TCS Ni-based Superalloys Database (TCNI14)

Technical Information

Available Starting with Thermo-Calc Version 2026b

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Contents

About the TCS Ni-based Superalloys Database (TCNI)

TCS Ni-based Superalloys Database (TCNI) is a thermodynamic and properties database for Ni- and Co-based alloys and superalloys. All necessary volume data (including molar volume and thermal expansivity) for various alloy phases is available. The database also comes with the description of electrical resistivity, thermal conductivity, and elastic constants as well as surface tension and viscosity of the liquid.

TCNI14 Thermophysical Properties and TCNI14 Elastic Properties

Nickel-based Superalloys

Ni-based superalloys exhibit excellent mechanical strength and resistance to creep at high temperatures, good surface stability and fatigue, resistance to oxidation and hot corrosion. The nickel–aluminum system is the binary basis for Ni-based superalloy compositions. As the amount of aluminium added is large enough, an ordered L12 phase (γ’) forms from the FCC matrix (γ) with the nominal composition of Ni_3Al. Today's superalloys can also be based on cobalt or nickel-iron. All these kinds of alloys usually contain at least ten alloying elements, with each one being added for a specific purpose. Due to this complexity in chemistry, it has traditionally taken a long time to optimize properties of existing alloys and to develop completely new alloys.

Cobalt-based Superalloys

Co-based superalloys are increasingly investigated in academia as promising engineering materials to complement Ni-based superalloys for aerospace applications. These alloys rely on the same fundamental strengthening mechanism as Ni-based systems, namely a γ/γ’ microstructure. Compared with current commercial superalloys, Co-based alloys may offer important advantages, such as higher solidus and liquidus temperatures and reduced segregation during solidification. In this context, CALPHAD-based databases play a key role in optimizing alloy compositions to achieve γ/γ’ Co-based superalloys with competitive properties. The TCS Ni-based Superalloys Database (TCNI) enables researchers and engineers to work with both Ni- and Co-based superalloy systems within a unified thermodynamic and property database framework, which is particularly valuable given the growing interest in Co-based superalloys.

Applications to Alloys and Superalloys

The database has been developed in a CALPHAD spirit with all of the constituent binary systems assessed for their full range of composition including all phases, plus all of the Ni-rich ternary systems, and many other ternary systems as well, in order to give an accurate thermodynamic description of the multicomponent systems of interest for various Ni-and Co-based alloys and superalloys including, but not limited to:

- Hastelloy and the Haynes alloys
- Inconel alloys
- Waspaloy
- René alloys
- Incoloy
- TMS alloys
- CMSX single crystal alloys
- Experimental Co-Al-W-based superalloys and W-free Co-based superalloys

Interconnectivity with Other Products

The database can be used with our entire suite of products: Thermo-Calc, the Add-on Diffusion (DICTRA), Precipitation (TC-PRISMA), and/or Additive Manufacturing Modules, and all available SDKs.

The thermodynamic database is compatible with the corresponding mobility database TCS Ni-alloys Mobility Database (MOBNI) that provides kinetic data for those working with the add-on kinetic modules – the Diffusion Module (DICTRA) and the Precipitation Module (TC-PRISMA) – as well as a few specific calculation types, such as Scheil with back diffusion. The current version of the mobility database is MOBNI7.

TCS Ni-based Superalloys Database (TCNI) is also integral to the Nickel Model Library, which is a package of property models used to set up calculations in the Property Model Calculator that are common to those working with nickel-based alloys. The library includes models intended for those working in the nickel industry: Antiphase Boundary Energy, Coarsening, Equilibrium with Freeze-in Temperature, Solvus for Ordered Phase, and Strain-Age Cracking.

The Nickel Model Library is available for free to all users who have licenses for both of the nickel databases TCNI (version 11 or newer) and MOBNI (version 5 or newer) and valid Maintenance & Support Subscription (M&SS).

Use Case Examples

There are examples available to both demonstrate the *validation* of the database and to showcase the types of *calculations* that can be used for different materials or application areas depending on the database.

Some general use case examples of how the TCNI14 database can be used include the following. Use it to calculate:

- Isothermal or vertical section phase diagrams
- Liquidus temperatures
- γ’ solvus temperatures
- Partitioning of alloying elements between γ and γ’ phases
- Amount of phases at varying temperatures
- Predict Young's modulus with elastic properties

Then in combination with the Add-on Diffusion (DICTRA), Precipitation (TC-PRISMA), and/or Additive Manufacturing Modules you can also calculate such things as:

- Interdiffusion in coating/substrate systems
- Diffusion in ordered γ’ and B2 phases
- Growth or dissolution of minor phases, such as TCP phases and carbides
- Concurrent nucleation, growth/dissolution and coarsening of precipitates
- Temporal evolution of particle size distribution
- Average particle radius and number density
- Calculate hydrogen diffusion depth in Ni-based superalloys

Combining Databases

It is possible to combine several databases to make calculations using Thermo-Calc. For more information related to a specific type of problem, contact one of our support specialists at info@thermocalc.com. The experts are available to make recommendations on the most suitable database to use for your needs.

Release History

- The current version of the database is TCNI14. To review the most recent changes, see TCNI14: Current Version Changes.
- To review additional older changes, see TCNI: Revision History.

Acknowledgement

Dr. Nathalie Dupin and Prof. Bo Sundman are acknowledged for many valuable discussions and important contributions during the original development, implementation and improvements to this database.

TCS Ni-based Superalloys Database (TCNI) Resources

Database technical content and examples are available in different formats (html help files or PDFs).

Go to these locations to access the same content:

- **Locally Installed Help**: When in Thermo-Calc, press F1 to open the current version of the help in a local browser. You can also click **Online Help** from the **My Project** page to open the file. Then search or navigate to the **Databases** folder to browse the contents.
- **Web Help**: Go to the Documentation page to link to the most recent version of the web help. Then search or navigate to the **Databases** folder to browse the contents.
- **Website resources**: The individual database technical information and examples are also available in PDF format from the website. Download the *current version* of the PDFs for each database.

About the CALPHAD Method

The Thermo-Calc databases are developed with the CALPHAD approach based on various types of experimental data and theoretical values (e.g. those from first-principles calculations). It is based on the critical evaluation of binary, ternary, and for some databases, important higher order systems. This enables predictions to be made for multicomponent systems and alloys of industrial importance. Among these, the thermodynamic database is of fundamental importance.

Learn more on our website about the CALPHAD Method and how it is applied to the Thermo-Calc databases. Also visit the video tutorials on our website or our YouTube playlist.

Learn More

Go to the Nickel- and Cobalt-based Superalloys Databases page on our website where you can access a *Validation and Calculation Examples Collection* and the *Technical Information* plus learn more about the compatible kinetic database. Also explore further applications of Thermo-Calc to nickel including links to resources such as examples, publications, and more.

For more information about the various thermophysical, thermomechanical, elastic, and properties models, and when in Thermo-Calc, press F1 to search the online help. The details are found under the *General Reference* section. You can also see the brochure on our website that lists what properties can be calculated with Thermo-Calc and the Add-on Modules.

TCNI14 Elements, Systems, and Phases

This section summarizes the available elements, assessed systems, and total number of phases in the TCS Ni-based Superalloys Database (TCNI).

Included Elements

There are 31 elements included in the most recent version of the database. Argon (Ar) is only included in the gas phase.

Included Elements									
Al	Ar*	B	C	Ca	Co	Cr	Cu	Fe	H
Hf	Mg	Mn	Mo	N	Nb	Ni	O	P	Pd
Pt	Re	Ru	S	Si	Ta	Ti	V	W	Y
Zr									

** Ar is only included in the gas phase.*

Assessed Systems and Phases

The most recent version of the database contains:

- 392 assessed binary systems, which can be listed with the BINARY module in Thermo-Calc Console Mode.
- 444 assessed ternary systems mostly to their full range of composition at least those being in equilibrium with γ and γ’ phase. These can be listed with the TERNARY module in Thermo-Calc Console Mode.
- 752 solution and intermetallic phases, where nearly all stable phases in all assessed binary systems and most ternary systems are modeled.

About the Phases

In Console Mode, you can list phases and constituents in the Database (TDB) module and the Gibbs (GES) module. For some phases, supplementary information is included in the definitions. To show the information, it is recommended in the Database (TDB) module to use the command LIST_SYSTEM with the option `Constituents`.

- The database contains an extensive GAS mixture phase for the main purpose of considering oxygen/nitrogen-gas controls in alloy making processes, and different gas atmospheres under, for example, heat treatments.

  Argon (Ar) is included in the gas phase only, and there is no solid solubility or condensed phase compounds with this element included in the database.

- Ordered and disordered BCC (A2 and B2/β) and FCC (A1 and L12/γ´) phases are modeled with a two sub-lattice model using a single Gibbs energy curve which enables order/disorder transformations to be modeled [2001Dup].
- The sigma (σ) and mu (μ) phases—two important Topologically Close-Packed (TCP) phases—are modeled using the Effective Bond Energy Formalism (EBEF) [2018Dup]. This implementation is supported by new Density Functional Theory (DFT) data and employs a five-sublattice (5-SL) model for both phases. The use of EBEF, supported by DFT calculations, results in more physically meaningful thermodynamic descriptions of the σ and μ phases. Moreover, because only effective bond energies of the pairs involved in their configuration are required to fully describe these phases, EBEF enables the use of the 5-SL model [2018Dup; 2024San], which better reflects the actual crystallography of the σ and μ structures. Altogether, this approach enhances the modeling of these phases in binary and ternary systems, as well as across the multicomponent composition space.
- Only the phases of interest for superalloys are defined by default, which means that when retrieving the data from the database other phases will automatically be rejected and would need to be manually restored if these are required for a calculation.

There are several possible composition sets for the phases named FCC_L12 and BCC_B2; they are either disordered (A1/carbonitride and A2) or ordered (L12 (γ') and B2 (β)).

TCNI14 Models for the Included Phases has detailed descriptions of all phases, e.g. number of sub lattices and elements on each sub lattice and if available also structure, Pearson symbol and Structur Bericht.

Also see Common Phases for Superalloys, which lists common phase names and the corresponding Thermo-Calc database phase names for some key superalloys.

References

[2001Dup] N. Dupin, B. Sundman, A thermodynamic database for Ni-base superalloys. Scand. J. Metall. 30, 184–192 (2001).

[2001Hil] M. Hillert, The compound energy formalism (1). J. Alloys Compd. 320, 161–176 (2001).

[2018Dup] N. Dupin, U. R. Kattner, B. Sundman, M. Palumbo, S. G. Fries, Implementation of an Effective Bond Energy Formalism in the Multicomponent Calphad Approach. J. Res. Natl. Inst. Stand. Technol. 123, 123020 (2018).

[2024San] J. C. P. dos Santos, S. Griesemer, N. Dupin, U. R. Kattner, C. Liu, D. Ivanova, T. Hammerschmidt, S. G. Fries, C. Wolverton, C. E. Campbell, Applying the Effective Bond Energy Formalism (EBEF) to Describe the Sigma (σ) Phase in the Co-Cr-Ni-Re System. J. Phase Equilibria Diffus. 45, 330–357 (2024).

[2026San] J. C. P. dos Santos, W. Zhang, H. Mao, G. Trimarchi, R. Naraghi, Implementing the Effective Bond Energy Formalism to Improve the Description of the Sigma (σ) and Mu (μ) Phases in the TCNI Database. J. Mater. Eng. Perform., doi: 10.1007/s11665-026-13873-4 (2026).

TCNI14 Properties Data

In this section:

TCNI14 Thermophysical Properties

This section summarizes the thermophysical properties available in the TCS Ni-based Superalloys Database (TCNI).

Molar Volume

Molar volume data is critically assessed for most phases of importance to Ni-based superalloys. All the necessary volume data (including molar volume and thermal expansion) for various alloy phases is incorporated, which allows for the calculation of volume fraction of phases, as well as density, thermal expansivity and lattice parameters, e.g. misfits between γ and γ', using Thermo-Calc. However, it should be noted that the molar volume data only provides rough estimations and has no pressure dependence.

Surface Tension and Viscosity

The properties data for surface tension and viscosity are available starting with TCNI10. Surface tension data is critically assessed for the liquid phase in all pure elements and binary systems. The viscosity of the liquid is described for all pure elements and 142 binary systems.

Electrical Resistivity and Thermal Conductivity

The properties data for electrical resistivity and thermal conductivity are available starting with TCNI11. Electrical resistivity and thermal conductivity data is critically assessed in all binary systems with data available, for the most important phases to Ni-base alloys. For all other phases or systems, the properties are estimated.

Thermophysical Properties Parameters and Variables

Below is a summary of the available thermophysical parameters and variables for the databases when working in Thermo-Calc. There are differences when you are working in Console Mode (CM) versus Graphical Mode (GM) as well as if you use an SDK such as TC-Python or TC-Toolbox for MATLAB®.

Property (Variable Name GM)	*Model Parameters*	*Variables to Show or Plot in CM or the SDKs*
Molar volume	V0, VA	VM for a system `VM(PHI)` for phase PHI
Electrical conductivity	ELQ**	ELCD for a system `ELCD(PHI)` for phase PHI
Electrical resistivity	ELRS, ESPD	ELRS for a system `ELRS(PHI)` for a phase PHI

Property (Variable Name GM)	*Model Parameters*	*Variables to Show or Plot in CM or the SDKs*
Thermal conductivity	THCD	THCD for a system `THCD(PHI)` for phase PHI
Thermal resistivity		THRS for a system `THRS(PHI)` for phase PHI
Thermal diffusivity		THDF for a system `THDF(PHI)` for phase PHI
Surface tension	SIGM, XI*	`SURF(LIQUID)` `SURF(ION)`**
Dynamic viscosity	VISC	`DVIS(LIQUID)` `DVIS(ION)`**
Kinematic viscosity		`KVIS(LIQUID)` `KVIS(ION)`**

* XI is not used in the TCOX database (all versions). As of 2023b it is also not used starting with the following versions of these databases: TCFE13, TCNI12.1, TCTI5.1, TCNOBL3, TCPMAG2, and TCCU6. As of 2024a, TCMG7, TCAL9, and TCHEA7. As of 2024b, TCSLD5. **`ION` is used in the TCS Metal Oxide Solutions Database (TCOX)

The examples listed for the SDKs (TC-Python and TC-Toolbox for MATLAB) are using CM syntax. The quantities can also be accessed in both `ThermodynamicQuantity` and `ScheilQuantity` classes. See the various model descriptions or the SDK help for details.

Examples

In Thermo-Calc, press F1 and search or navigate to the relevant database to discover the Validation and Calculation Examples Collection, which is also available in PDF format on our website.

Go to the Nickel- and Cobalt-based Superalloys Databases page on our website where you can access a *Validation and Calculation Examples Collection* and the *Technical Information* plus learn more about the compatible kinetic database. Also explore further applications of Thermo-Calc to nickel including links to resources such as examples, publications, and more.

Learn More

The thermophysical properties data is added as follows. Molar volume with thermal expansion coefficients properties data have been available since TCNI7 for the most important systems. Viscosity of the metallic liquids and surface tension of metallic liquids are included starting with version 10 (TCNI10). Electrical resistivity and thermal conductivity are included starting with version 11 (TCNI11).

For more information about the various thermophysical, thermomechanical, elastic, and properties models, and when in Thermo-Calc, press F1 to search the online help. The details are found under the *General Reference* section. You can also see the brochure on our website that lists what properties can be calculated with Thermo-Calc and the Add-on Modules.

TCNI14 Elastic Properties

This section summarizes the elastic properties in the TCS Ni-based Superalloys Database (TCNI).

Elastic Properties Parameters and Variables

Elastic properties are only available for cubic BCC (A2 and B2), cubic FCC (A1 and L12), and hexagonal HCP (A3) phases.

Graphical Mode

In the **Plot Renderer** in Graphical Mode, elastic constants and moduli can be selected from the drop-down list of axis variables.

The independent elastic constants are selected on the **Plot Renderer** as an axis variable **Elastic constant** and then choose an option (**C11**, **C12**, **C13**, **C33**, or **C44**) from the drop-down list.

The elastic moduli, **Bulk modulus**, **Shear modulus**, and **Young's modulus**, are directly available from the **Axis variable** list.

All can be tabulated and plotted using the quantity names, with options for a specific phase or all phases.

Console Mode

The quantities corresponding to the individual elastic constants and elastic moduli (derived from the elastic constants) can be can be calculated in Console Mode for individual phases or all phases. The results can be shown in the POLY module with the command SHOW_VALUE or shown as a plot in the POST module with the command PLOT_DIAGRAM using:

- `Cij(<phase name>)` or `Cij(*)`
- Bulk modulus: `BULKMOD(<phase name>)` or `BULKMOD(*)`
- Shear modulus: `SHEARMOD(<phase name>)` or `SHEARMOD(*)`
- Young's modulus: `YOUNGMOD(<phase name>)` or `YOUNGMOD(*)`

TC-Python and TC-Toolbox for MATLAB®

For the Software Development Kits (SDKs), i.e. TC-Python and TC-Toolbox, the quantities of elastic constants, bulk modulus, shear modulus, and Young's modulus can be retrieved for individual phases or all phases via `get_value_of()` or `get_values_of()` from any equilibrium calculation types using:

- `Cij(<phase name>)` or `Cij(ALL_PHASES/*)`
- `ThermodynamicQuantity.bulk_modulus(<phase name>)` or `ThermodynamicQuantity.bulk_modulus (ALL_PHASES/*)`
- `ThermodynamicQuantity.shear_modulus (<phase name>)` or `ThermodynamicQuantity.shear_modulus(ALL_PHASES/*)`
- `ThermodynamicQuantity.youngs_modulus(<phase name>)` or `ThermodynamicQuantity.youngs_modulus(ALL_PHASES/*)`

See the relevant SDK documentation for details.

Examples

In Thermo-Calc, press F1 and search or navigate to the relevant database to discover the Validation and Calculation Examples Collection, which is also available in PDF format on our website.

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Learn More

The elastic properties (elastic moduli and elastic constants) are included with the database as of version 13 (TCNI13) and are only available for cubic BCC (A2 and B2), cubic FCC (A1 and L12), and hexagonal HCP (A3) phases.

For more information about the various thermophysical, thermomechanical, elastic, and properties models, and when in Thermo-Calc, press F1 to search the online help. The details are found under the *General Reference* section. You can also see the brochure on our website that lists what properties can be calculated with Thermo-Calc and the Add-on Modules.

TCNI14 Systems

In this section:

TCNI14 Assessed Binary Systems

These are the assessed binary systems This table shows which binary systems are assessed in the full range of composition and temperature. An 'x' indicates an assessed system. Note that Argon (Ar) is available only in the GAS phase and is therefore not included in this table.

