Thermo-Calc Software

MOBNi1

Database name:	TCS Ni-alloys Mobility Database	Database acronym:	MOBNi1
Database owner:	Thermo-Calc Software AB	Database version:	1.0
Database segment:	Nickel-based superalloys		

Brief Description

MOBNi1 is a kinetic database containing mobility data for Ni-based alloys 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.

MOBNi1 is compatible and primarily recommended for use in combination with the TTNi thermodynamic database.

Applications

Used together with the DICTRA software and a thermodynamic database for Ni-based alloys (e.g. TTNi), then the MOBNi1 database can be used in order to study several different phenomena of interest to Ni-based superalloys design and manufacturing, such as e.g. microsegregation during solidification, homogenisation kinetics, precipitate growth/dissolution kinetics, interdiffusion in Ni-base superalloy coating/substrate compounds, and much more.

Included Elements

Al B C Co Cr Cu Fe Hf Mn Mo N Nb Ni O Re Ru Si
Ta Ti W V Zr

Included Phases

FCC_A1 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 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

The MOBNi1 database contains assessed impurity diffusion data in FCC_A1 Ni for all included elements. It also includes complete and critical assessments of FCC_A1 for the following binary, ternary systems, and higher order systems:

Al-B Al-Cr Al-Fe Al-Ni B-Ni C-Cr C-Fe C-Ni Co-Fe Co-Ni Cr-Fe Cr-Ni
Fe-Mn Fe-Ni Hf-Ni Mn-Ni Mo-Ni Ni-Re Ni-Ta Ni-Ti Ni-W

Al-B-Ni Al-Cr-Ni C-Cr-Fe C-Cr-Ni C-Fe-Ni Cr-Fe-Ni

Fe-Cr-Ni-C

There are also parameters added for diffusion in the liquid following a simple estimate that all diffusion coefficients in the liquid are equal to $1 \cdot 10^{-9}$ [m/s^2].

Limits

The database is applicable for commercial Ni-based superalloys, but care should always be taken, as these alloys are highly complex alloys that usually are including very high amounts of alloying elements. 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 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 Models & References

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

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