



Database name:	TCS Fe-containing Slag Database	Database version:	3.1
Database acronym:	SLAG3		
Database owner:	Thermo-Calc Software AB		
Database segment:	Fe-containing slag		

Brief description

SLAG3 is suitable for activity and phase equilibrium calculations in metallurgical slag systems containing iron.

Applications

Alloy design and engineering; Metallurgy.

Included Elements (30)

Ag	Al	Ar	B	C	Ca	Co	Cr	Cu	F	Fe	H	Mg	Mn	Mo	N	Na
Nb	Ni	O	P	Pb	S	Si	Sn	Ti	U	V	W	Zr				

Included Phases

SLAG3 database contains a liquid slag phase, as well as an Fe-rich liquid phase (dilute solution), a pure FeO liquid phase, a large gaseous mixture phase, and many stoichiometric solids and solid solution phases (*e.g.*, oxides, silicates, sulfides, phosphates, halites, *etc.*). Total amount of different phases is 114.

The slag phase (containing oxide/silicate/sulfide/phosphate/fluoride species), as well as various oxide, silicate, sulfide, phosphate and fluoride solids phases, cover 13 elements (Al-Ca-Cr-Fe-Mg-Mn-Na-Si-Ti-O-S-P-F).

The Fe-Liquid solution phase includes 26 dilute components (Ag-Al-B-C-Ca-Co-Cr-Cu-H-Mg-Mn-Mo-N-Nb-Ni-O-P-Pb-S-Si-Sn-Ti-U-V-W-Zr). The recommended composition limit of any minority component, in the 27-component diluted Fe-rich liquid, is only 0.1wt%. In some cases, data could be used at much higher concentrations in the Fe-rich liquid phase, but the user must carefully check each of such cases.

The gaseous mixture phase and many solid phases (stoichiometric or solution), as in the entire 30-element framework, are included.

For steels and various alloys, as well as other substance or solution phases, which are in interactions with the Fe-rich liquid phase or the liquid slag phase, thermodynamic data can be appended from other available databases, such as TCFE, TCNI, SSUB, SSOL, TCMP, TCES, TTAI/Mg/Ni/Ti, SALT, TCAQ, AQS, GCE, NUMT, NUOX, *etc.*

Assessed Systems

Thermodynamic data for the liquid slag phase and oxide/silicate solid phases within the Al₂O₃-CaO-CrO-Cr₂O₃-FeO-Fe₂O₃-MgO-MnO-Na₂O-SiO₂ system were critically assessed by IRSID (1984), using the Kapoor-Frohberg-Gaye Quasichemical Cell Model, *i.e.*, the Kapoor-Frohberg Slag Model with the extensions introduced by Gaye and Welfringer (1984) for complex multicomponent slag solution systems. Data for the additional components S, P and F (as sulphide, phosphate and fluoride species in the Al-Ca-Cr-Fe-Mg-Mn-Na-Si-O-S-P-F system) in the slag phase and solid phases, which were critically assessed by IRSID (1997), have been added to the database, and it thus allows calculations of sulphide capacities of slag. Composition-dependent parameters in the solid solution phases have not been considered in this particular database. From SLAG2 to SLAG3, the TiO₂ component has been introduced to the slag phases (both liquid slag and oxide solids), with critically-assessed data for many TiO₂-bearing slag systems. Meanwhile, there are corrections and improvements regarding some CaF₂-bearing slag systems.

Data for a dilute solution of many elements in the Fe-rich liquid phase are critically assessed and converted to regular solution parameters according to Hillert (1986), with modified dilute solution parameters (plus a quadratic term) in liquid iron from Sigworth and Elliot (1974), so that it becomes a consistent thermodynamic model and also generally improves the agreements of calculated results with available experimental data.

Limits

Critical calculations must always be verified by equilibrium experimental data; it is the user's responsibility to verify the calculations but Thermo-Calc Software is interested to know about any significant deviations in order to improve any future release.

Scientific Models & References

See the Thermo-Calc Software reference list available at: <http://www.thermocalc.com/Library.htm>