	Al	B	C	Ca	Co	Cr	Cu	Fe	H	Hf	Mg	Mn	Mo	N	Nb	Ni	O	P	Pd	Pt	Re	Ru	S	Si	Ta	Ti	V	W	Y	Zr
Al	Al																													
B	x	B																												
C	x	x	C																											
Ca	x	x	x	Ca																										
Co	x	x	x	x	Co																									
Cr	x	x	x	x	x	Cr																								
Cu	x	x	x	x	x	x	Cu																							
Fe	x	x	x	x	x	x	x	Fe																						
H	x			x	x	x	x	x	H																					
Hf	x	x	x		x	x	x	x	x	Hf																				
Mg	x	x	x	x	x	x	x	x	x	x	Mg																			
Mn	x	x	x	x	x	x	x	x	x	x	x	Mn																		
Mo	x	x	x	x	x	x	x	x	x	x	x	x	Mo																	
N	x	x			x	x	x	x			x	x	x	N																
Nb	x	x	x	x	x	x	x	x	x	x	x	x	x	x	Nb															
Ni	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	Ni														
O	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	O													
P	x	x	x	x	x	x	x	x				x	x		x	x		P												
Pd	x	x	x		x	x	x	x	x	x		x	x		x	x	x	x	Pd											
Pt	x	x	x		x	x	x	x		x		x	x		x	x	x	x	x	Pt										
Re	x	x	x		x	x	x	x		x		x	x		x	x	x		x	x	Re									
Ru	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	Ru								
S	x		x	x	x	x	x	x			x	x	x		x	x		x	x	x	x	x	S							
Si	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	Si						
Ta	x	x	x		x	x	x	x	x	x		x	x	x	x	x	x		x	x	x	x		x	Ta					
Ti	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	Ti				
V	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	V			
W	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	W		
Y	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	x	x	Y	
Zr	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	Zr

TCNI14 Assessed Ternary Systems

These are the assessed or partially assessed ternary systems described in the full range of composition and temperature.

Assessed Ternary Systems							
Al-B-Co	Al-B-Cr	Al-B-Fe	Al-B-Mo	Al-B-Ni	Al-B-Ti	Al-B-Zr	Al-C-Co
Al-C-Cr	Al-C-Fe	Al-C-Ni	Al-C-Si	Al-Ca-O	Al-Ca-Si	Al-Co-Cr	Al-Co-Hf
Al-Co-Mo	Al-Co-Nb	Al-Co-Ni	Al-Co-O	Al-Co-Si	Al-Co-Ta	Al-Co-Ti	Al-Co-W
Al-Co-Zr	Al-Cr-Nb	Al-Cr-Ni	Al-Cr-O	Al-Cr-Pt	Al-Cr-Ru	Al-Cr-Ta	Al-Cr-Ti
Al-Cr-W	Al-Cr-Zr	Al-Cu-Fe	Al-Cu-Mn	Al-Cu-Ni	Al-Cu-S	Al-Cu-Si	Al-Fe-Mn
Al-Fe-Mo	Al-Fe-N	Al-Fe-Nb	Al-Fe-Ni	Al-Fe-O	Al-Fe-P	Al-Fe-Re	Al-Fe-Ru
Al-Fe-S	Al-Fe-Ta	Al-Fe-Ti	Al-Fe-W	Al-H-Mg	Al-Hf-Ni	Al-Hf-Ru	Al-Hf-Ti
Al-Mn-Ni	Al-Mn-O	Al-Mn-Si	Al-Mn-Ti	Al-Mo-Nb	Al-Mo-Ni	Al-Mo-Re	Al-Mo-Si
Al-Mo-Ti	Al-Mo-Zr	Al-N-Ti	Al-Nb-Ni	Al-Nb-Ru	Al-Nb-Si	Al-Ni-O	Al-Ni-Pt
Al-Ni-Ru	Al-Ni-S	Al-Ni-Si	Al-Ni-Ta	Al-Ni-Ti	Al-Ni-V	Al-Ni-W	Al-Ni-Y
Al-Ni-Zr	Al-O-S	Al-O-Si	Al-O-Ti	Al-O-Y	Al-O-Zr	Al-Ru-Ti	Al-Ta-Ti
Al-Ti-W	B-C-Hf	B-C-Ti	B-C-W	B-C-Zr	B-Co-Cr	B-Co-Hf	B-Co-Mo
B-Co-Re	B-Co-Ta	B-Co-Ti	B-Co-W	B-Co-Zr	B-Cr-Fe	B-Cr-Hf	B-Cr-Mo
B-Cr-Ni	B-Cr-Re	B-Fe-Mo	B-Fe-Nb	B-Fe-Ni	B-Fe-W	B-Hf-Nb	B-Hf-Ni
B-Hf-Ta	B-Hf-Ti	B-Mo-Ni	B-Mo-Re	B-Mo-Ti	B-Nb-Re	B-Ni-P	B-Ni-Re
B-Ni-Si	B-Ni-Ta	B-Ni-Ti	B-Re-Ta	B-Re-W	B-Re-Zr	C-Co-Cr	C-Co-Fe
C-Co-Mo	C-Co-Nb	C-Co-Ni	C-Co-Ta	C-Co-Ti	C-Co-W	C-Cr-Fe	C-Cr-Hf
C-Cr-Mn	C-Cr-Mo	C-Cr-N	C-Cr-Nb	C-Cr-Ni	C-Cr-Re	C-Cr-Si	C-Cr-Ta
C-Cr-Ti	C-Cr-V	C-Cr-W	C-Cr-Zr	C-Cu-Fe	C-Fe-Mn	C-Fe-Mo	C-Fe-N
C-Fe-Nb	C-Fe-Ni	C-Fe-O	C-Fe-P	C-Fe-Si	C-Fe-Ti	C-Fe-V	C-Fe-W

Assessed Ternary Systems							
C-Hf-Mo	C-Hf-Ta	C-Hf-Ti	C-Hf-W	C-Mn-Si	C-Mn-V	C-Mo-N	C-Mo-Ni
C-Mo-Si	C-Mo-Ta	C-Mo-Ti	C-Mo-V	C-Mo-W	C-Mo-Zr	C-N-Nb	C-N-Ti
C-Nb-Re	C-Nb-Ti	C-Nb-V	C-Nb-W	C-Nb-Zr	C-Ni-Ta	C-Ni-Ti	C-Ni-W
C-Re-W	C-Si-Ti	C-Ta-Ti	C-Ta-W	C-Ti-W	C-Ti-Zr	C-V-W	C-W-Zr
Ca-Co-O	Ca-Cr-O	Ca-Cu-O	Ca-Cu-S	Ca-Fe-O	Ca-Fe-S	Ca-Mg-S	Ca-Mn-O
Ca-Mn-S	Ca-Nb-O	Ca-Ni-O	Ca-O-S	Ca-O-Si	Ca-O-Y	Ca-O-Zr	Ca-S-Y
Co-Cr-Cu	Co-Cr-Fe	Co-Cr-Mo	Co-Cr-Nb	Co-Cr-Ni	Co-Cr-O	Co-Cr-Re	Co-Cr-S
Co-Cr-Ta	Co-Cr-Ti	Co-Cr-W	Co-Cu-Fe	Co-Cu-Mn	Co-Cu-Nb	Co-Cu-Ni	Co-Cu-S
Co-Cu-Ti	Co-Fe-N	Co-Fe-Ni	Co-Fe-O	Co-Fe-P	Co-Fe-S	Co-Fe-Ti	Co-Fe-W
Co-Hf-Ni	Co-Hf-Si	Co-Mn-O	Co-Mn-S	Co-Mo-Ta	Co-Nb-Ni	Co-Nb-Si	Co-Ni-O
Co-Ni-P	Co-Ni-Re	Co-Ni-Ru	Co-Ni-S	Co-Ni-Si	Co-Ni-Ta	Co-Ni-Ti	Co-Ni-V
Co-Ni-W	Co-O-S	Co-O-Si	Co-O-W	Co-P-V	Co-P-W	Co-Si-Ta	Co-Si-Ti
Co-Si-W	Co-Si-Zr	Co-Ta-Ti	Co-Ta-W	Cr-Cu-Fe	Cr-Cu-Nb	Cr-Cu-Ni	Cr-Cu-S
Cr-Cu-Si	Cr-Fe-Mn	Cr-Fe-Mo	Cr-Fe-N	Cr-Fe-Ni	Cr-Fe-O	Cr-Fe-P	Cr-Fe-S
Cr-Fe-Si	Cr-Fe-V	Cr-Fe-W	Cr-Mn-N	Cr-Mn-O	Cr-Mn-S	Cr-Mo-N	Cr-Mo-Nb
Cr-Mo-Ni	Cr-N-Nb	Cr-N-Ni	Cr-N-V	Cr-Nb-Ni	Cr-Nb-P	Cr-Nb-Si	Cr-Nb-V
Cr-Ni-O	Cr-Ni-P	Cr-Ni-Pt	Cr-Ni-Re	Cr-Ni-Ru	Cr-Ni-S	Cr-Ni-Si	Cr-Ni-Ta
Cr-Ni-Ti	Cr-Ni-V	Cr-Ni-W	Cr-Ni-Zr	Cr-O-S	Cr-O-Si	Cr-O-Ti	Cr-O-V
Cr-O-Y	Cr-O-Zr	Cr-P-Ti	Cu-Fe-Mn	Cu-Fe-Mo	Cu-Fe-N	Cu-Fe-Nb	Cu-Fe-Ni
Cu-Fe-P	Cu-Fe-S	Cu-Fe-Si	Cu-Fe-Ti	Cu-Fe-V	Cu-H-Pd	Cu-H-Ti	Cu-Mg-Ni
Cu-Mg-S	Cu-Mg-Si	Cu-Mn-Ni	Cu-Mn-S	Cu-Mn-Si	Cu-Mo-Ni	Cu-Ni-P	Cu-Ni-S
Cu-Ni-Si	Cu-Ni-Ti	Cu-O-S	Cu-O-Y	Cu-S-Si	Cu-Ti-Zr	Fe-H-Si	Fe-Mg-Ni

Assessed Ternary Systems							
Fe-Mg-S	Fe-Mn-N	Fe-Mn-Ni	Fe-Mn-O	Fe-Mn-P	Fe-Mn-S	Fe-Mn-Si	Fe-Mo-N
Fe-Mo-Ni	Fe-Mo-P	Fe-Mo-W	Fe-N-Nb	Fe-N-Ti	Fe-N-V	Fe-Nb-Ni	Fe-Nb-P
Fe-Nb-S	Fe-Nb-Si	Fe-Nb-V	Fe-Nb-Zr	Fe-Ni-O	Fe-Ni-P	Fe-Ni-S	Fe-Ni-Si
Fe-Ni-Ti	Fe-Ni-W	Fe-O-S	Fe-O-Si	Fe-O-Ti	Fe-O-V	Fe-O-W	Fe-O-Y
Fe-O-Zr	Fe-P-Si	Fe-P-Ti	Fe-P-V	Fe-P-W	Fe-S-Zr	Fe-Si-Ta	Fe-Si-Ti
Fe-Si-W	Fe-Si-Zr	H-Hf-Ni	H-Mg-Ni	H-Ni-Ti	H-Ni-Zr	H-Ti-Zr	Hf-Nb-Si
Hf-Ni-Si	Hf-Ni-Ta	Hf-Ni-Ti	Hf-O-Si	Mg-Mn-Ni	Mg-Mn-S	Mn-Ni-O	Mn-Ni-S
Mn-Ni-Si	Mn-O-S	Mn-O-Si	Mn-O-W	Mn-O-Y	Mn-O-Zr	Mn-S-Zr	Mo-N-Ni
Mo-N-V	Mo-Ni-O	Mo-Ni-Si	Mo-Ni-Ta	Mo-Ni-Ti	Mo-O-S	Mo-Re-Ru	Mo-Re-Ta
Mo-Ru-Ta	N-Nb-Ti	N-Ni-Ti	N-Ti-V	Nb-Ni-P	Nb-Ni-Ti	Nb-Ni-W	Nb-O-S
Nb-P-Ti	Nb-Re-Ta	Nb-Re-W	Ni-O-S	Ni-O-Si	Ni-O-Ti	Ni-O-V	Ni-O-W
Ni-O-Y	Ni-O-Zr	Ni-P-Si	Ni-P-Ti	Ni-P-V	Ni-P-W	Ni-Re-Ta	Ni-Re-W
Ni-Re-Zr	Ni-Ru-Ti	Ni-Si-Ta	Ni-Si-V	Ni-Si-W	Ni-Si-Zr	Ni-Ta-Ti	Ni-Ti-Zr
O-S-Si	O-S-Y	O-S-Zr	P-V-W				

TCNI14 Phases

In this section:

Common Phases for Superalloys

The following lists common phase names and the corresponding Thermo-Calc database phase names for some key superalloys.

Only the phases of interest for superalloys are defined by default, which means that when retrieving the data from the database other phases are automatically rejected and need to be manually restored if these are required for a calculation.

The complete description of all the binary systems and many ternary systems are available using the BINARY and TERNARY modules in Thermo-Calc Console Mode.

There are several possible composition sets for the phases named FCC_L12 and BCC_B2; they are either disordered (A1/carbonitride and A2) or ordered (L12 (γ') and B2 (β)).

Name in the Database	*Common Name and Description*
ALN_B4	AlN, aluminum nitride
BCC_B2#1	Disordered BCC A2
BCC_B2#2	Ordered B2, β
BCT_D022	γ'', typically Ni_3Nb with a BCT structure
BETA_RHOMBO_B	Rhombohedral allotrope of boron (β-B). Primarily boron, may contain minor C, Cu, Si
C14_LAVES	C_{14}, Topologically Close-Packed (TCP) Laves phase with hexagonal structure (C_{14})
CEMENTITE	Fe_3C, carbide commonly found in Fe-alloys
CHI_A12	χ, Topologically Close-Packed (TCP) chi phase, typically enriched in refractory elements
D5A_M3B2	M_3B_2, boride such as Fe_3B_2, Nb_3B_2, and Ta_3B_2
DIAMOND_A4	C, carbon allotrope with cubic diamond structure
FCC_L12#1	Disordered FCC A1, γ
FCC_L12#2	Ordered L12 γ', gamma-prime, ordered L12 phase

Name in the Database	*Common Name and Description*
FCC_L12#3	Carbonitride with FCC structure
FE4N_LP1	Fe_4N, a Fe-nitride
FECN_CHI	FeCN, a carbonitride
G_PHASE	G phase, a complex intermetallic phase which typically contains refractory elements
GAS	Gas phase
GRAPHITE	Graphite, a carbon allotrope with a hexagonal structure
HCP_A3 (M2(C,N))	HCP metals as well as Me_2X carbonitrides (ε) such as Cr_2N, Mo_2C, Ta_2C, V_2C, and W_2C
LIQUID	Liquid phase
M12C	Ternary carbide stable in the C-Co-W and C-Mo-Ni systems
M23C6	$M_{23}C_6$ carbides such as $Cr_{23}C_6$ and $Mn_{23}C_6$
M2B_TETR	M_2B boride such as Co_2B, Fe_2B, and Ni_2B
M3B2	Boride stable in ternary systems such as B-Cr-Mo, and B-Fe-Mo
M3C2	Carbide stable in ternary systems such as C-Ni-Mo, and C-Ni-W
M6C	Carbide stable in ternary systems such as C-Ni-Mo, and C-Ni-Ta
M7C3	M_7C_3, such as Cr_7C_3, and Mn_7C_3
MB_B33	MB boride such as NiB, TaB, and VB
MB2_C32	MB_2 boride such as TaB_2, and TiB_2
MC_ETA	MC carbide, typically MoC
MC_SHP	MC carbide, typically MoC and WC
MU_PHASE	μ, Mu phase, a complex topologically close-packed (TCP) phase

Name in the Database	*Common Name and Description*
NI3B_D011	M_3B boride, typically Ni_3B, or Co_3B
NI3TA_D0A	Delta δ, Orthorhombic phase, typically Ni_3Nb in superalloys
NI3TI_D024	Eta η, hexagonal phase, typically Ni_3Ti
P_PHASE	P phase, Complex intermetallic phase with orthorhombic structure, typically enriched in refractory elements
PI (π)	A nitride, typically with Cr, Fe, and Ni
R_PHASE	R phase, complex intermetallic phase with rhombohedral structure, typically enriched in refractory elements
SIGMA	σ, a complex topologically close-packed (TCP) phase
TAU	τ, a ternary boride
Z_PHASE	A ternary nitride

TCNI14 Models for the Included Phases

The table lists all phases and the thermodynamic model used to describe the phase.

See the separate listing for Gas and Liquid Phases below.

