MOB2: TCS Alloys Mobility Database

MOB2 is a kinetic database containing mobility data primarily but not limited to Fe-based alloys. Data is present in a format suitable for simulation of diffusion controlled phenomena using the add-on Diffusion Module (DICTRA) and/or Precipitation Module (TC-PRISMA), and/or for use together with any Thermo-Calc programming interface. MOB2 is compatible and recommended for use in combination with the SSOL (SGTE Solution Database) thermodynamic database.

Database name:	**TCS Alloys Mobility Database**
Database acronym:	**MOB2**
Database owner:	**Thermo-Calc Software AB**
Database version:	**2.7**

Applications

Primarily for aiding alloy design and the optimization of manufacturing processes, through simulation of different diffusion controlled phenomena, such as e.g. microsegregation during solidification, homogenisation, kinetics of phase transformations, precipitate growth/dissolution kinetics, carburization, nitriding and much more.

Included Elements (75)

Ag	Al	Am	As	Au	B	Ba	Be	Bi	C
Ca	Cd	Co	Cr	Cs	Cu	Dy	Er	Fe	Ga
Gd	Ge	Hf	Hg	Ho	In	Ir	K	La	Li
Lu	Mg	Mn	Mo	N	Na	Nb	Nd	Ni	Np
Os	P	Pa	Pb	Pd	Pr	Pt	Pu	Rb	Re
Rh	Ru	S	Sb	Sc	Se	Si	Sm	Sn	Sr
Ta	Tb	Tc	Te	Th	Ti	Tl	Tm	U	V
W	Y	Yb	Zn	Zr					

Included Phases

BCC_A2	CEMENTITE	FCC_A1	M4N	HCP_A3	LIQUID

The above phases have diffusion data included in the database. You can include other phases in a diffusion simulation. However, these other phases are treated as so-called diffusion *NONE*, i.e. there is no diffusion considered in these other phases. Any phase not listed above is automatically entered as diffusion *NONE* (in Console Mode in the DICTRA module or in Graphical Mode with the Diffusion Calculator), as long as a thermodynamic description for the phases is retrieved prior to reading data from the mobility database.

Assessed Systems

This database contains assessed self- and impurity diffusion data for a number of elements, as well as assessed data for some alloy systems (listed below). Since a lot of experimental data is missing in the literature, naturally some parameters are missing in the database. In order to make the database as complete as possible, several parameters were estimated. Because of this reason the databases is most applicable to Fe-based systems, i.e. steels.

Binary Systems

BCC_A2:	C-Fe	C-Cr	Cr-Fe	Cr-N	Cr-Ni	Fe-N	Fe-Ni		
FCC_A1:	Al-Cr	Al-Ni	C-Fe	C-Ni	Cr-Fe	Cr-Ni	Fe-N	Fe-Ni	Fe-Si
HCP_A3:	C-Fe	Fe-N							
M4N:	C-Fe	Fe-N							

Ternary Systems

BCC_A2:	C-Cr-Fe		
FCC_A1:	Al-Cr-Ni	C-Cr-Fe	C-Fe-Ni

Higher Order Systems

BCC_A2:	C-Cr-Fe-N-Ni

FCC_A1:	C-Cr-Fe-Ni

A model from Jönsson includes the effect on diffusion from the ferromagnetic transition in body-centred cubic Fe (B. Jönsson; Z. Metallkd. 83(1992), pp 349-355). Diffusion data for the LIQUID phase is presented in the database, but since no valid diffusion model exist for liquids, a rule of thumb value of $1 \cdot 10^{-9}$ [m/s^2] is used for all diffusivities. For the phase HCP_A3 most data are assumed to be the same as that in FCC_A1.

Limits

The database is primarily recommended for Fe-based alloys and steels. However, MOB2 can also be used in a few other systems, but it's important to make sure data is included for the system of interest.

As in the spirit of the CALPHAD method, predictions can be made for multicomponent systems by extrapolation into multicomponent space of data critically evaluated and assessed based on binary, ternary and in some cases higher order systems. However, critical calculations must always be verified by equilibrium experimental data; it is the user's responsibility to verify the calculations but Thermo-Calc Software AB is interested to know about any significant deviations in order to improve any future release.

Scientific Bibliography

See the Thermo-Calc Software scientific bibliography on our website.