TCS Ti-alloys Mobility Database (MOBTI4)

Technical Information

Available Starting with Thermo-Calc Version 2021a

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MOBTI4: TCS Ti-alloys Mobility Database

The TCS Ti-alloys Mobility Database (MOBTI) is a kinetic database containing atomic mobility data limited to Ti/TiAl-based alloys.

MOBTI4 is compatible and recommended for use in combination with the TCTI5 TCS Ti/TiAl-based Alloys thermodynamic database.

When the database is used with the Add-on Diffusion Module (DICTRA), you can study several diffusion-controlled phenomena in Ti/TiAl based alloys, such as microsegregation during solidification, homogenization kinetics, growth/dissolution kinetics of precipitates, and much more.

Similarly when combined with the Add-on Precipitation Module (TC-PRISMA), is suitable to simulate concurrent nucleation, growth, and coarsening of precipitates in Ti/TiAl-alloys.

MOBTI: TCS Titanium Mobility Database Revision History. The current version is MOBTI4.

Included Elements (28)

Ag	Al	B	C	Co	Cr	Cu	Fe	H	Hf
Mn	Mo	N	Nb	Ni	O	Pd	Pt	Re	Ru
Si	Sn	Ta	Ti	V	W	Y	Zr		

Included Phases (4)

BCC_A2	HCP_A3	ALTI_L10	LIQUID

The 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 Module (DICTRA) and/or Precipitation Module (TC-PRISMA)), as long as a thermodynamic description for the phases is retrieved prior to reading data from the mobility database.

Assessed Systems

MOBTI4 contains critically assessed self- and impurity diffusion data for the elements in the LIQUID, BCC_A2, HCP_A3, and ALTi_L10 phases when experimental information is available. In other cases estimates based on empirical rules are made.

This database also includes complete and critical assessments of the binary and ternary systems for the LIQUID, BCC_A2, and ALTI_L10 phases.

For the HCP_A3 phase, which has a very small solubility range and no reported experimental diffusivities in binary and ternary Ti-based alloys, only the self- and impurity diffusivities are included.

Diffusion data for the LIQUID phase is also assessed for systems where experimental data is available; otherwise the modified Sutherland equation is used for estimation.

Binary Systems (29)

BCC_A2

Ag-Ti	Al-Fe	Al-Ti	Al-V	Cr-Ti
Cu-Ti	Fe-Ti	H-Mo	H-Nb	H-Ti
H-V	Hf-Ti	Mo-Ti	Nb-Ti	Ni-Ti
Si-Ti	Sn-Ti	Ta-Ti	Ti-V	Ti-Zr

HCP_A3

Ag-Ti	Al-H	H-Ti	Pd-Ti

ALTI_L10

Al-Ti

LIQUID

Al-Ni	Al-Si	Fe-Mn	Fe-Si	Ni-Si

Ternary Systems (11)

BCC_A2

Al-Fe-Ti	Al-Ti-V	Al-Cr-Ti	H-Mo-Ti	H-Nb-V	H-Ti-V

HCP_A3

H-Al-Ti

ALTI_L10

Al-Cr-Ti	Al-Mn-Ti	Al-Nb-Ti	Al-Ti-Zr

Limits

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.

Additional Resources

Go to the Titanium and TiAl-based Alloys Databases page on our website where you can access technical information plus learn more about the compatible thermodynamic database. Also explore further applications of Thermo-Calc to titanium and TiAl including links to resources such as examples, publications, and more.

Learn more on our website about the CALPHAD Method and how it is applied to the Thermo-Calc databases.

MOBTI: TCS Titanium Mobility Database Revision History

Current Database Version

Database name (acronym):	**TCS Ti-alloys Mobility Database (MOBTI)**
Database owner:	**Thermo-Calc Software AB**
Database version:	**4.1**
First release:	**MOBTI1 was released in 2013**

MOBTI versions 2 and higher are for use with the Thermo-Calc thermodynamic TCTI database. MOBTI1 is for use with the ThermoTech TTTI3 database.

Changes in the Most Recent Database Release

MOBTI4.0 to MOBTI4.1

Software release 2023a (December 2022/January 2023)

- Modified the impurity diffusivity parameter of nitrogen in HCP_A3 titanium.

Previous Releases

MOBTI3.1 to MOBTI4.0

Software release 2021a (December 2020/January 2021)

The element Copper (Cu) is added in the Bcc_A2, Hcp_A3, and liquid phases.

MOBTI3.0 to MOBTI3.1

Software release 2021a (December 2020/January 2021)

The diffusivity of O in Bcc_A2 Ti is corrected.

MOBTI2.0 to MOBTI3.0

Software release 2019a (January 2019)

- 4 new elements added: Ag, H, Pd, Pt
- 7 new binary systems added: Ag-Ti, Al-H, H-Ti, H-V, H-Nb, H-Mo, Pd-Ti
- 4 new ternary systems added: H-Mo-Ti, H-Ti-V, H-Nb-V, H-Al-Ti

MOBTI1.0 to MOBTI2.0

Software release version: 2017a (June 2017)

The following is what is included with MOBTI2.

- 23 elements Al, B, C, Co, Cr, Fe. Hf, Mn, Mo, N, Nb, Ni, O, Re, Ru, Si, Sn, Ta, Ti, V, W, Y, Zr.
- 4 phases: BCC_A2, HCP_A3, ALTI_L10, LIQUID.
- 20 assessed binary systems.
- 7 assessed ternary systems.