Phase Name	*Prototype*	*Strukturbericht*	*Pearson Symbol*	*Space Group*	*Info*	*Sublattices*	*Formula Unit*
FCC_A1	Face-Centered Cubic (Cu, A1, fcc)	A1	cF4	(225, Fm-3m)	-	2	(AL, CA, CO, CR, CU, FE, HF, MG, MN, MO, NB, NI, P, PD, PT, RE, RU, S, SI, TA, TI, V, W, Y, ZR)1(B, C, H, N, O, VA)1
DIS_FCC_A1	Face-Centered Cubic (Cu, A1, fcc)	A1	cF4	(225, Fm-3m)	-	2	(AL, CA, CO, CR, CU, FE, HF, MG, MN, MO, NB, NI, P, PD, PT, RE, RU, S, SI, TA, TI, V, W, Y, ZR)1(B, C, H, N, O, VA)1
FCC_L12	Bogdanovite (Cu3Au, L12)	L12	cP4	(221, Pm-3m)	-	3	(AL, CA, CO, CR, CU, FE, HF, MG, MN, MO, NB, NI, P, PD, PT, RE, RU, S, SI, TA, TI, V, W, Y, ZR)0.75(AL, CA, CO, CR, CU, FE, HF, MG, MN, MO, NB, NI, P, PD, PT, RE, RU, S, SI, TA, TI, V, W, Y, ZR)0.25(B, C, H, N, O, VA)1
BCC_A2	Body-Centered Cubic (W, A2, bcc)	A2	cI2	(229, Im-3m)	-	2	(AL, CA, CO, CR, CU, FE, HF, MG, MN, MO, NB, NI, P, PD, PT, RE, RU, S, SI, TA, TI, V, W, Y, ZR, VA)1(B, C, H, N, O, VA)3
BCC_B2	CsCl (B2)	B2	cP2	(221, Pm-3m)	-	3	(AL, CA, CO, CR, CU, FE, HF, MG, MN, MO, NB, NI, P, PD, PT, RE, RU, S, SI, TA, TI, V, W, Y, ZR, VA)0.5(AL, CA, CO, CR, CU, FE, HF, MG, MN, MO, NB, NI, P, PD, PT, RE, RU, S, SI, TA, TI, V, W, Y, ZR, VA)0.5(B, C, H, N, O, VA)3
HCP_A3	Hexagonal Close Packed (Mg, A3, hcp)	A3	hP2	(194, P6_3/mmc)	-	2	(AL, CA, CO, CR, CU, FE, HF, MG, MN, MO, NB, NI, P, PD, PT, RE, RU, SI, TA, TI, V, W, Y, ZR)1(B, C, H, N, O, VA)0.5
CBCC_A12	alpha-Mn (A12)	A12	cI58	(217, I-43m)	-	2	(AL, CO, CR, CU, FE, MN, MO, NB, NI, P, PD, PT, RE, RU, SI, TA, TI, V, W, Y, ZR)1(B, C, VA)1
CUB_A13	beta-Mn (A13)	A13	cP20	(213, P4_132)	-	2	(AL, CO, CR, CU, FE, HF, MN, MO, NB, NI, P, PD, PT, RE, RU, SI, TA, TI, V, W, Y, ZR)1(B, C, VA)1
DIAMOND_A4	Diamond (A4)	A4	cF8	(227, Fd-3m)	-	1	(AL, B, C, O, P, SI)1
BETA_RHOMBO_B	beta-B (R-105)	-	hR105	(166, R-3m)	-	2	(B)93(B, C, CU, SI)12

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
GRAPHITE	Hexagonal Graphite (A9)	A9	hP4	(194, P6_ 3/mmc)	-	1	(B, C)1
NI3TI_D024	Ni3Ti (D024)	D024	hP16	(194, P6_ 3/mmc)	-	2	(AL, CO, CR, CU, FE, HF, NI, PD, PT, TA, TI, W, ZR)3(AL, CR, CU, HF, MO, NB, NI, PD, PT, SI, TA, TI, W, ZR)1
NI3TA_D0A	beta-TiCu3 (D0a)	D0a	oP8	(59, Pmmn)	-	2	(AL, CO, CR, FE, NI, NB, PT, SI)3(AL, FE, MO, NB, NI, PT, TA, TI, V, W)1
BCT_D022	Al3Ti (D022)	D022	tI8	(139, I4/mmm)	-	2	(AL, CO, CR, FE, MO, NB, NI, PD, PT, TI, V)3(AL, CO, CR, MO, NB, NI, PD, PT, TA, TI, V, SI)1
C14_LAVES	MgZn2 Hexagonal Laves (C14)	C14	hP12	(194, P6_ 3/mmc)	-	2	(AL, CA, CO, CR, CU, FE, HF, MG, MN, MO, NB, NI, SI, RE, RU, TA, TI, V, W, Y, ZR)2(AL, CA, CO, CR, CU, FE, HF, MG, MN, MO, NB, NI, SI, RE, RU, TA, TI, V, W, Y, ZR)1
DIS_MU	Fe7W6 (D85) mu-phase	D85	hR13	(166, R-3m)	-	1	(AL, CO, CR, CU, FE, MN, MO, NB, NI, RE, SI, TA, TI, W)1
MU_PHASE	Fe7W6 (D85) mu-phase	D85	hR13	(166, R-3m)	-	5	(AL, CO, CR, CU, FE, MN, MO, NB, NI, RE, SI, TA, TI, W)1(AL, CO, CR, CU, FE, MN, MO, NB, NI, RE, SI, TA, TI, W)6(AL, CO, CR, CU, FE, MN, MO, NB, NI, RE, SI, TI, TA, W)2(AL, CO, CR, CU, FE, MN, MO, NB, NI, RE, SI, TA, TI, W)2(AL, CO, CR, CU, FE, MN, MO, NB, NI, RE, SI, TA, TI, W)2
DIS_SIG	sigma-CrFe (D8b)	D8b	tP30	(136, P4_ 2/mnm)	-	1	(AL, CO, CR, FE, MN, MO, NB, NI, PD, PT, RE, RU, SI, TA, TI, V, W)1
SIGMA	sigma-CrFe (D8b)	D8b	tP30	(136, P4_ 2/mnm)	-	5	(AL, CO, CR, FE, MN, MO, NB, NI, PD, PT, RE, RU, SI, TA, TI, V, W)2 (AL, CO, CR, FE, MN, MO, NB, NI, PD, PT, RE, RU, SI, TA, TI, V, W)4 (AL, CO, CR, FE, MN, MO, NB, NI, PD, PT, RE, RU, SI, TA, TI, V, W)8 (AL, CO, CR, FE, MN, MO, NB, NI, PD, PT, RE, RU, SI, TA, TI, V, W)8 (AL, CO, CR, FE, MN, MO, NB, NI, PD, PT, RE, RU, SI, TA, TI, V, W)8
R_PHASE	R-(Co, Cr, Mo)	-	hR53	(148, R-3)	-	3	(CO, CR, FE, NI, RE)27(MO, W)14(CO, CR, FE, MO, NI, RE, W)12
P_PHASE	Cr9Mo21Ni20	-	oP56	(62, Pnma)	-	3	(CR, FE, NI, RE)24(CR, FE, MO, NI, RE)20(MO)12
CHI_A12	alpha-Mn (A12)	A12	cI58	(217, I-43m)	-	3	(CR, FE, NI, RE)24(AL, CR, HF, MO, NB, TA, TI, W, ZR)10(CR, FE, MO, NB, NI, RE, TA, W)24
MONI_DELTA	MoNi	-	oP56	(19, P2_12_	-	3	(CO, CR, FE, NI, RE)24(CO, CR, FE, MO, NI, RE, W)20(CU, MO, W)12

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
				12_1)			
NISI_B31	MnP (B31)	B31	oP8	(62, Pnma)	-	2	(NI, PD)1(SI)1
MC_ETA	CMo	-	hP12	(194, P6_ 3/mmc)	-	2	(MO, V, W)1(C, VA)1
MC_SHP	Tungsten Carbide (WC, Bh)	Bh	hP2	(187, P-6m2)	-	2	(MO, W)1(C, N)1
M23C6	Cr23C6 (D84)	D84	cF116	(225, Fm-3m)	-	3	(CO, CR, FE, MN, NI, RE, V)20(CO, CR, FE, MN, MO, NI, RE, V, W)3 (C)6
CEMENTITE	Cementite (Fe3C, D011)	D011	oP16	(62, Pnma)	-	2	(CO, CR, FE, MN, MO, NI, V, W)3(C, N)1
M12C	Fe6W6C	-	cF104	(227, Fd-3m)	-	3	(CO, NI)6(MO, W)6(C)1
M3C2	Tongbaite (Cr3C2, D510)	D510	oP20	(62, Pnma)	-	2	(CO, CR, MO, V, W)3(C)2
M6C	eta-carbide (Fe3W3C, E93)	E93	cF112	(227, Fd-3m)	-	4	(CO, FE, NI)2(MO, NB, TA, W)2(CO, CR, FE, MO, NB, NI, TA, V, W)2 (C)1
M7C3	C3Cr7 (D101)	D101	oP40	(62, Pnma)	-	2	(CO, CR, FE, MN, MO, NI, RE, V, W)7(C)3
M5C2	Mn5C2 (Fe5C2 Hagg carbide)	-	mS28	(15, C2/c)	-	2	(FE, MN)5(C)2
TAU	Cr23C6 (D84)	D84	cF116	(225, Fm-3m)	-	4	(CO, HF, NI, RE)20(B)6(B, VA)6(AL, CR, HF, MO, RE, TA, TI, V, W, ZR)3
MB_B33	CrB (B33)	B33	oS8	(63, Cmcm)	-	2	(CR, FE, HF, MO, NB, NI, TA, TI, V)1(B)1
MB2_C32	Hexagonal omega (C32)	C32	hP3	(191, P6/mmm)	-	2	(B)2(AL, CR, HF, MG, MN, MO, NB, TA, TI, V, Y, ZR)1
M3B2	Si2U3 (D5a)	D5a	tP10	(127, P4/mbm)	-	3	(CR, FE, MO, NI, W)0.4(CR, FE, NI)0.2(B)0.4
M2B_TETR	Khatyrkite (Al2Cu, C16)	C16	tI12	(140, I4/mcm)	-	2	(AL, CO, CR, FE, MN, MO, NB, NI, RE, TA, W)2(B)1
B12ZR	UB12 (D2f)	D2f	cF52	(225, Fm-3m)	-	2	(B)12(Y, ZR)1

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
MNP_B31	MnP (B31)	B31	oP8	(62, Pnma)	-	2	(CO, CR, FE, MN, NI, RU, W)1(P, SI)1
CU3P_D021	Cu3P (D021)	D021	hP24	(165, P-3c1)	-	2	(CU, FE)3(P)1
M2P_C22	Barringerite (Revised Fe2P, C22)	C22	hP9	(189, P-62m)	-	2	(AL, CO, CR, FE, MN, MO, NB, NI, TI, V, W)2(B, P, SI)1
M3P_D0E	Ni3P (D0e)	D03	tI32	(82, I-4)	-	2	(AL, CO, CR, CU, FE, MN, MO, NI, TI)3(B, P)1
TINIP_C37	Co2Si (C37)	C37	oP12	(62, Pnma)	-	3	(CO, CR, FE, NB, NI, TI, V, W)1(CO, CR, FE, NB, NI, TI, V, W)1(P)1
NI5P2_ALPHA	Pd8Sb3	-	hR44	(161, R3c)	-	2	(CO, NI)5(P)2
NI5P2_BETA	Unknown Structure	-	-	-	-	2	(CO, NI)5(P)2
NI12P5_ALPHA	Ni12P5	-	tI34	(87, I4/m)	-	2	(CO, NI)12(P)5
NI12P5_BETA	Unknown Structure	-	-	-	-	2	(CO, NI)12(P)5
NI5P4	Ni5P4	-	hP36	(194, P6_3/mmc)	-	2	(NI)5(P)4
NIP2	PdP2	-	mS12	(15, C2/c)	-	2	(NI)1(P)2
COP3	Skutterudite (CoAs3, D02)	D02	cI32	(204, Im-3)	-	2	(CO)1(P)3
NBP	NbAs	-	tI8	(109, I4_1md)	-	2	(NB)1(P)1
NB7P4	Nb7P4	-	mS44	(12, C2/m)	-	2	(NB, TI)7(P)4
TI3P	Ti3P	-	tP32	(86, P4_2/n)	-	2	(CR, NB, TI)3(P)1
TI5P3	beta-Yb5Sb3	-	oP32	(62, Pnma)	-	2	(TI)5(P)3
ZINCBLENDE_B3	Zincblende (ZnS, B3)	B3	cF8	(216, F-43m)	-	2	(AL)1(P)1
WP2	MoP2	-	oS12	(36, Cmc2_1)	-	2	(W)1(P)2

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
MO3P	alpha-V3S	-	tI32	(121, I-42m)	-	2	(MO)3(P)1
MOP_BH	Tungsten Carbide (WC, Bh)	Bh	hP2	(187, P-6m2)	-	2	(MO)1(P)1
NB2NI9P	MgCu4Sn	-	cF24	(216, F-43m)	-	3	(NB)2(NI)9(P)1
NBNI2P	Unknown Structure	-	-	-	-	3	(NB)1(NI)2(P)1
NB5NI4P4	Cu5Nb5Si4	-	tI26	(87, I4/m)	-	3	(NB)5(NI)4(P)4
NB3NI2P	Si2U3 (D5a)	D5a	tP10	(127, P4/mbm)	-	3	(NB)3(NI)2(P)1
NB4NIP	Nb4CoSi	-	tP12	(124, P4/mcc)	-	3	(NB)4(NI)1(P)1
NB2NI2P3	Nb2Ni2P3	-	hP28	(176, P6_3/m)	-	3	(NB)2(NI)2(P)3
NBNIP2	NbNiP2	-	oP16	(62, Pnma)	-	3	(NB)1(NI)1(P)2
P2S5	P2S5	-	aP28	(2, P-1)	-	2	(P)2(S)5
SIP1	(SiP)	-	oS48	(36, Cmc2_1)	-	2	(P)1(SI)1
SIP2	Pyrite (FeS2, C2)	C2	cP12	(205, Pa-3)	-	2	(P)2(SI)1
CA2P2	Na2O2	-	hP12	(189, P-62m)	-	2	(CA)1(P)1
CA5P8	Ca5P8	-	mS26	(12, C2/m)	-	2	(CA)5(P)8
CAP3	CaP3	-	aP8	(2, P-1)	-	2	(CA)1(P)3
PD15P2	P2Pd15	-	hR17	(148, R-3)	-	2	(PD)15(P)2
PD6P	PPd6	-	mP28	(14, P2_1/c)	-	2	(PD)6(P)1
PD3P_D011	Cementite (Fe3C, D011)	D011	oP16	(62, Pnma)	-	2	(PD)3(P, VA)1

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
PD5P2	Unknown Structure	-	-	-	-	2	(PD)5(P)2
PD6FE5MN2	Unknown Structure	-	-	-	-	3	(FE)0.3846(PD)0.46154(MN)0.15385
PD7P3	P3Pd7	-	hR20	(148, R-3)	-	2	(PD)7(P)3
PDP2	PdP2	-	mS12	(15, C2/c)	-	2	(PD)1(P)2
PTP2	Pyrite (FeS2, C2)	C2	cP12	(205, Pa-3)	-	2	(PT)1(P)2
PT5P2	Pt5P2	-	mS28	(15, C2/c)	-	2	(PT)5(P)2
RU2P	Co2Si (C37)	C37	oP12	(62, Pnma)	-	2	(RU)2(P)1
RUP2	Marcasite (FeS2, C18)	C18	oP6	(58, Pnnm)	-	2	(RU)1(P)2
FENB2P	Bogdanovite (Cu3Au, L12)	L12	cP4	(221, Pm-3m)	-	3	(FE)1(NB)2(P)1
FENB4P	Nb4CoSi	-	tP12	(124, P4/mcc)	-	3	(FE)1(NB)4(P)1
FESI4P4	FeSi4P4	-	aP9	(1, P1)	-	3	(FE)1(SI)4(P)4
CO5B2P	Mo5SiB2	-	tI32	(140, I4/mcm)	-	3	(CO)5(B)2(P)1
NB5P3	Nb5P3	-	oP64	(62, Pnma)	-	2	(NB)5(P)3
NB8P5	Nb8P5	-	oP54	(55, Pbam)	-	2	(NB)8(P)5
NB1P2	OsGe2	-	mS12	(12, C2/m)	-	2	(NB)1(P)2
ALPT_B20	FeSi (B20)	B20	cP8	(198, P2_13)	-	2	(AL)0.5(NI, PT)0.5
FCC_L10	CuAu(I) (L10)	L10	tP2	(123, P4/mmm)	-	2	(AL, CR, CU, FE, MN, MO, NI, PD, PT, TA, TI, W)0.5(AL, CR, CU, FE, MN, MO, NI, PD, PT, TA, TI, W)0.5
NIZR	CrB (B33)	B33	oS8	(63, Cmcm)	-	2	(NI)1(TI, Y, ZR)1

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
ALZR_B33	CrB (B33)	B33	oS8	(63, Cmcm)	-	2	(AL)1(HF, Y, ZR)1
ALPHA_B19	beta'-AuCd (B19)	B19	oP4	(51, Pmma)	-	2	(MO, NB, PD, PT, TI, V, ZR)1(MO, NB, PD, PT, TI, V, ZR)1
B11	gamma-CuTi (B11)	B11	tP4	(129, P4/nmm)	-	2	(CO, CU, NI, PD, TI)1(CU, NI, TA, TI)1
CUPT_L11	Rhombohedral CuPt (L11)	L11	hR2	(166, R-3m)	-	3	(CU, PT)0.5(CU, PT)0.5(VA)1
HFMN	NiTi2	-	cF96	(227, Fd-3m)	-	2	(HF)0.5(MN)0.5
MNTA	Unknown Structure	-	-	-	-	2	(MN)1(TA)1
PDY_LT	CrB (B33)	B33	oS8	(63, Cmcm)	-	2	(PD, Y)1(Y)1
PDY_HT	CsCl (B2)	B2	cP2	(221, Pm-3m)	-	2	(PD, Y)1(Y)1
AL2PT	Fluorite (CaF2, C1)	C1	cF12	(225, Fm-3m)	-	3	(AL)2(NI, PT)1(NI, VA)1
C15_LAVES	Cu2Mg Cubic Laves (C15)	C15	cF24	(227, Fd-3m)	-	2	(AL, CO, CR, CU, FE, HF, MG, MN, MO, NB, NI, SI, RE, RU, TA, TI, V, W, Y, ZR)2(AL, CO, CR, CU, FE, HF, MG, MO, NB, NI, SI, RE, RU, TA, TI, V, W, Y, ZR)1
C36_LAVES	MgNi2 Hexagonal Laves (C36)	C36	hP24	(194, P6_ 3/mmc)	-	2	(AL, CO, CR, CU, FE, HF, MG, MN, MO, NB, NI, SI, TA, TI, W, ZR)2(AL, CO, CR, CU, FE, HF, MG, MN, MO, NB, NI, SI, TA, TI, W, ZR)1
CRNI2_OP6	MoPt2	-	oI6	(71, Immm)	-	2	(CR, MO, W)1(MO, NI, W)2
NI2TA	MoSi2 (C11b)	C11b	tI6	(139, I4/mmm)	-	2	(CO, CR, NI)2(TA, TI)1
NI2V	MoPt2	-	oI6	(71, Immm)	-	2	(MO, NI, PD, PT)2(MO, NB, PT, TA, V)1
C16_THETA	Khatyrkite (Al2Cu, C16)	C16	tI12	(140, I4/mcm)	-	2	(AL, HF, MO, NB, TA, TI, W, ZR)2(AL, CO, CR, CU, FE, NI, SI)1
CU2TI1	Au2V	-	oS12	(63, Cmcm)	-	2	(CO, CU, NI)2(TI)1
CU2Y_H	Unknown Structure	-	hP*	-	-	2	(CU)2(Y)1

