MOB2: TCS Alloy Mobility Database

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

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.

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

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

Please note that apart from above phases for which diffusion data is indeed included in the database, then also other phases may be included in a diffusion simulation. However, these other phases will be treated as so-called diffusion “NONE”, i.e. there will be no diffusion considered in such phases. Phases which are not listed above will automatically be entered as diffusion “NONE” in the DICTRA module in Thermo-Calc, provided a thermodynamic description for such phases has been 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.

Scientific Models and References

See the Thermo-Calc Software reference list and reference library at: http://www.thermocalc.com/resources/