



<b>Database name:</b>	TCS Steels/Fe-Alloys Mobility Database	<b>Database version:</b>	1.0
<b>Database acronym:</b>	MOBFE1		
<b>Database owner:</b>	Thermo-Calc Software AB		
<b>Database segment:</b>	Iron and Steel		

**Brief description**

MOBFE1 is a kinetic database containing mobility data limited to Fe-based alloys. Data is present in a format suitable for simulation of diffusion controlled phenomena using the DICTRA simulation software, and/or for use together with any Thermo-Calc programming interface. MOBFE1 is compatible and recommended for use in combination with the TCFE6 (TCS Steels/Fe-Alloys 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**

Al	Ar	B	C	Ca	Co	Cr	Cu	Fe	Mg	Mn	Mo	N	Nb	Ni	O	P
S	Si	Ti	W	V												

**Included Phases**

BCC_A2	CEMENTITE	FCC_A1	FE4N	HCP_A3	LIQUID
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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 DICTRA 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 DICTRA, 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, some parameters have been estimated.

*Binary systems*

BCC_A2:	Al-Fe	C-Fe	C-Cr	Cr-Fe	Cr-N	Cr-Ni	Fe-N	Fe-Ni				
FCC_A1:	Al-Cr	Al-Ni	C-Fe	C-Ni	Co-Fe	Co-Ni	Cr-Fe	Cr-Ni	Fe-Mn	Fe-N	Fe-Ni	
	Fe-Si	Mn-Ni										
HCP_A3:	C-Fe	Fe-N										
FE4N:	C-Fe	Fe-N										

*Ternary systems*

BCC_A2:	C-Cr-Fe											
FCC_A1:	Al-Cr-Ni	C-Cr-Fe	C-Fe-Ni	Co-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-centered 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<sup>2</sup>/s] 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 contains a limited amount of binary and higher order assessments and hence some caution is recommended when performing calculations on highly alloyed steels.

**Scientific Models & References**

See the Thermo-Calc Software reference available at:

[http://www.thermocalc.com/DOWNLOAD\\_AREA/References.html](http://www.thermocalc.com/DOWNLOAD_AREA/References.html)