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
CU2Y_L	KHg2	-	oI12	(74, Imma)	-	2	(CU)2(Y)1
MNNI2	Unknown Structure	-	-	-	-	2	(MN, NI)1(NI)2
NITI2	NiTi2	-	cF96	(227, Fd-3m)	-	2	(CO, CR, CU, FE, HF, NI, PT, RE, TI)1(AL, CR, CU, HF, NI, TA, TI, ZR)2
PD2Y1	Unknown Structure	-	-	-	-	2	(PD)2(Y)1
PTY2	Co2Si (C37)	C37	oP12	(62, Pnma)	-	2	(PT)1(Y)2
PT2Y	Cu2Mg Cubic Laves (C15)	C15	cF24	(227, Fd-3m)	-	2	(PT)2(Y)1
REZR2	Zr21Re25	-	hR92	(167, R-3c)	-	2	(NI, RE)1(ZR)2
ALTI3_D019	Ni3Sn (D019)	D019	hP8	(194, P6_3/mmc)	-	2	(AL, CO, CR, MN, MO, NI, PT, TA, TI, W)3(AL, CR, MO, NB, NI, PT, RE, TA, TI, W)1
AL3Y_HT	BaPb3	-	hR12	(166, R-3m)	-	2	(AL)0.75(Y)0.25
AL3Y_LT	Ni3Sn (D019)	D019	hP8	(194, P6_3/mmc)	-	2	(AL)0.75(Y)0.25
AL3ZR_D023	Al3Zr (D023)	D023	tI16	(139, I4/mmm)	-	2	(AL)3(HF, ZR)1
CUTI3	CuTi3 (L60)	L60	tP4	(123, P4/mmm)	-	2	(CU, TI)1(TI)3
MZR3_E1A	MgCuAl2 (E1a)	E1a	oS16	(63, Cmcm)	-	2	(CO, FE, NI)1(Y, ZR)3
PDY3	Cementite (Fe3C, D011)	D011	oP16	(62, Pnma)	-	2	(PD)1(Y)3
PTY3	Cementite (Fe3C, D011)	D011	oP16	(62, Pnma)	-	2	(PT)1(Y)3
RUY3	Cementite (Fe3C, D011)	D011	oP16	(62, Pnma)	-	2	(RU)0.25(Y)0.75
H_L21	Heusler (Cu2AlMn, L21)	L21	cF16	(225, Fm-3m)	-	3	(AL, CR, NI, TI)0.5(AL, HF, NB, NI, TA, TI, ZR)0.5(CO, NI, RU, VA)1

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
G_PHASE	Th6Mn23 (D8a)	D8a	cF116	(225, Fm-3m)	-	3	(AL, CO, FE, MN, NI, TI)16(HF, NB, TI, TA, Y, ZR)6(CO, FE, MN, NI, SI)7
ALCU_DEL	Al5Cu8	-	hR52	(160, R3m)	-	2	(AL)2(CU, FE)3
ALCU_EPS	InNi2 (B82)	B82	hP6	(194, P6_ 3/mmc)	-	2	(AL, CU, NI)1(CU, FE)1
ALCU_ETA	AlCu(r)	-	mS20	(12, C2/m)	-	2	(AL, CU)1(CU, FE, NI)1
ALCU_PRIME	Al9Cu11(h)	-	oF88	(42, Fmm2)	-	2	(AL)2(CU)1
ALCU_ZETA	Al9Cu11(h)	-	oF88	(42, Fmm2)	-	2	(AL)9(CU, FE)11
GAMMA_D83	gamma-brass (Cu9Al4, D83)	D83	cP52	(215, P-43m)	-	3	(AL, NI, SI)4(AL, CU, NI, SI)1(CU, FE, MN, NI)8
GAMMA_H	gamma-Brass (Cu5Zn8, D82)	D82	cI52	(217, I-43m)	-	3	(AL)4(AL, CU)1(CU, FE, MN, NI)8
AL67CO4TI29	Unknown Structure	-	oP380	-	-	3	(AL)67(CO)4(TI)29
AL23CUFE4	MnAl6 (D2h)	D2h	oS28	(63, Cmcm)	-	3	(AL)23(CU)1(FE)4
AL62CU25FE13	Quasicrystal	-	-	-	-	3	(FE)0.125(AL, CU)0.255(AL)0.62
AL7CU2FE	FeCu2Al7 (E9a)	E9a	tP40	(128, P4/mnc)	-	3	(FE, NI)1(CU)2(AL)7
AL10CU10FE	(Al10Cu10Fe)	-	oF116	(42, Fmm2)	-	3	(FE)1(AL, CU)10(AL)10
AL7CU4NI	(Cu0.8Ni0.2)2.53Al3.5	-	hR14	(166, R-3m)	TAU	2	(AL)1(FE, CU, NI, VA)1
AL12MN	Al12W	-	cI26	(204, Im-3)	-	2	(AL)12(MN)1
AL4MN_R	lambda-Al4Mn	-	hP586	(176, P6_3/m)	-	2	(AL)461(MN, FE)107
AL4MN_U	mu-Al4Mn	-	hP574	(194, P6_ 3/mmc)	-	2	(AL)4(MN)1

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
AL11MN4_LT	Al11Mn4	-	aP15	(2, P-1)	-	2	(AL)11(MN, FE)4
AL11MN4_HT	Mn6(Mn0.5Al0.5)8Al25	-	oP156	(62, Pnma)	-	2	(AL, MN)29(MN)10
AL8MN5	Cr5Al8 (D810)	D810	hR26	(160, R3m)	-	3	(AL, TI)12(MN)5(AL, CU, MN, SI, TI)9
TI25MN9AL66_L12	Bogdanovite (Cu3Au, L12)	L12	cP4	(221, Pm-3m)	-	3	(AL, MN, TI)0.25(AL, MN)0.08(AL, MN, TI)0.67
AL28CU4MN7	Mn6Cu4Al29	-	oS156	(63, Cmcm)	-	3	(AL)28(MN)7(CU)4
AL11CU5MN3	Unknown Structure	-	oP380	-	-	3	(AL)11(MN)3(CU)5
ALCU3MN2	Cu2Mg Cubic Laves (C15)	C15	cF24	(227, Fd-3m)	-	3	(AL)1(MN)2(CU)3
AL16FEMN3	mu-Al4Mn	-	hP574	(194, P6_3/mmc)	-	2	(AL)4(FE, MN)1
AL13FE2MN2	Al13Fe4	-	mS102	(12, C2/m)	-	2	(FE, MN)4(AL)13
AL10FEMN2	Mn3Al10	-	hP26	(194, P6_3/mmc)	-	2	(FE, MN)3(AL)10
AL21PD8	Al21Pt8	-	tI116	(88, I4_1/a)	-	2	(AL)21(PD)8
AL2PD5	Ga2Pd5	-	oP28	(62, Pnma)	-	2	(AL)2(AL, PD)5
AL3PD1	(Al3Pd)	-	oP*	(33, Pna2_1)	-	2	(AL)3(PD)1
AL3PD2	Al3Ni2 (D513)	D513	hP5	(164, P-3m1)	-	2	(AL, PD)3(AL, PD)2
AL3PD5	Rh5Ge3	-	oP16	(55, Pbam)	-	2	(AL)3(PD)5
AL4PD	(Al4Pd)	-	hP*	(182, P6_322)	-	2	(AL)4(PD)1
ALPD2	Co2Si (C37)	C37	oP12	(62, Pnma)	-	2	(AL, NI, PD)1(AL, NI, PD)2
AL21PT5	Li21Si5	-	cF416	(216, F-43m)	-	2	(AL)0.8077(NI, PT)0.1923

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
AL21PT8	Al21Pt8	-	tI116	(88, I4_1/a)	-	2	(AL)0.7241(NI, PT)0.2759
AL3PT5	Rh5Ge3	-	oP16	(55, Pbam)	-	2	(AL)0.375(NI, PT)0.625
ALPT2	Co2Si (C37)	C37	oP12	(62, Pnma)	-	2	(AL)0.33333(NI, PT)0.66667
AL6MN	MnAl6 (D2h)	D2h	oS28	(63, Cmcm)	-	2	(AL)6(FE, MN, RE, RU)1
ALZR2	InNi2 (B82)	B82	hP6	(194, P6_3/mmc)	-	2	(AL)1(Y, ZR)2
AL2ZR3	Zr3Al2	-	tP20	(136, P4_2/mnm)	-	2	(AL)2(HF, Y, ZR)3
AL3ZR4	Al3Zr4	-	hP7	(191, P6/mmm)	-	2	(AL)3(HF, ZR)4
AL3ZR2	Zr2Al3	-	oF40	(43, Fdd2)	-	2	(AL)3(HF, ZR)2
AL3NI2	Al3Ni2 (D513)	D513	hP5	(164, P-3m1)	-	3	(AL, SI)3(AL, CU, NI, PT, RU)2(RU, NI, VA)1
AL12W	Al12W	-	cI26	(204, Im-3)	-	2	(AL)12(MO, RE, W)1
AL4W	Al4W	-	mS30	(8, Cm)	-	2	(AL)4(MO, W)1
AL1MN1SI1	TiSi2 (C54) Nowotony Chimney-Ladder	C54	oF24	(70, Fddd)	-	3	(AL)1(MN)1(SI)1
AL3MNSI2	(Al3MnSi2)	-	tP48	(85, P4/n)	-	3	(AL)3(MN)1(SI)2
AL3MN4SI2	Unknown Structure	-	-	-	-	3	(AL)3(MN)4(SI)2
ALMNSI_T6	Unknown Structure	-	-	-	-	2	(AL, MN)4(SI)1
ALMNSI_T8	Mn3Al10	-	hP26	(194, P6_3/mmc)	-	5	(MN, VA)6(MN, VA)2(AL)12(AL, SI)6(AL, SI)2
AL15SI2M4	Al15(Mn, Fe)3Si2	-	cI168	(204, Im-3)	-	3	(AL)14(FE, MN)4(AL, SI)5

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
AL2MNSI3	Ga5Pd	-	tI24	(140, I4/mcm)	-	3	(AL)2(MN)1(SI)3
HF2PD	MoSi2 (C11b)	C11b	tI6	(139, I4/mmm)	-	2	(HF)2(PD)1
HF3PD4	Unknown Structure	-	-	-	-	2	(HF)3(PD)4
HFPD2	MoSi2 (C11b)	C11b	tI6	(139, I4/mmm)	-	2	(HF)1(PD)2
BPD3	Cementite (Fe3C, D011)	D011	oP16	(62, Pnma)	-	2	(B)1(PD)3
BPD5	Unknown Structure	-	-	-	Might be SG I4/mmm, Pearson tI*	2	(B)1(PD)5
BPD6	Pd6B	-	mS28	(15, C2/c)	-	2	(B)1(PD)6
B2PD5	Mn5C2 (Fe5C2 Hagg carbide)	-	mS28	(15, C2/c)	-	2	(B)2(PD)5
BPT3	Unknown Structure	-	-	-	-	2	(B)1(PT)3
BPT2	Molybdenite (MoS2, C7)	C7	hP6	(194, P6_ 3/mmc)	-	2	(B)1(PT)2
B2PT3	PtB0.67	-	oS8	(63, Cmcm)	-	2	(B)2(PT)3
YB4	ThB4 (D1e)	D1e	tP20	(127, P4/mbm)	-	2	(Y)1(B)4
YB6_D21	CaB6 (D21)	D21	cP7	(221, Pm-3m)	-	2	(Y)1(B)6
YB66	YB66	-	cF1936	(226, Fm-3c)	-	2	(Y)1(B)66
MONI4_BETA	Ni4Mo (D1a)	D1a	tI10	(87, I4/m)	-	2	(MO, W)1(CO, NI)4
AL5W	Al5W	-	hP12	(182, P6_322)	-	2	(AL)5(MO, W)1

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
CO10CU57TI33	MoSi2 (C11b)	C11b	tI6	(139, I4/mmm)	-	3	(CO)0.1(CU)0.57(TI)0.33
CO17Y2	Ni17Th2	-	hP38	(194, P6_3/mmc)	united HT/LT phase.	3	(CO2, Y)1(CO2, Y)2(CO)15
CO5Y_D2D	CaCu5 (D2d)	D2d	hP6	(191, P6/mmm)	-	3	(CO2, Y)1(CO)4(CO, VA)1
CO3Y1	Ni3Pu	-	hR12	(166, R-3m)	-	2	(CO)3(Y)1
CO3Y2	Unknown Structure	-	cP*	-	-	2	(CO)3(Y)2
CO7Y6	Unknown Structure	-	-	-	-	2	(CO)7(Y)6
COY_BF	CrB (B33)	B33	oS8	(63, Cmcm)	-	2	(CO)1(Y)1
CO3Y4	Co3Ho4	-	hP22	(176, P6_3/m)	-	2	(CO)3(Y)4
CO5Y8	Co5Y8	-	mP52	(14, P2_1/c)	-	2	(CO)5(Y)8
CU51HF14	Ag51Gd14	-	hP68	(175, P6/m)	-	2	(CU)51(HF)14
CU8HF3	Cu8Hf3	-	oP44	(62, Pnma)	-	2	(CU)8(HF)3
CU10HF7	Ni10Zr7	-	oS68	(64, Cmce)	-	2	(CU)10(HF)7
T1_CU2TI	Au2V	-	oS12	(63, Cmcm)	-	2	(CU, FE)2(TI)1
T2_CU3TI2	Cu3Ti2	-	tP10	(129, P4/nmm)	-	2	(CU, FE)3(TI)2
T3_CU4TI3	Cu4Ti3	-	tI14	(139, I4/mmm)	-	2	(CU, FE)4(TI)3
T4CUFETI	Unknown Structure	-	-	-	-	2	(CU, FE)0.63(TI)0.37
T5CUFETI	Unknown Structure	-	-	-	-	2	(CU, FE)0.55(TI)0.45

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
CU5MN4SI	Unknown Structure	-	-	-	-	3	(CU)0.5(MN)0.37(SI)0.13
CU6NISI3	Unknown Structure	-	-	-	-	2	(CU, NI)0.732(SI)0.268
CU46NI25SI29	Unknown Structure	-	-	-	-	3	(CU)0.458(NI)0.25(SI)0.292
T1CUNITI	MoSi2 (C11b)	C11b	tI6	(139, I4/mmm)	-	2	(CU, NI)2(TI)1
T2CUNITI	Cu3Ti2	-	tP10	(129, P4/nmm)	-	3	(CU)0.175(NI)2.825(TI)2
T4CUNITI	BaPb3	-	hR12	(166, R-3m)	-	3	(CU)0.05(NI)0.7(TI)0.25
T6CUNITI	Unknown Structure	-	-	-	-	3	(CU)0.25(NI)0.5(TI)0.25
CU33SI7_DELTA	Unknown Structure	-	tP*	-	-	2	(CU)0.825(SI)0.175
CU15SI4_EPSILON	Cu15Si4 (D86)	D86	cI76	(220, I-43d)	-	2	(CU, MN)0.789474(AL, SI)0.210526
CU56SI11_GAMMA	Mg3Ru2	-	cP20	(213, P4_132)	-	2	(CU, MN, NI, SI)0.835821(SI)0.164179
CUSI_ETA	Cu3Si-h2	-	hR*	(162, P-31m)	Structure uncertain	2	(CU, MN, NI)0.76(SI)0.24
CU3TI2	Cu3Ti2	-	tP10	(129, P4/nmm)	-	2	(CU, NI, FE)3(CO, TI)2
CU4TI1	Au4Zr	-	oP20	(62, Pnma)	-	2	(CU, TI)4(CU, TI)1
CU4TI3	Cu4Ti3	-	tI14	(139, I4/mmm)	-	2	(CO, CU, NI)4(TI)3
CU2TIZR	MgZn2 Hexagonal Laves (C14)	C14	hP12	(194, P6_3/mmc)	-	3	(CU)0.5(TI)0.25(ZR)0.25
CU7Y1	Cu7Tb	-	hP8	(191, P6/mmm)	-	2	(CU2, Y)1(CU)5
CU4Y	Cu5Y1.25	-	mP16	(11, P2_1/m)	-	2	(CU)4(Y)1

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
CU7Y2	Ag51Gd14	-	hP68	(175, P6/m)	-	2	(CU)7(Y)2
CU10ZR7	Ni10Zr7	-	oS68	(64, Cmce)	-	2	(CU)10(ZR)7
CU51ZR14	Ag51Gd14	-	hP68	(175, P6/m)	-	2	(CU)51(ZR)14
CU8ZR3	Cu8Hf3	-	oP44	(62, Pnma)	-	2	(CU)8(ZR)3
MN3PD5	Ga3Pt5	-	oS16	(65, Cmmm)	-	2	(MN)3(PD)5
MNPD2	Ga3Pt5	-	oS16	(65, Cmmm)	-	2	(MN)1(PD)2
MN11SI19	Mn11Si19	-	tP120	(118, P-4n2)	-	2	(MN)11(AL, SI)19
MN3SI	BiF3 (D03)	D03	cF16	(225, Fm-3m)	-	2	(MN, FE)3(AL, SI)1
MN6SI	Fe7W6 (D85) mu-phase	D85	hR13	(166, R-3m)	-	2	(AL, MN)17(SI)3
MN9SI2	Mn9Si2	-	oI186	(71, Immm)	-	2	(MN)33(SI)7
MN12Y	Mn12Th (D2b)	D2b	tI26	(139, I4/mmm)	-	2	(MN)12(Y)1
NI2Y1	Ni2Tm	-	cF192	(216, F-43m)	-	2	(NI)2(Y)1
NI2Y3	Ni2Y3	-	tP80	(92, P4_12_12)	-	2	(NI)2(Y)3
NI3Y	Ni3Pu	-	hR12	(166, R-3m)	-	2	(FE, NI)3(Y)1
NI4Y	Unknown Structure	-	hR*	-	-	2	(NI)4(Y)1
NI44M56_TAU	Unknown Structure	-	-	-	-	2	(NI)0.44(HF, TI)0.56
NI7ZR2	Ni7Zr2	-	mS36	(12, C2/m)	-	2	(AL, CO, CR, NI)7(HF, Y, ZR)2
NI11ZR9	Pt11Zr9	-	tI40	(87, I4/m)	-	2	(NI)11(HF, TI, ZR)9

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
NI10ZR7	Ni10Zr7	-	oS68	(64, Cmce)	-	2	(NI)23(HF, TI, ZR)17
NI5ZR	AuBe5 (C15b)	C15b	cF24	(216, F-43m)	-	2	(AL, CU, NI)5(HF, Y, ZR)1
PD21SI4	Unknown Structure	-	-	-	-	2	(PD, SI)21(SI)4
PD5SI	Pd5Si	-	mP24	(4, P2_1)	-	2	(PD)5(SI)1
PD14SI3	Unknown Structure	-	-	-	-	2	(PD)14(SI)3
PD9SI2	Pd9Si2	-	oP44	(62, Pnma)	-	2	(PD)9(SI)2
PD15SI4	Unknown Structure	-	-	-	-	2	(PD)15(SI)4
PD3SI	Cementite (Fe3C, D011)	D011	oP16	(62, Pnma)	-	2	(PD)3(SI)1
PD39SI20	Unknown Structure	-	-	-	-	2	(PD)39(SI)20
PD19SI10	Unknown Structure	-	-	-	-	2	(PD)19(SI)10
ALPHA_PD2SI	Barringerite (Revised Fe2P, C22)	C22	hP9	(189, P-62m)	-	2	(PD, SI)2(SI)1
BETA_PD2SI	Barringerite (Revised Fe2P, C22)	C22	hP9	(189, P-62m)	-	2	(PD, SI)2(SI)1
NI17Y2	Fe17Lu2	-	hP80	(194, P6_ 3/mmc)	-	2	(AL, FE, NI)1(Y)0.1176
PD2TA	MoPt2	-	oI6	(71, Immm)	-	2	(PD)2(TA)1
PD2TI	MoSi2 (C11b)	C11b	tI6	(139, I4/mmm)	-	2	(PD)2(TI)1
PD3TI2	Pd3Ti2	-	oS20	(63, Cmcm)	-	2	(PD, PT)3(HF, TI)2
PD5TI3	Pd5Ti3	-	tP8	(123, P4/mmm)	-	2	(PD)5(TI)3

