1	-1
23 SiO2	1	-1	-1	-1	-1
24 Ag2S	1	-1	-1	-1	-1
25 Al2O3	1	-1	-1	-1	-1
26 Bi2S3	1	-1	-1	-1	-1

**Elements**

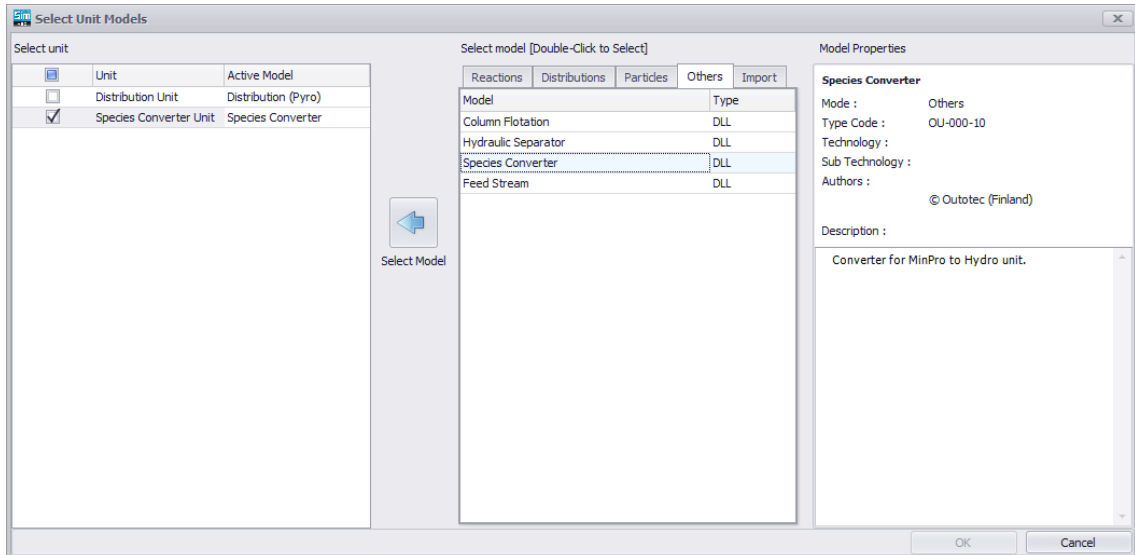
Element	Wt-%	Residual
30 Fe	19.3306133	-0.01849528
31 Cu	8.67165054	-1.63E-07
32 S	25.4948515	0.01305635
33 Pb	21.4755405	-0.00390283
34 Bi	0.0149447	-5.0102E-07
35 Ag	0.02988941	-3.8129E-07
36 Si	11.6309528	0.02887314
37 Al	0.0026475	-0.02254084
38 O	13.3321972	-0.0253424
39 H	0.0092325	-0.0092325
40 Others	0.00747998	0

The right-hand side of the interface shows the 'Properties' window for the 'Species Converter Unit' and a 'Log viewer' window with several entries, including 'Connecting Stream 1 as a source to...', 'Connecting Unit 1 as a target of the re...', 'FlowSheetUnit - PrepareCalculations', 'Calculating static round 1', and 'Process unit CleanUpCalculations (M...'.

In Sim 8, it is possible to connect minerals processing DLL units to conventional Reactions(Hydro) and Distribution(Pyro) units. However, this connection requires that the content of the mineral streams is converted to chemical species. This conversion is carried out with the Species Converter unit.

### 47.1. Selecting the Species Converter unit model

The Species Converter unit model is selected with the "Select Unit Model" tool (**Fig. 1**). Mineral streams are connected as inputs, and the output of a Species Converter unit is connected either to a Reactions or a Distribution unit.



**Fig. 1.** Selecting the Species Converter unit model.

### 47.2. Setting the conversion parameters

The conversion, from the element distribution of the minerals to chemical species, requires a list of species. These species are entered on the "Parameters" page in the unit, under the "Species" heading (Fig. 2).

6	Species
7	1 CuFeS2
8	2 Cu2S
9	3 FeS2
10	4 PbS
11	5 SiO2
12	6 Ag2S
13	7 Al2O3
14	8 Bi2S3
15	9

Fig. 2. Enter the species that can be formed.

Users can also set optional parameters for the conversion, to adjust the conversion by target values and weighting coefficients. These optional parameters are entered in the mineral-species matrix (Fig. 3). If a species does not have any specific target values, then "-1" is used as a default parameter.

17	Mineral to species conversion targets and weights					
18		Weight	Ccp	Gn	Py	Qtz
19	CuFeS2	5		80	0	0
20	Cu2S	1		-1	-1	-1
21	FeS2	1		15	0	100
22	PbS	1		-1	-1	-1
23	SiO2	10		0	0	100
24	Ag2S	1		-1	-1	-1
25	Al2O3	1		-1	-1	-1
26	Bi2S3	1		-1	-1	-1

Fig. 3. Set target and weight coefficient values, to adjust the conversion.

Finally, when all the necessary parameters are set, run the model to get the conversion results.

### 47.3. Conversion results

After the model is run, the conversion results can be checked from the "Output" page to see the actual amounts of the species. However, it is also extremely important to check the element balance on "Parameters" page after the conversion, to ensure that the residuals of the element balance are acceptable (**Fig. 4**). If the residual values are too high, you can try to obtain a better conversion by adding more species to the list or by changing the target and weighting parameters.

28	Elements		
29		Wt-%	Residual
30	Fe	19.3306133	-0.01834455
31	Cu	8.67165054	-2.5977E-07
32	S	25.4948515	0.01318637
33	Pb	21.4755405	-0.00418113
34	Bi	0.0149447	-5.3151E-07
35	Ag	0.02988941	-4.089E-07
36	Si	11.6309528	0.02887313
37	Al	0.0026475	0.02254082
38	O	13.3321972	-0.02534243
39	H	0.0092325	-0.0092325
40	Others	0.00747998	0

Fig. 4. Element balance residuals after conversion.

#### **47.4. Advices when using Species Converter unit**

- The species used in the conversion have to be found from the active HSC database (main or own).
- Usually the more species is specified, the better conversion is obtained (small element balance residuals).
- H<sub>2</sub>O amount of the input mineral streams is automatically converted to the output stream.
- When connecting the output of a Species Converter unit to a Reactions(Hydro) unit, all the converted species have to be found from the variable list, including "Others".