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
PD7Y	Ca7Ge	-	cF32	(225, Fm-3m)	-	2	(PD)7(Y)1
PD3Y2_LT	Unknown Structure	-	-	-	-	2	(PD)3(Y)2
PD3Y2_HT	Unknown Structure	-	-	-	-	2	(PD)3(Y)2
PD4Y3	Pd4Pu3	-	hR14	(148, R-3)	-	2	(PD)4(Y)3
PD2Y3	Er3Ni2	-	hR15	(148, R-3)	-	2	(PD)2(Y)3
PD2Y5	Dy5Pd2	-	cF144	(227, Fd-3m)	-	2	(PD)2(Y)5
PD11ZR9	Ni11Zr9	-	tP44	(83, P4/m)	-	2	(PD)11(ZR)9
PD4ZR3	Pd4Pu3	-	hR14	(148, R-3)	-	2	(PD)4(ZR)3
PDZRM	MoSi2 (C11b)	C11b	tI6	(139, I4/mmm)	-	3	(PD)1(ZR)1(PD, ZR)1
PDZR_ALPHA	(PdZr-alpha)	-	mS*	(8, Cm)	-	2	(PD)1(ZR)1
PDZR_BETA	CrB (B33)	B33	oS8	(63, Cmcm)	-	2	(PD)1(ZR)1
PTSI	Westerveldite (FeAs, B14)	B14	oP8	(62, Pnma)	-	2	(PT)1(SI)1
PT6SI5	Pt6Si5	-	mP22	(11, P2_1/m)	-	2	(PT)6(SI)5
ALPHA_PT2SI	ThH2 (L'2b)	L'2b	tI6	(139, I4/mmm)	-	2	(PT)2(SI)1
BETA_PT2SI	Barringerite (Revised Fe2P, C22)	C22	hP9	(189, P-62m)	-	2	(PT)2(SI)1
ALPHA_PT17SI8	Ni12P5	-	tI34	(87, I4/m)	-	2	(PT)17(SI)8
BETA_PT17SI8	Pt12Si5	-	tP68	(85, P4/n)	-	2	(PT)17(SI)8

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
PT5SI2	Unknown Structure	-	-	-	-	2	(PT)5(SI)2
BETA_PT3SI	Cementite (Fe3C, D011)	D011	oP16	(62, Pnma)	-	2	(PT)3(SI)1
ALPHA_PT3SI	GePt3	-	mS16	(12, C2/m)	-	2	(PT)3(SI)1
PT25SI7	Unknown Structure	-	-	-	-	2	(PT)25(SI)7
PT2TA	Au2V	-	oS12	(63, Cmcm)	-	2	(PT)2(TA)1
PT3TA	NbPt3	-	mP48	(11, P2_1/m)	-	2	(PT)3(TA)1
PT3TI4	Unknown Structure	-	-	-	-	2	(PT)3(TI)4
PT8TI	Pt8Ti	-	tI18	(139, I4/mmm)	-	2	(PT)8(TI)1
PT5Y	Unknown Structure	-	-	-	-	2	(PT)5(Y)1
PT4Y3	Unknown Structure	-	-	-	-	2	(PT)4(Y)3
PT4Y5	Gd5Si4	-	oP36	(62, Pnma)	-	2	(PT)4(Y)5
PT3Y5	Mavlyanovite (Mn5Si3, D88)	D88	hP16	(193, P6_3/mcm)	-	2	(PT)3(Y)5
PT3Y7	Fe3Th7 (D102)	D102	hP20	(186, P6_3mc)	-	2	(PT)3(Y)7
PT4ZR3	Pd4Pu3	-	hR14	(148, R-3)	-	2	(HF, PT, ZR)4(HF, PT, ZR)3
PT4ZR1	Unknown Structure	-	-	-	-	2	(PT, ZR)4(PT, ZR)1
PT3ZR5	Mavlyanovite (Mn5Si3, D88)	D88	hP16	(193, P6_3/mcm)	-	2	(PT, ZR)3(PT, ZR)5
PT10ZR7	Ni10Zr7	-	oS68	(64, Cmce)	-	2	(PT)10(ZR)7

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
HF8NI21	Hf8Ni21	-	aP29	(2, P-1)	-	2	(HF, ZR)8(NI)21
AL13FE4	Al13Fe4	-	mS102	(12, C2/m)	-	3	(AL, CU)0.6275(FE, MN, RU)0.235(AL, SI, VA)0.1375
NI8TA	Pt8Ti	-	tI18	(139, I4/mmm)	-	2	(NI)8(NB)1
CO7M2	(Co7Nb2)	-	mS18	(12, C2/m)	also L12 Co7Ta2	2	(CO, NI)7(NB, TA)2
RU2Y3	Er3Ru2	-	hP10	(176, P6_3/m)	-	2	(RU)0.4(Y)0.6
RU25Y44	Ru25Y44	-	oP276	(52, Pnna)	-	2	(RU)0.362(Y)0.638
RU2Y5	Mn5C2 (Fe5C2 Hagg carbide)	-	mS28	(15, C2/c)	-	2	(RU)0.286(Y)0.714
NB15NI56TI29	Unknown Structure	-	o*100	-	-	3	(NB)0.15(NI)0.56(TI)0.29
NB8NI9TI3	Unknown Structure	-	-	-	-	3	(NB)0.4(NI)0.45(TI)0.15
NB5NI75TI20	Ni3Sn (D019)	D019	hP8	(194, P6_ 3/mmc)	-	3	(NB)0.05(NI)0.75(TI)0.2
NB13NI75TI12	Unknown Structure	-	-	-	-	3	(NB)0.13(NI)0.75(TI)0.12
NB15NI80TI5	Unknown Structure	-	-	-	-	3	(NB)0.15(NI)0.8(TI)0.05
CFC2_FENBZR	Cu2Mg Cubic Laves (C15)	C15	cF24	(227, Fd-3m)	-	3	(FE, NB, ZR)2(NB, ZR)1(NB, ZR)3
TI3SIC2	Ti3SiC2	-	hP12	(194, P6_ 3/mmc)	-	3	(TI)3(SI)1(C)2
AL31MN6NI2	mu-Al4Mn	-	hP574	(194, P6_ 3/mmc)	-	3	(AL)31(MN)6(NI)2
AL5MN6SI7	CrSi2 (C40)	C40	hP9	(180, P6_222)	-	3	(AL)5(MN)6(SI)7
ALCCR2	AlCCr2	-	hP8	(194, P6_ 3/mmc)	-	3	(AL)1(C)1(CR)2

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
AL8SIC7	Unknown Structure	-	hP16	-	-	3	(AL)8(SI)1(C)7
ALFESI_ALPHA_TAU5	Fe23Al81Si15	-	hP246	(194, P6_ 3/mmc)	-	4	(AL)0.6612(FE)0.19(SI)0.0496(AL, SI)0.0992
ALFESI_BETA_TAU6	Fe2Al9Si2	-	mS52	(15, C2/c)	-	3	(AL)14(FE)3(SI)3
ALFESI_GAMMA_TAU2	Unknown Structure	-	mS*	-	-	3	(AL)3(FE)1(SI)1
ALFESI_DELTA_TAU4	FeAl3Si2	-	oP24	(60, Pbcn)	-	3	(AL)0.55(FE)0.15(SI)0.3
ALFESI_TAU1	Unknown Structure	-	-	-	-	3	(AL)2(FE)2(SI)1
ALFESI_TAU3	Fe(Al0.67Si0.33)3	-	oS128	(67, Cmme)	-	3	(AL)2(FE)1(SI)1
AL2MN2SI3	(Al2Mn2Si3)	-	hP21	(174, P-6)	-	3	(AL)2(MN)2(SI)3
CO3AL2B5	Unknown Structure	-	-	-	-	3	(CO)3(AL)2(B)5
ALCR2B2	AlMn2B2	-	oS10	(65, Cmmm)	-	3	(AL)1(CR)2(B)2
ALCR3B4	AlCr3B4	-	oP8	(47, Pmmm)	-	3	(AL)1(CR)3(B)4
ALBMO	ZrSi2 (C49)	C49	oS12	(63, Cmcm)	-	3	(AL)1(B)1(MO)1
NI8ALB11	Unknown Structure	-	m**	-	-	3	(NI)8(AL)1(B)11
AL4SIC4	Al5C3N (E94)	E94	hP18	(186, P6_3mc)	-	3	(AL)4(SI)1(C)4
NB3RU5	Rh5Ge3	-	oP16	(55, Pbam)	united Nb3Ru5_HT and NbRu3_LT phase	2	(NB, RU)0.375(RU)0.625
FENBSI2	CrSi2Zr	-	oP48	(55, Pbam)	-	3	(FE)1(NB)1(SI)2
FE4NB4SI7	Co4Ge7Zr4	-	tI60	(139, I4/mmm)	-	3	(CO, FE)4(NB, TA)4(SI)7

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
FENBSI_C23	MnCuP	-	oP12	(62, Pnma)	-	3	(FE)1(NB)1(SI)1
FE3NB4SI5	Fe3Nb4Si5	-	oP72	(31, Pmn2_1)	-	3	(FE)3(NB)4(SI)5
FE3TA3SI4	Unknown Structure	-	-	-	-	3	(FE)3(TA)3(SI)4
FENB2SI2	FeNb2Si2	-	tP198	(132, P4_ 2/mcm)	-	3	(FE)1(NB)2(SI)2
FENB4SI	Nb4CoSi	-	tP12	(124, P4/mcc)	-	3	(FE)1(NB)4(SI)1
FESI2_H	FeSi2-h	-	tP3	(123, P4/mmm)	-	2	(FE)0.3(SI)0.7
FESI2_L	FeSi2-l	-	oS48	(64, Cmce)	-	2	(FE)0.333333(SI)0.666667
HFNI3_ALPHA	PdRh2Ta	-	hP40	(194, P6_ 3/mmc)	-	2	(HF)0.25(NI)0.75
HF3NI7	Hf3Ni7	-	aP20	(2, P-1)	-	2	(HF)0.3(NI)0.7
HFNI_ALPHA	CrB (B33)	B33	oS8	(63, Cmcm)	-	2	(HF, PT)0.5(HF, NI, PT)0.5
HFRE	Zr21Re25	-	hR92	(167, R-3c)	-	2	(HF)1(RE)1
MNTI_LT	Zr21Re25	-	hR92	(167, R-3c)	-	2	(MN)1(TI)1
MNTI_HT	Unknown Structure	-	t**	-	-	2	(MN)0.515(TI)0.485
MN3TI	Unknown Structure	-	-	-	-	2	(MN)3(TI)1
MN4TI	R-(Co, Cr, Mo)	-	hR53	(148, R-3)	-	2	(MN)0.815(TI)0.185
NI3SI_ORTHO	Cementite (Fe3C, D011)	D011	oP16	(62, Pnma)	-	2	(NI)3(SI)1
FE2SI	AlNi2	-	hP6	(164, P-3m1)	-	2	(FE)0.666667(SI)0.333333

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
CO11ZR2	(Co11Hf2)	-	oP*	(50, Pban)	-	2	(CO)11(ZR)2
HFNI3_BETA	BaPb3	-	hR12	(166, R-3m)	-	2	(HF)0.25(NI)0.75
RUB2	RuB2	-	oP6	(59, Pmmn)	-	2	(RU)1(B)2
RU2B3	Ru2B3	-	hP10	(194, P6_3/mmc)	-	2	(RU)2(B)3
RU1B1	Unknown Structure	-	-	-	-	2	(RU)1(B)1
B3SI	B13C2 "B4C" (D1g)	D1g	hR15	(166, R-3m)	-	3	(B)6(SI)2(B, SI)6
B6SI	SiB6	-	oP280	(58, Pnnm)	-	3	(B)210(SI)23(B, SI)48
BNSI	alpha-B (R-12)	-	hR12	(166, R-3m)	-	3	(B)61(SI)1(B, SI)8
V2B3	V2B3	-	oS20	(63, Cmcm)	-	2	(V)0.4(B)0.6
B9W2	W2B9	-	hP22	(147, P-3)	-	2	(B)9(W)2
SIC	Zincblende (ZnS, B3)	B3	cF8	(216, F-43m)	-	2	(SI)1(C)1
V3C2	Sc2Te3	-	hR8	(166, R-3m)	-	2	(V)3(C)2
CO7HF	(Co11Hf2)	-	oP*	(50, Pban)	-	2	(CO)7(HF)1
CO3SI	Ni3Sn (D019)	D019	hP8	(194, P6_3/mmc)	-	2	(CO)3(SI)1
CO3V	Al3Pu	-	hP24	(194, P6_3/mmc)	-	2	(CO, NI, TI, V)3(CO, NI, TI, V)1
AL4ZR5	Ti5Ga4	-	hP18	(193, P6_3/mcm)	-	2	(AL)4(ZR)5
AL2TI	Ga2Hf	-	tI24	(141, I4_1/amd)	-	2	(AL)2(TI)1

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
AL10V	Al10V	-	cF176	(227, Fd-3m)	-	2	(AL)10(V)1
AL7V	Al45V7	-	mS104	(12, C2/m)	-	2	(AL)7(V)1
AL23V4	Al23V4	-	hP54	(194, P6_ 3/mmc)	-	2	(AL)23(V)4
AL8V5	gamma-Brass (Cu5Zn8, D82)	D82	cI52	(217, I-43m)	-	2	(AL)8(V)5
AL77W23	Unknown Structure	-	-	-	-	2	(AL)77(W)23
AL7W3	Unknown Structure	-	-	-	-	2	(AL)7(W)3
AL2W	CrSi2 (C40)	C40	hP9	(180, P6_222)	-	2	(AL)2(W)1
AL3ZR5	W5Si3 (D8m)	D8m	tI32	(140, I4/mcm)	-	2	(AL)3(ZR)5
AL11RE4	Al11Mn4	-	aP15	(2, P-1)	-	2	(AL)11(RE)4
AL4RE	Al4Re	-	aP71	(2, P-1)	-	2	(AL)4(RE)1
ALRE2	CuZr2	-	tI6	(139, I4/mmm)	-	2	(AL)1(RE)2
ALRE_B11	gamma-CuTi (B11)	B11	tP4	(129, P4/nmm)	-	2	(AL)1(RE)1
TA1AL1	Al38Ta48	-	mP86	(14, P2_1/c)	-	2	(TA)0.51515(AL)0.48485
TAAL2	Al69Ta39	-	cF444	(216, F-43m)	-	2	(TA)0.35(AL)0.65
AL11TI5	Al3Zr (D023)	D023	tI16	(139, I4/mmm)	-	2	(AL)17(TI)8
ALMO	Body-Centered Cubic (W, A2, bcc)	A2	cI2	(229, Im-3m)	-	2	(AL, MO)1(AL, MO)1
AL3NI1	Cementite (Fe3C, D011)	D011	oP16	(62, Pnma)	-	2	(AL)0.75(NI)0.25

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
AL3NI5	Ga3Pt5	-	oS16	(65, Cmmm)	-	2	(AL)0.375(NI, PT)0.625
AL2FE	Al2Fe	-	aP18	(1, P1)	-	2	(AL, CU)2(FE, MN)1
AL5FE2	Al2.8Fe	-	oS24	(63, Cmcm)	-	2	(AL, CU)5(FE, MN)2
AL5FE4	gamma-Brass (Cu5Zn8, D82)	D82	cI52	(217, I-43m)	-	1	(AL, CU, FE)1
AL63MO37	Unknown Structure	-	-	-	-	2	(AL)63(MO)37
AL8MO3	Al8Mo3	-	mS22	(12, C2/m)	-	2	(AL)8(MO)3
AL11CR2	Al5Cr	-	mS732	(15, C2/c)	-	3	(AL)10(AL)1(CR)2
AL13CR2	Al45V7	-	mS104	(12, C2/m)	-	2	(AL)13(CR)2
AL4CR	mu-Al4Mn	-	hP574	(194, P6_3/mmc)	-	2	(AL)4(CR)1
AL8CR5_H	gamma-Brass (Cu5Zn8, D82)	D82	cI52	(217, I-43m)	-	2	(AL)8(CR)5
AL8CR5_L	Cr5Al8 (D810)	D810	hR26	(160, R3m)	-	2	(AL)8(CR)5
AL9CR4_H	Unknown Structure	-	-	-	-	2	(AL)9(CR)4
AL9CR4_L	Unknown Structure	-	-	-	-	2	(AL)9(CR)4
ALCR2_C11B	MoSi2 (C11b)	C11b	tI6	(139, I4/mmm)	-	2	(AL)1(CR)2
ALB12_ALPHA	alpha-AlB12	-	tP216	(92, P4_12_12)	-	2	(AL)1(B)12
AL13CO4	Orthorhombic Co4Al13 (Approximate Quasicrystal)	-	oP102	(31, Pmn2_1)	-	2	(AL)13(CO)4
AL3CO	Os4Al13	-	mS34	(12, C2/m)	-	2	(AL)3(CO)1

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
AL5CO2_D811	Co2Al5 (D811)	D811	hP28	(194, P6_ 3/mmc)	-	2	(AL)5(CO)2
AL9CO2	Co2Al9 (D8d)	D8d	mP22	(14, P2_1/c)	-	2	(AL)9(CO)2
W3COC	W10Co3C3.4	-	hP34	(194, P6_ 3/mmc)	-	3	(W)3(CO, NI)1(C)1
ALM3C_E21	Cubic Perovskite (CaTiO3, E21)	E21	cP5	(221, Pm-3m)	-	3	(AL)1(CO, FE)3(C)1
AL4C3	Al4C3 (D71)	D71	hR7	(166, R-3m)	-	2	(AL, SI)4(C)3
YC2_C11A	CaC2-I (C11a)	C11a	tI6	(139, I4/mmm)	-	1	(C2Y1)1
Y15C19_H	Unknown Structure	-	-	-	-	2	(C)19(Y)15
Y15C19_R	alpha-Y15C19	-	oP18	(55, Pbam)	-	2	(C)19(Y)15
Y2C3_H	Unknown Structure	-	-	-	-	3	(Y)2(C)2(C, VA)1
Y2C3_R	Sc3C4	-	tP70	(128, P4/mnc)	-	3	(Y)2(C)2(C, VA)1
YC_GAMMA	Rock Salt/Halite (NaCl, B1)	B1	cF8	(225, Fm-3m)	-	2	(Y)1(C, C2, VA)1
BM	FeB (B27)	B27	oP8	(62, Pnma)	-	2	(B, PT)1(CR, FE, HF, MN, MO, TI, Y)1
COB	FeB (B27)	B27	oP8	(62, Pnma)	-	2	(CO, RE)1(B)1
MOB_LT	MoB (Bg)	Bg	tI16	(141, I4_ 1/amd)	-	2	(CR, FE, MO)1(B)1
BW_ALPHA	MoB (Bg)	Bg	tI16	(141, I4_ 1/amd)	-	2	(B, C, VA)1(W)1
BW_BETA	CrB (B33)	B33	oS8	(63, Cmcm)	-	2	(B, C, VA)1(W)1
CR2B_ORTH	Mg2Cu (Cb)	Cb	oF48	(70, Fddd)	-	2	(CR, FE, MO, RE)0.66666667(B)0.33333333

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
MN2B_D1F	Mn2B (D1f)	D1f	oF48	(70, Fddd)	-	2	(MN)0.6707(B)0.3293
MNB4	MnB4	-	mS10	(12, C2/m)	-	2	(MN)0.2(B)0.8
MOCOB	MnCuP	-	oP12	(62, Pnma)	-	3	(MO, W)1(CO)1(B)1
NI3B_D011	Cementite (Fe3C, D011)	D011	oP16	(62, Pnma)	-	2	(CO, CR, FE, MO, NI)3(B)1
RE3B	Re3B	-	oS16	(63, Cmcm)	-	2	(CR, MO, RE, TA, W)3(B)1
B4TA3_D7B	Ta3B4 (D7b)	D7b	oI14	(71, Immm)	-	2	(B)4(CR, HF, MN, NB, TA, TI, V)3
B5W2_X	Mo2B5 (D8i)	D8i	hR7	(166, R-3m)	-	2	(B, C, VA)5(W)2
RE7B3	Fe3Th7 (D102)	D102	hP20	(186, P6_3mc)	-	3	(CO, CR, MO, NB, RE, RU, TA, W)7(B)3(B, VA)3
D5A_M3B2	Si2U3 (D5a)	D5a	tP10	(127, P4/mbm)	-	2	(FE, HF, MO, NB, TA, V)3(B)2
W2COB2	W2CoB2	-	oI10	(71, Immm)	-	3	(MO, W)2(CO, NI)1(B)2
CR5B3	Cr5B3 (D8l)	D8l	tI32	(140, I4/mcm)	-	2	(CR, MO)0.625(B)0.375
V5B6	V5B6	-	oS22	(65, Cmmm)	-	2	(NB, V)5(B)6
B4C	B13C2 "B4C" (D1g)	D1g	hR15	(166, R-3m)	-	2	(B11C, B12)1(B2, C2B, CB2)1
CRB4	CrB4	-	oI10	(71, Immm)	-	2	(CR)0.2(B)0.8
MOB4	MoB4	-	hP16	(194, P6_3/mmc)	-	2	(MO)0.2(B)0.8
REB2	ReB2	-	hP6	(194, P6_3/mmc)	-	3	(RE)1(B)2(B, VA)2
NI4B3	m-Ni4B3	-	mS28	(15, C2/c)	-	2	(NI)0.57142857(B)0.42857143

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
MO2B5_D8I	Mo2B5 (D8i)	D8i	hR7	(166, R-3m)	-	2	(MO)0.32(B)0.68
RE3CO3B2	Ti3P	-	tP32	(86, P4_2/n)	-	3	(RE)3(CO)3(B)2
NI3CR2B6	V5B6	-	oS22	(65, Cmmm)	-	3	(NI)3(CR)2(B)6
NICR3B6	V2B3	-	oS20	(63, Cmcm)	-	3	(NI)0.1(CR)0.3(B)0.6
FEWB	MnCuP	-	oP12	(62, Pnma)	-	3	(FE)1(W)1(B)1
MO3NI10B11	Unknown Structure	-	-	-	-	3	(MO)3(NI)10(B)11
RE5CO2B4	Re5Co2B4	-	tP22	(127, P4/mbm)	-	4	(RE)4(CO, RE)2(CO)1(B)4
NI5ALB4	Unknown Structure	-	-	-	-	3	(NI)5(AL)1(B)4
RECOB	MnCuP	-	oP12	(62, Pnma)	-	3	(RE)1(CO)1(B)1
Z_PHASE	CrNbN	-	tP6	(129, P4/nmm)	-	3	(CR, FE)1(MO, NB, V)1(N, VA)1
FE4N_LP1	gamma'-Fe4N (L'10)	L'10	cP5	(221, Pm-3m)	-	2	(CO, CR, FE, MN, NI)4(C, N)1
FECN_CHI	Mn5C2 (Fe5C2 Hagg carbide)	-	mS28	(15, C2/c)	-	2	(FE)2.2(C, N)1
PI	beta-Mn (A13)	A13	cP20	(213, P4_132)	-	3	(CR)12.8(FE, NI)7.2(N)4
ALN_B4	Wurtzite (ZnS, B4)	B4	hP4	(186, P6_3mc)	-	2	(AL)1(N)1
SI3N4	Nierite (alpha-Si3N4)	-	hP28	(159, P31c)	-	2	(SI)3(N)4
BN_B4	Wurtzite (ZnS, B4)	B4	hP4	(186, P6_3mc)	-	2	(B)1(N)1
MN6N4	Mn3N2	-	tI10	(139, I4/mmm)	-	2	(MN)6(N)4

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
MN6N5	CoO	-	tI4	(139, I4/mmm)	-	2	(MN)6(N)5
TI2N_C4	Rutile (TiO2, C4)	C4	tP6	(136, P4_2/mnm)	-	2	(TI)2(N)1
TAN_EPS	TaN-eps	-	hP6	(189, P-62m)	-	2	(TA)1(N)1
TI3N2	TiS-9R	-	hR6	(166, R-3m)	-	2	(TI)0.71(N)0.29
TI4N3	Sc2Te3	-	hR8	(166, R-3m)	-	2	(TI)0.685(N)0.315
ALNTI2	AlCCr2	-	hP8	(194, P6_3/mmc)	-	3	(AL)1(N)1(TI)2
ALNTI3	Cubic Perovskite (CaTiO3, E21)	E21	cP5	(221, Pm-3m)	-	3	(AL)1(N)1(TI)3
AL2N2TI3	(Al2Ti3N2)	-	hP22	(186, P6_3mc)	-	3	(AL)2(N)2(TI)3
NIAL2Y	MgCuAl2 (E1a)	E1a	oS16	(63, Cmcm)	-	3	(NI)1(AL)2(Y)1
NIALY	ZrNiAl	-	hP9	(189, P-62m)	-	3	(NI)1(AL)1(Y)1
NI2ALY2	W2CoB2	-	oI10	(71, Immm)	-	3	(NI)2(AL)1(Y)2
NI6AL2Y3	Ce3Ni6Si2	-	cI44	(229, Im-3m)	-	3	(NI)6(AL)2(Y)3
NI3ALY2	Unknown Structure	-	-	-	-	3	(NI)3(AL)1(Y)2
NI8ALY3	CeNi3	-	hP24	(194, P6_3/mmc)	-	3	(NI)8(AL)1(Y)3
HALITE	Rock Salt/Halite (NaCl, B1)	B1	cF8	(225, Fm-3m)	-	2	(AL+3, CA+2, CO+2, CO+3, CR+3, CU+2, FE+2, FE+3, MG+2, MN+2, MN+3, NI+2, NI+3, TI, TI+2, TI+3, V, V+2, V+3, VA, ZR+4, Y+3)1(O-2, VA)1
QUARTZ	alpha-Quartz (low Quartz)	-	hP9	(152, P3_121)	-	1	(SIO2)1

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
TRIDYMITE	Monoclinic (Cc) Low Tridymite (SiO2)	-	mS144	(9, Cc)	-	1	(SIO2)1
CRISTOBALITE	Ideal beta-Cristobalite (SiO2, C9)	C9	cF24	(227, Fd-3m)	-	1	(SIO2)1
B2O3	B2O3	-	hP15	(152, P3_121)	-	1	(B2O3)1
CUPRITE_C3	Cuprite (Cu2O, C3)	C3	cP6	(224, Pn-3m)	-	2	(CU+1)2(O-2)1
CUO	Tenorite (CuO, B26)	B26	mS8	(15, C2/c)	-	2	(CU+2)1(O-2)1
YCUO2	Hexagonal Delafossite (CuFeO2)	-	hP8	(194, P6_ 3/mmc)	-	3	(Y+3)1(CU+1)1(O-2)2
Y2CU2O5	Cu2Ho2O5	-	oP36	(33, Pna2_1)	-	3	(Y+3)2(CU+2)2(O-2)5
OLIVINE	Forsterite (Mg2SiO4, S12)	S12	oP28	(62, Pnma)	-	4	(CA+2, CO+2, CR+2, CU+2, FE+2, MN+2, NI+2)1(CA+2, CO+2, CR+2, CU+2, FE+2, MN+2, NI+2)1(SI+4)1(O-2)4
RHODONITE	Rhodonite (MnSiO3-b)	-	aP50	(2, P-1)	-	3	(CA+2, MN+2)1(SI+4)1(O-2)3
ANDALUSITE	Andalusite (Al2SiO5, S02)	S02	oP32	(58, Pnnm)	-	4	(AL+3)1(AL+3)1(SI+4)1(O-2)5
SILLIMANITE	Sillimanite (Al2SiO5, S03)	S03	oP32	(62, Pnma)	-	4	(AL+3)1(AL+3)1(SI+4)1(O-2)5
MULLITE	Al(Al0.7Si0.3)2O4.8	-	oP24	(55, Pbam)	-	4	(AL+3)1(AL+3)1(AL+3, SI+4)1(O-2, VA)5
KYANITE	Kyanite (Al2SiO5, S01)	S01	aP32	(2, P-1)	-	4	(AL+3)1(AL+3)1(SI+4)1(O-2)5
CORUNDUM	Corundum (alpha-alumina, Al2O3, D51)	D51	hR10	(167, R-3c)	-	3	(AL+3, CR+2, CR+3, FE+2, FE+3, MN+3, TI+3, V+3)2(CR+3, FE+3, NI+2, VA)1(O-2)3
SPINEL	Spinel (Al2MgO4, H11)	H11	cF56	(227, Fd-3m)	-	4	(AL+3, CO+2, CO+3, CR+2, CR+3, CU+2, FE+2, FE+3, MG+2, MN+2, NI+2)1(AL+3, CA+2, CO+2, CO+3, CR+3, CU+2, FE+2, FE+3, MG+2, MN+2, MN+3, MN+4, NI+2, VA)2(CR+2, FE+2, MG+2, MN+2, VA)2 (O-2)4
ALPHA_SPINEL	Haussmannite (Mn3O4)	-	tI28	(141, I4_	-	4	(CO+2, MG+2, MN+2, MN+3, NI+2)1(AL+3, CR+3, FE+3, MN+2,

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
				1/amd)			MN+3, VA)2(MN+2, VA)2(O-2)4
HFSIO4	(HfSiO4)	-	tI*	(141, I4_ 1/amd)	-	3	(HF+4)1(SI+4)1(O-2)4
MN2YO5	HoMn2O5	-	oP32	(55, Pbam)	-	4	(Y+3)1(MN+3)1(MN+4)1(O-2)5
MNYO3_HEX	LuMnO3	-	hP30	(185, P6_3cm)	-	3	(Y+3)1(MN+3)1(O-2)3
MO4O11	Mo4O11	-	oP60	(33, Pna2_1)	-	2	(MO)4(O)11
MO8O23	Approximate High Temperature Mo8O23	-	mP62	(13, P2/c)	-	2	(MO)8(O)23
MO9O26	Mo9O26	-	mP70	(13, P2/c)	-	2	(MO)1(O)2.889
MOO2	VO2	-	mP12	(14, P2_1/c)	-	2	(MO)1(O)2
MOO3	gamma-WO3	-	mP32	(14, P2_1/c)	-	2	(MO)1(O)3
NIMOO4	Huanzalaite (MgWO4, H06)	H06	mP12	(13, P2/c)	Also Ni[MoO4] of type Co[MoO4] SG12	3	(NI+2)1(MO+6)1(O-2)4
NIMNO3	Ilmenite (FeTiO3, E22)	E22	hR10	(148, R-3)	-	2	(MN+3, MN+4, NI+2)2(O-2)3
NI6MNO8	Rock Salt/Halite (NaCl, B1)	B1	cF8	(225, Fm-3m)	-	3	(NI+2)6(MN+4)1(O-2)8
NIWO4	Sylvanite (AgAuTe4, E1b)	E1b	mP12	(13, P2/c)	-	3	(CO+2, FE+2, MN+2, NI+2)1(W+6)1(O-2)4
NB2O5	Nb2O5	-	mP99	(10, P2/m)	-	2	(NB)2(O)5
NB1O1	NbO	-	cP6	(221, Pm-3m)	-	2	(NB)1(O)1
NBO2	alpha-NbO2	-	tI96	(88, I4_1/a)	-	2	(NB)1(O)2
PDO	Cooperite (PtS, B17)	B17	tP4	(131, P4_ 2/mmc)	-	2	(PD)1(O)1

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
PTO2	CdI2	-	hP3	(164, P-3m1)	Also other variants TiO2/CaCl2	2	(PT)1(O)2
PT3O4	Pt3O4	-	cI14	(229, Im-3m)	-	2	(PT)3(O)4
REO2	ReO2	-	mP14	(14, P2_1/c)	Also Ht variant, SG Pbcn	1	(O2RE1)1
REO3	alpha-ReO3 (D09)	D09	cP4	(221, Pm-3m)	There are 6 allotropes	1	(O3RE1)1
RE2O7	Re2O7	-	oP72	(19, P2_12_12_1)	-	1	(O7RE2)1
RUTILE_MO2	Rutile (TiO2, C4)	C4	tP6	(136, P4_2/mnm)	-	2	(AL+3, MN+4, RU+4, V+4, TI+4, ZR+4)1(O-2, VA)2
TA2O5_HT	Ta2O5-ht	-	tI44	(141, I4_1/amd)	-	2	(TA)2(O)5
TA2O5_LT	beta-Ta2O5	-	oP14	(49, Pccm)	-	2	(TA)2(O)5
TI3O2	(Ti3O2)	-	hP5	(191, P6/mmm)	-	3	(TI+2)2(TI)1(O-2)2
TI3O5	V3O5-ht	-	mS32	(15, C2/c)	-	3	(TI+3)2(TI+4)1(O-2)5
TIO_ALPHA	alpha-TiO	-	mS20	(12, C2/m)	-	2	(TI+2)1(O-2)1
VO2_LT	VO2	-	mP12	(14, P2_1/c)	-	2	(V+4)1(O-2)2
V2O_SS	V7O3	-	mS20	(12, C2/m)	-	2	(V)1(O, VA)0.5
V2O5	Shcherbinaite (V2O5) (Revised)	-	oP14	(59, Pmmn)	-	2	(V+5)2(O-2)5
V52O64	V13O16	-	tI116	(141, I4_1/amd)	-	2	(V)52(O)64

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
WO2_00	VO2	-	mP12	(14, P2_1/c)	-	1	(O2W1)1
WO2_72	Unknown Structure	-	-	-	-	1	(O2_72W1)1
WO2_90	Unknown Structure	-	-	-	-	1	(O2_90W1)1
WO2_96	Unknown Structure	-	-	-	-	1	(O2_96W1)1
WO3_HT	WO2.95	-	tP16	(113, P-42_ 1m)	-	1	(O3W1)1
WO3_LT	beta-WO3	-	oP32	(60, Pbcn)	-	1	(O3W1)1
M2O3C	Bixbyite (Mn2O3, D53)	D53	cI80	(206, Ia-3)	-	3	(AL+3, CA+2, CR+3, FE+3, MG+2, MN+3, NI+2, Y, Y+3, ZR+4)2(O-2, VA)3(O-2, VA)1
M2O3H	H-La2O3	-	hP10	(194, P6_ 3/mmc)	-	3	(CA+2, MG+2, MN+3, Y, Y+3, ZR+4)2(O-2, VA)3(O-2, VA)1
M2O3B	B-Sm2O3	-	mS30	(12, C2/m)	-	3	(AL+3, CA+2, CO+3, MG+2, Y+3, ZR+4)2(O-2, VA)3(O-2, VA)1
M2O3A	La2O3 (D52)	D52	hP5	(164, P-3m1)	-	3	(CA+2, MG+2, Y+3, ZR+4)2(O-2, VA)3(O-2, VA)1
M2O3X	Nd2O3	-	cI26	(229, Im-3m)	-	3	(CA+2, MG+2, Y+3, ZR+4)2(O-2, VA)3(O-2, VA)1
ZRO2_MONO	Baddeleyite (ZrO2, C43)	C43	mP12	(14, P2_1/c)	-	2	(AL+3, CA+2, CR+3, HF+4, TI+4, Y+3, ZR+4)2(O-2, VA)4
ZRO2_TETR	Coccinite (Red HgI2, C13)	C13	tP6	(137, P4_ 2/nmc)	-	2	(AL+3, CA+2, CR+3, FE+2, HF+4, MG+2, MN+2, MN+3, NI+2, TI+4, Y+3, ZR+4)2(O-2, VA)4
FLUORITE_C1	Fluorite (CaF2, C1)	C1	cF12	(225, Fm-3m)	-	2	(AL+3, CA+2, CR+3, FE+2, HF+4, MN+2, MN+3, NI+2, TI+4, Y+3, ZR, ZR+4)2(O-2, VA)4
PSEUDO_BROOKITE	Pseudobrookite (Fe2TiO5, E41)	E41	oS32	(63, Cmcm)	-	3	(TI+4)1(AL+3)2(O-2)5
YAG	Garnet [S14, Co3Al2 (SiO4)3]	S14	cI160	(230, Ia-3d)	-	3	(AL+3, CR+3, FE+3)5(Y+3)3(O-2)12

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
YAP	CaTiO3 Pnma Perovskite	-	oP20	(62, Pnma)	-	3	(AL+3, CO+3, CR+3, FE+3, MN+3)1(CA+2, Y+3)1(O-2, VA)3
YAM	Y4Al2O9	-	mP60	(14, P2_1/c)	-	4	(AL+3, SI+4)2(CA+2, Y+3)4(O-2, VA)1(O-2)9
Y2S2D_Y2SI2O7	Possible delta-Y2Si2O7	-	oP44	(62, Pnma)	-	3	(Y+3)1(Y+3)1(SI2O7-6)1
Y2S2G_Y2SI2O7	Y2Si2O7-b	-	mP22	(14, P2_1/c)	-	3	(Y+3)1(Y+3)1(SI2O7-6)1
Y2S2B_Y2SI2O7	La4Ge3[GeO4]O10	-	aP44	(2, P-1)	-	3	(Y+3)1(Y+3)1(SI2O7-6)1
Y2S2A_Y2SI2O7	Thortveitite ([Sc, Y]2Si2O7, S21)	S21	mS22	(12, C2/m)	-	3	(Y+3)1(Y+3)1(SI2O7-6)1
Y2SIO5	Y2SiO5 (RE2SiO5 X2)	-	mS64	(15, C2/c)	-	4	(Y+3)1(Y+3)1(SIO4-4)1(O-2)1
ZRSIO4	Zircon (ZrSiO4, S11)	S11	tI24	(141, I4_ 1/amd)	-	3	(SI+4)1(ZR+4)1(O-2)4
ZRTIO4_ALPHA	Unknown Structure	-	-	-	-	3	(ZR+4)1(TI+4)1(O-2)4
ZRTIO4_BETA	zeta-Fe2N	-	oP12	(60, Pbcn)	-	2	(TI+4, ZR+4)2(O-2)4
ZRTI2O6	Columbite (FeNb2O4, E51)	E51	oP36	(60, Pbcn)	-	3	(ZR+4)1(TI+4)2(O-2)6
ZR3Y4O12	UY6O12	-	hR19	(148, R-3)	-	3	(ZR+4)3(Y+3)4(O-2)12
M5SI3_D88	Mavlyanovite (Mn5Si3, D88)	D88	hP16	(193, P6_ 3/mcm)	-	4	(CR, CU, FE, HF, MN, MO, NI, NB, SI, TI, Y, ZR)2(AL, CR, SI, TI)3(CR, CU, FE, HF, MN, MO, NI, NB, TI, Y, ZR)3(C, VA)1
W5SI3_D8M	W5Si3 (D8m)	D8m	tI32	(140, I4/mcm)	-	3	(CR, FE, MO, NB, V, W)4(CR, FE, MO, NB, V, W, SI)1(AL, SI)3
TA5SI3_D8L	Cr5B3 (D8l)	D8l	tI32	(140, I4/mcm)	-	2	(HF, NB, TA)5(AL, SI)3
ZR5SI4	Si4Zr5	-	tP36	(92, P4_12_ 12)	-	2	(HF, NB, TI, Y, ZR)5(SI)4
CR3SI_A15	Cr3Si (A15)	A15	cP8	(223, Pm-3n)	-	3	(CR, FE, MO, NB, NI, PD, PT, RE, SI, TA, TI, V)3(AL, CO, CR, MO, NB, NI, PD, PT, RU, SI, TA, TI, V)1(C, VA)3

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
CO4TASI3	Pd40Sn31Y13	-	hP168	(191, P6/mmm)	-	3	(CO)4(TA)1(SI)3
M3SI1	Ti3P	-	tP32	(86, P4_2/n)	-	2	(HF, NB, TA, TI, ZR)3(SI)1
CO2SI_C23	Co2Si (C37)	C37	oP12	(62, Pnma)	-	2	(CO, CR, CU, FE, NI, TI)2(SI)1
MSI_B27	FeB (B27)	B27	oP8	(62, Pnma)	-	2	(HF, NB, TI, Y, ZR)1(SI)1
FESI_B20	FeSi (B20)	B20	cP8	(198, P2_13)	-	2	(CO, CR, FE, MN, NI, RE)1(AL, SI)1
CRSI2_C40	CrSi2 (C40)	C40	hP9	(180, P6_222)	-	2	(CR, CU, HF, MO, NB, SI, TA, V)1(AL, CR, CU, SI)2
MOSI2_C11B	MoSi2 (C11b)	C11b	tI6	(139, I4/mmm)	-	2	(CO, CU, FE, MO, NI, PD, W)1(AL, HF, SI, TI, ZR)2
ZRSI2_C49	ZrSi2 (C49)	C49	oS12	(63, Cmcm)	Also YSi2-orth of SG Imma	2	(ZR, Y, HF, NB)1(SI)2
YSI2_HT	Unknown Structure	-	-	-	-	2	(Y)1(SI)2
Y3SI5_HT	Hexagonal omega (C32)	C32	hP3	(191, P6/mmm)	-	2	(Y)3(SI)5
Y3SI5_LT	Unknown Structure	-	-	-	-	2	(Y)3(SI)5
TISI2_C54	TiSi2 (C54) Nowotony Chimney-Ladder	C54	oF24	(70, Fddd)	-	2	(MO, NB, RU, TI)1(AL, SI)2
MSI2_C1	Fluorite (CaF2, C1)	C1	cF12	(225, Fm-3m)	-	2	(CO, CU, MN, NI)1(AL, CU, SI)2
M3SI2_D5A	Si2U3 (D5a)	D5a	tP10	(127, P4/mbm)	-	2	(HF, NB, ZR)3(SI)2
NI31SI12	Ni31S12	-	hP42	(150, P321)	-	2	(CO, CR, CU, FE, NI)5(SI)2
CR3NI5SI2	AlAu4	-	cP20	(198, P2_13)	-	4	(CR)3(NI)5(SI)2(C, VA)1
NI6SI2B	ZrNiAl	-	hP9	(189, P-62m)	-	3	(NI)6(SI)2(B)1

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
NI4SI2B	Nb5Sn2Si	-	tI32	(140, I4/mcm)	-	3	(NI)4.29(SI)2(B)1.43
FE8SI2C	Mn8Si2C	-	aP*	(1, P1)	-	3	(FE)8(SI)2(C)1
CRNBSI	ZrNiAl	-	hP9	(189, P-62m)	-	3	(CR)1(NB)1(SI)1
M11SI8	Cr11Ge8	-	oP76	(62, Pnma)	-	2	(CR, NB)11(SI)8
M6SI5	Si5V6	-	oI44	(72, Ibam)	-	2	(CR, NB)6(SI)5
CR2NI2SI	NiTi2	-	cF96	(227, Fd-3m)	-	3	(CR)5(NI)5(SI)3
M4SI3	Ru4Si3	-	oP28	(62, Pnma)	-	2	(CR, NI)4(SI)3
RU2SI_C37	Co2Si (C37)	C37	oP12	(62, Pnma)	-	2	(RU)2(SI)1
RU4SI3	Ru4Si3	-	oP28	(62, Pnma)	-	2	(RU)4(SI)3
RUSI	FeSi (B20)	B20	cP8	(198, P2_13)	-	2	(RU)1(SI)1
RU2SI3	Ge3Ru2	-	oP40	(60, Pbcn)	-	2	(RU)2(SI)3
SI5V6	Si5V6	-	oI44	(72, Ibam)	-	2	(SI)5(V)6
NI3SI_MONOCL	Ge9Pd25	-	hP34	(147, P-3)	-	2	(NI)3(SI)1
NI3SI2	Ni3Si2	-	oP80	(36, Cmc2_1)	-	2	(NI)3(SI)2
NI2SI_TETA	AlNi2	-	hP6	(164, P-3m1)	-	3	(CU, NI)1(NI, VA)1(AL, SI)1
RE2SI	Re2Si	-	mP24	(14, P2_1/c)	-	2	(RE)2(SI)1
RESI2_C11B	Re4Si7	-	mS44	(8, Cm)	-	2	(RE)0.357(SI)0.643
MN15NI45SI40	Unknown Structure	-	-	-	-	3	(MN)0.15(NI)0.45(SI)0.4

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
MN15NI50SI35	Unknown Structure	-	-	-	-	3	(MN)0.15(NI)0.5(SI)0.35
MN6NI16SI7	Th6Mn23 (D8a)	D8a	cF116	(225, Fm-3m)	-	3	(MN)0.206897(NI)0.551724(SI)0.241379
MN1NI1SI1	MnCuP	-	oP12	(62, Pnma)	-	3	(MN, TA)1(CO, FE, NI)1(SI)1
MNNISI_T5	MgZn2 Hexagonal Laves (C14)	C14	hP12	(194, P6_ 3/mmc)	-	2	(MN)1(NI, SI)2
MNNISI_T6	Cu2Mg Cubic Laves (C15)	C15	cF24	(227, Fd-3m)	-	2	(MN)1(NI, SI)2
MN3NI2SI	Mn3Ni2Si	-	cF96	(227, Fd-3m)	-	3	(MN, TA)3(NI)2(SI)1
MN2NISI	Unknown Structure	-	-	-	-	2	(MN, NI)3(SI)1
MN6NISI3	R-(Co, Cr, Mo)	-	hR53	(148, R-3)	-	3	(MN)0.61(NI)0.12(SI)0.27
MN66NI4SI30	Unknown Structure	-	-	-	-	3	(MN)0.66(NI)0.04(SI)0.3
MN52NI29SI19	Unknown Structure	-	-	-	-	3	(MN)0.52(NI)0.29(SI)0.19
NI5TA8SI7	Unknown Structure	-	-	-	-	3	(NI)5(TA)8(SI)7
MONOCLINIC_S	beta-S	-	mP48	(14, P2_1/c)	-	1	(S)1
ORTHORHOMBIC_S	alpha-S (A16)	A16	oF128	(70, Fddd)	-	1	(S)1
RED_P	Unknown Structure	-	-	-	-	1	(P)1
WHITE_P	Unknown Structure	-	-	-	-	1	(P)1
AL2S3	Al2S3	-	hP30	(169, P6_1)	-	2	(AL)2(S)3
CR1S1	CrS	-	mS8	(15, C2/c)	-	2	(CR)1.03(S)1
CR7S8	Cr7Se8	-	mS30	(12, C2/m)	-	2	(CR)7(S)8

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
CR5S6	Cr5S6	-	hP22	(163, P-31c)	-	2	(CR)5(S)6
CR3S4	Brezinaite (Cr3S4)	-	mS14	(12, C2/m)	-	2	(CR, FE, MN, NI)3(S)4
CR2S3	Dolomite [MgCa(CO3)2, G11	G11	hR10	(148, R-3)	Also Cr+ variant of SG P-31c	2	(CR, FE)2(S)3
NIS_LT	Millerite (NiS, B13)	B13	hR6	(160, R3m)	-	2	(NI)1(S)1
NI3S2_LT	Hazelwoodite (Ni3S2, D5e)	D53	hR5	(155, R32)	-	2	(NI)3(S)2
CUCRS2	CuCrS2-b	-	hR4	(160, R3m)	Also ht variant of pearson hR5	3	(CU)1(CR)1(S)2
FEAL2S4	ZnIn2S4	-	hR7	(160, R3m)	-	3	(FE)1(AL)2(S)4
SIS2	SiS2 (C42)	C42	oI12	(72, Ibam)	-	2	(SI)1(S)2
ZRS2	CdI2	-	hP3	(164, P-3m1)	-	2	(ZR)1(S)2
ANILITE	Cu7S4	-	oP44	(62, Pnma)	-	2	(CU)1.75(S)1
CHALCOCITE_ALPHA	Cu2S-alpha	-	mP144	(14, P2_1/c)	-	2	(CU)2(S)1
CHALCOCITE_BETA	Cu2S-beta	-	hP16	(194, P6_ 3/mmc)	-	2	(CU)2(S)1
COVELLITE	Covellite (CuS, B18)	B18	hP12	(194, P6_ 3/mmc)	-	2	(CU)1(S)1
DJURLEITE	Cu31S16	-	mP376	(14, P2_1/c)	-	2	(CU)1.93(S)1
CUFES2_LT	Chalcopyrite (CuFeS2, E11)	E11	tI16	(122, I-42d)	-	3	(CU)1(FE)1(S)2
MO2S3	Mo2S3	-	mP10	(11, P2_1/m)	-	2	(MO)2(S)3
MO1S2	Molybdenite (MoS2, C7)	C7	hP6	(194, P6_ 3/mmc)	-	2	(MO)1(S)2

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
HEAZLEWOODITE_B1	Cu1.9S	-	cF12	(216, F-43m)	-	2	(CO, FE, NI, VA)2(S)1
HEAZLEWOODITE_B2	Unknown Structure	-	cP*	-	-	2	(FE, NI, VA)2(S)1
NI7S6	Unknown Structure	-	t**	-	-	2	(FE, NI)7(S)6
NI9S8	Ni9S8	-	oS68	(21, C222)	-	2	(FE, NI)9(S)8
THIOSPINEL	Spinel (Co3O4, D72)	D72	cF56	(227, Fd-3m)	-	3	(CO, CU, FE, MN, NI)1(CO, CR, NI)2(S)4
ALABANDITE	Rock Salt/Halite (NaCl, B1)	B1	cF8	(225, Fm-3m)	-	2	(CA, CO, CR, CU, FE, MG, MN, Y, ZR)1(S)1
PYRRHOTITE	Nickeline (NiAs, B81)	B81	hP4	(194, P6_3/mmc)	-	2	(AL, CO, CR, CU, FE, MG, MN, NB, NI, TI, V, ZR, VA)1(S)1
PYRITE	Pyrite (FeS2, C2)	C2	cP12	(205, Pa-3)	-	2	(CO, FE, MN, NI)1(S)2
CO9S8	Co9S8 (D89)	D89	cF68	(225, Fm-3m)	-	2	(CO, FE, NI)9(S)8
PENTLANDITE	Co9S8 (D89)	D89	cF68	(225, Fm-3m)	-	3	(FE, NI)8(FE, NI)1(S)8
DIGENITE	Cu2Se	-	cF44	(225, Fm-3m)	-	3	(CU, FE, MG, MN, VA)2(CU, VA)1(S)1
CHALCOPYRITE	Chalcopyrite (CuFeS2, E11)	E11	tI16	(122, I-42d)	-	3	(CU, FE, VA)1(CU, VA)1(S)1
FE2O12S3	Fe2[SO4]3	-	hR34	(148, R-3)	-	2	(AL+3, CR+3, FE+3)2(SO4-2)3
ZRO8S2	Zr[SO4]2	-	oP44	(62, Pnma)	-	2	(ZR+4)1(SO4-2)2
ANHYDRITE	Anhydrite (CaSO4, H01)	H01	oS24	(63, Cmcm)	-	2	(CA+2, CO+2, CU+2, FE+2, MN+2, NI+2)1(SO4-2)1
CASO4_HT	CePO4	-	hP18	(180, P6_222)	-	2	(CA+2, CO+2)1(SO4-2)1
CU2SO4	Thenardite [Na2SO4 (V), H17]	H17	oF56	(70, Fddd)	-	2	(CU+1)2(SO4-2)1
CU2SO5	Cu2[SO4]O	-	mS32	(12, C2/m)	-	1	(CU2O5S1)1

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
MN9SI3O14S1	Unknown Structure	-	-	-	-	4	(MN+2)9(SI+4)3(O-2)14(S-2)1
C1A1_AL2CAO4	Al2CaO4	-	mP84	(14, P2_1/c)	-	4	(CA+2)3(AL+3)5(AL+3, FE+3)1(O-2)12
C1A2	Al4CaO7	-	mS48	(15, C2/c)	-	4	(CA+2)1(AL+3)3(AL+3, FE+3)1(O-2)7
C1A6	Magnetoplumbite (PbFe12O19)	-	hP64	(194, P6_ 3/mmc)	-	3	(CA+2)1(AL+3, FE+3)12(O-2)19
C3A1	Ca3Al2O6	-	cP264	(205, Pa-3)	-	3	(CA+2)3(AL+3, FE+3)2(O-2)6
C12A7	Mayenite (12 CaO.7Al2O3, K74, C12A7)	K74	cI152	(220, I-43d)	-	4	(CA+2)6(AL+3)6(AL+3, FE+3)1(O-2)16.5
AF	FeGaO3	-	oP40	(33, Pna2_1)	-	2	(AL2O3)1(FE2O3)1
CACR2O4_A	SrCr2O4	-	oP28	(59, Pmmn)	-	3	(CA+2)1(AL+3, CR+3, FE+3)2(O-2)4
CF2	Ca3.5Fe14O24.5	-	mS172	(5, C2)	-	3	(CA+2)1(FE+3)4(O-2)7
C2F	Ca2Fe2O5	-	oP36	(62, Pnma)	-	3	(CA+2)2(AL+3, FE+3)2(O-2)5
CWF	CaFe3O5	-	oS36	(63, Cmcm)	-	4	(CA+2)1(FE+2)1(FE+3)2(O-2)5
CW3F	CaFe5O7	-	oS52	(63, Cmcm)	-	4	(CA+2)1(FE+2)3(FE+3)2(O-2)7
C4WF4	Ca4Fe9O17	-	mS60	(5, C2)	-	4	(CA+2)4(FE+2)1(FE+3)8(O-2)17
C4WF8	Sr2Fe2O5	-	oI44	(74, Imma)	-	4	(CA+2)4(FE+2)1(FE+3)16(O-2)29
CAV2O4	CaV2O4	-	oP28	(62, Pnma)	-	3	(CA+2)1(AL+3, CR+3, FE+3, Y+3)2(O-2)4
CAMN2O4	CaMn2O4	-	oP28	(57, Pbcm)	-	3	(CA+2)1(MN+3)2(O-2)4
CA3CO2O6	Ca3Co2O6	-	hR22	(167, R-3c)	-	3	(CA+2)3(CO+3, CU+2)2(O-2, VA)6
CA3CO4O9	Ca3Co4O9	-	mS30	(12, C2/m)	-	3	(CA+2)3(CO+3, CU+2)4(O-2, VA)9

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
CA4NB2O9_HT11	Ca4Nb2O9	-	mP20	(14, P2_1/c)	-	5	(CA+2)6(CA+2, NB+5)3(NB+5)3(O-2, VA)3(O-2)15
CA4NB2O9_LT21	Ca4Nb2O9-lt	-	mP60	(14, P2_1/c)	-	5	(CA+2)6(CA+2, NB+5)4(CA+2)2(O-2, VA)3(O-2)15
LAAP	PrNiO3	-	hR10	(167, R-3c)	This is Rhombohedral Perovskite: La(Al, Co)O3 with solubility of Ca, Cu, Ni, Y	3	(CA+2, Y+3)1(AL+3, CO+3, CU+2, FE+3, NI+2)1(O-2, VA)3
CAMO3	CaTiO3 Pnma Perovskite	-	oP20	(62, Pnma)	-	3	(CA+2, Y+3)1(MN+4, Y+3, ZR+4)1(O-2)3
CACU2O3	Shcherbinaite (V2O5) (Revised)	-	oP14	(59, Pmmn)	-	3	(CA+2)1(CU+2)2(O-2)3
CA2CUO3	Sr2CuO3	-	oI12	(71, Immm)	-	3	(CA+2)2(CU+2)1(O-2)3
CA15CU18O35	Ca4.8Cu6O11.6	-	mP92	(13, P2/c)	-	4	(CA+2)15(CU+2)14(CU+3)4(O-2)35
CASFEO	Unknown Structure	-	-	-	-	4	(CA+2)2(S-2)2(FE+2, FE+3)2(O-2, VA)3
CA3S3FE4OX	Unknown Structure	-	-	-	-	4	(CA+2)3(S-2)3(FE+2, FE+3)4(O-2, VA)6
CA2NB2O7	La2Ti2O7	-	mP44	(4, P2_1)	-	3	(CA+2)2(NB+5)2(O-2)7
CA3NB2O8	Unknown Structure	-	-	-	-	3	(CA+2)3(NB+5)2(O-2)8
CA2SIO4_ALPHA	Ca2SiO4	-	hP24	(194, P6_ 3/mmc)	-	3	(CA+2, MN+2, Y+3)3(CA+2, VA)1(SIO4-4)2
CA2SIO4_ALPH_PRM	K2CoCl4	-	oP84	(33, Pna2_1)	-	3	(CA+2, FE+2, MN+2, Y+3)3(CA+2, VA)1(SIO4-4)2
LARNITE	Parawollastonite (CaSiO3, S33(II))	S33(II)	mP60	(14, P2_1/c)	-	3	(CA+2)2(SI+4)1(O-2)4
RANKINITE	3CaO.2SiO2	-	mP48	(14, P2_1/c)	-	3	(CA+2)3(SI+4)2(O-2)7
CLINO_PYROXENE	Diopside [CaMg(SiO3)2,	S41	mS40	(15, C2/c)	-	4	(CA+2, FE+2, NI+2)1(CO+2, FE+2, NI+2)1(SI+4)2(O-2)6

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
	S41]						
ORTHO_PYROXENE	Enstatite (MgSiO3, S43)	S43	oP80	(61, Pbca)	-	4	(CA+2, FE+2)1(FE+2)1(SI+4)2(O-2)6
PROTO_PYROXENE	MgSiO3	-	oP40	(60, Pbcn)	-	3	(CA+2, CO+2, CR+2, FE+2, NI+2)1(SI+4)1(O-2)3
WOLLASTONITE	Wollastonite (CaSiO3)	-	aP30	(2, P-1)	-	3	(CA+2, FE+2, MN+2)1(SI+4)1(O-2)3
PSEUDO_ WOLLASTONITE	CaSiO3	-	mS120	(15, C2/c)	-	3	(CA+2)1(SI+4)1(O-2)3
HATRURITE	Ca3(SiO4)O-b	-	hR81	(160, R3m)	-	3	(CA+2, Y+3, VA)3(SIO4-4)1(O-2)1
CAZRO3_C	Cubic Perovskite (CaTiO3, E21)	E21	cP5	(221, Pm-3m)	-	3	(CA+2, Y+3)1(Y+3, ZR+4)1(O-2)3
CAZR4O9	CaZr4O9	-	mS224	(15, C2/c)	-	3	(CA+2)1(ZR+4)4(O-2)9
CA6ZR19O44	Ca6Hf19O44	-	hR138	(167, R-3c)	-	3	(CA+2)6(ZR+4)19(O-2)44
C13A6Z2	Ca7ZrAl6O18	-	oP104	(31, Pmn2_1)	-	4	(CA+2)13(AL+3)12(ZR+4)2(O-2)35
CAY4O7	(Ca0.25Gd0.75)4GdO7	-	mS48	(12, C2/m)	-	3	(CA+2)1(Y+3)4(O-2)7
CAYALO4	K2NiF4	-	tI14	(139, I4/mmm)	-	4	(CA+2)1(Y+3)1(AL+3)1(O-2)4
CAYAL3O7	Akermanite (Ca2MgSi2O7, S53)	S53	tP24	(113, P-42_ 1m)	-	4	(CA+2)1(Y+3)1(AL+3)3(O-2)7
CA3COAL4O10	Ca3ZnAl4O10	-	oP72	(29, Pca2_1)	-	4	(CA+2)3(CO+2)1(AL+3)4(O-2)10
CA2ALNBO6	Ca2AlNbO6	-	mP24	(14, P2_1/c)	-	4	(CA+2)2(AL+3)1(NB+5)1(O-2)6
ANORTHITE	Ca(Al0.5Si0.5)4O8	-	aP104	(2, P-1)	-	4	(CA+2)1(AL+3)2(SI+4)2(O-2)8
CACRSI4O10	gillespite (BaFeSi4O10)	-	tP64	(130, P4/ncc)	-	4	(CA+2)1(CR+2)1(SI+4)4(O-2)10

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
CA2ZRSI4O12	cyclosilicate (Ca2ZrSi4O12)	-	mP38	(11, P2_1/m)	-	1	(CA2ZRSI4O12)1
CA3ZRSI2O9	Ca3Hf(Si2O7)O2	-	mP60	(14, P2_1/c)	-	1	(CA3ZRSI2O9)1
GARNET	Orthorhombic Garnet	-	oF320	(70, Fddd)	-	4	(CA+2, MN+2)3(AL+3, CR+3)2(SI+4)3(O-2)12
MELILITE	Akermanite (Ca2MgSi2O7, S53)	S53	tP24	(113, P-42_ 1m)	-	5	(CA+2)2(AL+3, CO+2, FE+2, FE+3)1(AL+3, SI+4)1(SI+4)1(O-2)7
APATITE	Fluorapatite [Ca5F(PO4)3, H57]	H57	hP42	(176, P6_3/m)	-	4	(CA+2, Y+3, ZR+4, VA)4(Y+3)6(SIO4-4)6(O-2, VA)2
CA3Y2SI6O18	Ca0.6Y0.4Si6O18	-	mS116	(15, C2/c)	-	4	(CA+2)3(Y+3)2(SI+4)6(O-2)18
CA3Y2SI3O12	Ca3Y2Si3O12	-	oP100	(62, Pnma)	-	4	(CA+2)3(Y+3)2(SI+4)3(O-2)12
C1A1F2	Unknown Structure	-	-	-	-	5	(CA+2)1(AL+3)1(FE+3)2(AL+3, FE+3)3(O-2)10
CA2NI7	Co7Gd2	-	hR18	(166, R-3m)	-	2	(CA)2(NI)7
CANI2	Cu2Mg Cubic Laves (C15)	C15	cF24	(227, Fd-3m)	-	2	(NI)2(CA)1
CANI3	Ni3Pu	-	hR12	(166, R-3m)	-	2	(CA)0.25(NI)0.75
CANI5	CaCu5 (D2d)	D2d	hP6	(191, P6/mmm)	-	2	(CA)1(NI)5
CA2SI_C37	Co2Si (C37)	C37	oP12	(62, Pnma)	-	2	(CA)2(SI)1
CASI_B33	CrB (B33)	B33	oS8	(63, Cmcm)	-	2	(CA)1(SI)1
CASI2_C12	CaSi2 (C12)	C12	hR6	(166, R-3m)	-	2	(CA)1(SI)2
CUMG2	Mg2Cu (Cb)	Cb	oF48	(70, Fddd)	-	2	(CU, NI)1(MG)2
MG3N2_D53	Bixbyite (Mn2O3, D53)	D53	cI80	(206, Ia-3)	-	2	(MG)3(N)2

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
MG2NI	Mg2Ni (Ca)	Ca	hP18	(180, P6_222)	-	2	(MG)2(CU, NI)1
MG24Y5_A12	alpha-Mn (A12)	A12	cI58	(217, I-43m)	-	3	(MG)24(MG, Y)4(Y)1
MNPT7	Ca7Ge	-	cF32	(225, Fm-3m)	-	3	(PT)6(PT)1(MN)1
PD4S	Pd4Se	-	tP10	(114, P-42_1c)	-	2	(PD)0.8(S)0.2
PD3S1	Pd3S	-	oS16	(40, Ama2)	-	2	(PD)0.75(S)0.25
PD16S7	Pd16S7	-	cI46	(217, I-43m)	-	2	(PD)0.696(S)0.304
PDS	Vysotskite (PdS, B34)	B34	tP16	(84, P4_2/m)	-	2	(PD)0.5(S)0.5
PTS_B17	Cooperite (PtS, B17)	B17	tP4	(131, P4_2/mmc)	-	2	(PT)1(S)1
PTS2	CdI2	-	hP3	(164, P-3m1)	-	2	(PT)1(S)2
RE1S2	ReS2	-	aP12	(2, P-1)	-	2	(RE)1(S)2
RE1S3	Unknown Structure	-	-	-	-	2	(RE)1(S)3
RE2S7	Re2O7	-	oP72	(19, P2_12_12_1)	-	2	(RE)2(S)7
RU1S2	Pyrite (FeS2, C2)	C2	cP12	(205, Pa-3)	-	2	(RU)1(S)2
W1S2	Molybdenite (MoS2, C7)	C7	hP6	(194, P6_3/mmc)	also HT variant of SG R3m	2	(W)1(S)2
MG3MNNI2	Unknown Structure	-	-	-	-	3	(MG)3(MN)1(NI)2
NIOCALITE_C10NS6	Niocalite	-	oS114	(21, C222)	-	4	(CA+2)10(NB+5)2(SI+4)6(O-2)27
AL4CA_D13	D13 (BaAl4)	D13	tI10	(139, I4/mmm)	-	2	(AL)4(CA)1

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
AL2CA_C15	Cu2Mg Cubic Laves (C15)	C15	cF24	(227, Fd-3m)	-	2	(AL)2(CA)1
ALMG_BETA	Al45Mg28	-	cF1832	(227, Fd-3m)	-	2	(AL)140(MG)89
ALMG_EPSILON	Al30Mg23	-	hR53	(148, R-3)	-	2	(AL)30(MG)23
AL12MG17_A12	alpha-Mn (A12)	A12	cI58	(217, I-43m)	-	3	(MG)10(AL, MG)24(AL, MG)24
CAB6	CaB6 (D21)	D21	cP7	(221, Pm-3m)	-	2	(CA)1(B)6
MGB4	MgB4	-	oP20	(62, Pnma)	-	2	(MG)1(B)4
MGB7	MgB7	-	oI64	(74, Imma)	-	2	(MG)1(B)7
C2CA1_C11A	CaC2-I (C11a)	C11a	tI6	(139, I4/mmm)	-	1	(C2CA1)1
C2CA1_S2	CaC2	-	cF36	(225, Fm-3m)	-	1	(C2CA1)1
MGC2	MgC2	-	tP6	(136, P4_ 2/mnm)	-	2	(MG)1(C)2
MG2C3	Mg2C3	-	oP10	(58, Pnnm)	-	2	(MG)2(C)3
CA2CU1	Ca2Cu	-	oP12	(62, Pnma)	-	2	(CA)2(CU)1
CA1CU1	alpha-CaCu	-	mP20	(11, P2_1/m)	-	2	(CA)1(CU)1
CACU5_D2D	CaCu5 (D2d)	D2d	hP6	(191, P6/mmm)	-	2	(CA)1(CU)5
MG2SI	Fluorite (CaF2, C1)	C1	cF12	(225, Fm-3m)	-	2	(MG)2(SI)1
ALH3	AlH3	-	oP24	(58, Pnnm)	-	2	(AL)1(H)3
AL2MGH8	CdI2 (Polytype 6H1)	-	hP9	(156, P3m1)	-	3	(AL)2(MG)1(H)8
DIS_BETA	V2H1.1	-	tI56	(141, I4_	-	2	(H, VA)0.5(V)0.5

Phase Name	Prototype	Strukturbericht	Pearson Symbol	Space Group	Info	Sublattices	Formula Unit
				1/amd)			
BETA_PHASE	V2H	-	mS6	(12, C2/m)	-	3	(H, VA)0.25(H, VA)0.25(V)0.5
CAH2_C37	Co2Si (C37)	C37	oP12	(62, Pnma)	-	2	(CA)1(H)2
CAH2_BETA	Unknown Structure	-	-	-	-	2	(CA)1(H)2
DELTA_TIH2	Fluorite (CaF2, C1)	C1	cF12	(225, Fm-3m)	-	2	(HF, NB, TI, V, ZR, Y)1(H, VA)2
HFNIH3	ZrNiH3	-	oS20	(63, Cmcm)	-	3	(HF, ZR)1(NI)1(H)3
MGH2_C4	Rutile (TiO2, C4)	C4	tP6	(136, P4_ 2/mnm)	-	2	(MG)1(H)2
NIMG2H4	K2PtCl6 (J11)	J11	cF36	(225, Fm-3m)	-	3	(NI)1(MG)2(H)4
NBH_BETA	Ta2H	-	oS8	(21, C222)	-	2	(NB)1(H, VA)1.1
TA2H_EPSLON	Unknown Structure	-	-	-	-	2	(TA)2(H, VA)1
TI2NIH	Ti2NiH	-	cF128	(227, Fd-3m)	-	3	(TI)2(NI)1(H)1
V3H2	Unknown Structure	-	-	-	-	2	(V)0.6(H)0.4
YH3_EPSLON	H3Ho	-	hP24	(165, P-3c1)	-	2	(Y)1(H, VA)3
ZRNIH	Unknown Structure	-	-	-	-	3	(ZR)1(NI)1(H)1

Gas and Liquid Phases

Name	*Prototype*	*Info*	*Sublattices*	*Formula Unit*
GAS	Gas	Gas mixture	1	(AL, AL1B1O2, AL1B3H12, AL1C1, AL1C2, AL1CU1, AL1CU1S1, AL1CU1S2, AL1H1, AL1H1O1_ALOH, AL1H1O1_HALO, AL1H1O2, AL1H2, AL1H2O2, AL1H3, AL1H3O3, AL1N1, AL1O1, AL1O2, AL1P1, AL1P2, AL1S1, AL1S2, AL2, AL2C2, AL2C6H18, AL2O1, AL2O2, AL2O3, AL2S1, AL2S2, AR, B, B10H14, B1C1, B1C1H3O1, B1C2, B1C2H7O2, B1C3H9, B1C3H9O3, B1C6H15, B1H1, B1H1O1_BOH, B1H1O1_HBO, B1H1O2, B1H1S1, B1H2, B1H2O1, B1H2O2, B1H3, B1H3O1, B1H3O2, B1H3O3, B1H6N1, B1N1, B1O1, B1O2, B1S1, B1S2, B2, B2C1, B2H4O4, B2H6, B2O1, B2O2, B2O3, B2S1, B2S2, B2S3, B3H3O3, B3H3O6, B3H6N3, B4S6, B5H9, C, C1H1, C1H1N1O1, C1H1N1S1, C1H1N1_HCN, C1H1N1_HNC, C1H1O1, C1H1O2, C1H1P1, C1H2, C1H2N4, C1H2O1, C1H2O2_CIS, C1H2O2_DIOXIRANE, C1H2O2_TRANS, C1H3, C1H3O1_CH2OH, C1H3O1_CH3O, C1H3P1, C1H4, C1H4N2O1, C1H4O1, C1H4S1, C1H5N1, C1H5O1P1, C1H5O3P1, C1H5P1, C1H5P1S1, C1H6N1P1_N, C1H6N1P1_P, C1H6P2, C1N1, C1N1O1, C1N1O1_NCO, C1N2_CNN, C1N2_NCN, C1O1, C1O1S1, C1O2, C1P1, C1P1SI1, C1P1SI2, C1P2, C1PT1, C1S1, C1S2, C1SI1, C1SI2, C1SI3, C1SI4, C2, C2H1, C2H1N1, C2H2, C2H2O1, C2H3, C2H4, C2H4O1_ACETALDEHYDE, C2H4O1_OXIRANE, C2H4O2_ACETICACID, C2H4O2_DIOXETANE, C2H4O3_123TRIOXOLANE, C2H4O3_124TRIOXOLANE, C2H5, C2H6, C2H6O1SI1, C2H6O1_1, C2H6O1_2, C2H6O2, C2H7O1P1, C2H7O3P1, C2H7P1S1, C2H7P1_1, C2H7P1_2, C2H8N1P1_N, C2H8N1P1_P, C2H8SI1, C2N1_CCN, C2N1_CNC, C2N2, C2O1, C2P1, C2P2, C2SI1, C2SI2, C2SI3, C3, C3H1, C3H1N1, C3H4_1, C3H4_2, C3H6O1_1, C3H6O1_2, C3H6_1, C3H6_2, C3H8, C3N1, C3O2, C4, C4H1, C4H10_1, C4H10_2, C4H12SI1, C4H2_1, C4H2_2, C4H4_1, C4H4_2, C4H6_1, C4H6_2, C4H6_3, C4H6_4, C4H6_5, C4H8_1, C4H8_2, C4H8_3, C4H8_4, C4H8_5, C4H8_6, C4N1, C4N2, C4NI1O4, C5, C5FE1O5, C5H1N1, C5N1, C60, C6H6, C6H6O1, C6MO1O6, C6N1, C6N2, C9N1, CA, CA1H1, CA1H1O1, CA1H2O2, CA1O1, CA1S1, CA2, CO, CO1H1, CO1H1O1, CO1H2O2, CO1O1, CO1S1, CO2, CR, CR1H1, CR1H1O1, CR1H1O2, CR1H1O3, CR1H2O2, CR1H2O3, CR1H2O4, CR1H3O3, CR1H3O4, CR1H4O4, CR1H4O5, CR1N1, CR1O1, CR1O2, CR1O3, CR1S1, CR1S2, CR2, CR2O1, CR2O2, CR2O3, CU, CU1H1, CU1H1O1, CU1O1, CU1S1, CU2, CU2S1, FE, FE1H1, FE1H1O1, FE1H1O2, FE1H2O2, FE1O1, FE1O2, FE1S1, FE2, H, H1MG1, H1MG1O1, H1MN1, H1MN1O1, H1MO1O1, H1MO1O2, H1MO3, H1N1, H1N1O1, H1N1O2_CIS, H1N1O2_TRANS, H1N1O3, H1N3, H1NI1, H1NI1O1, H1O1, H1O1P1, H1O1S1_HSO, H1O1S1_SOH, H1O1W1, H1O2, H1O2W1, H1P1, H1PT1, H1S1, H1SI1, H1ZR1, H2, H2MG1O2, H2MO1O2, H2MO1O3, H2MO1O4, H2N1, H2N2O2, H2N2_1_1N2H2, H2N2_CIS, H2N2_TRANS, H2NI1O2, H2O1, H2O1S1_H2SO, H2O1S1_HSOH, H2O2, H2O2W1, H2O3SI1, H2O3W1, H2O4S1, H2O4W1, H2P1, H2S1, H2S2, H2SI1, H3N1, H3N1O1, H3P1, H3SI1, H4N2, H4O4SI1, H4SI1, H6SI2, HF, HF1O1, HF1O2, MG, MG1N1, MG1O1, MG1S1, MG2, MN, MN1O1, MN1O2, MN1S1, MO, MO1N1, MO1O1, MO1O2, MO1O3, MO1S1, MO1S2, MO2, MO2O6, MO3O9, MO4O12, MO5O15, N, N1NB1, N1O1, N1O2, N1O3, N1P1, N1S1, N1SI1, N1SI2, N1TI1, N1V1, N1ZR1, N2, N2O1, N2O2, N2O3, N2O4, N2O5, N3, NB, NB1O1, NB1O2, NB1S1, NI, NI1O1, NI1S1, NI2, O, O10P4, O10V4, O12W4, O15W5, O1P1, O1PD1, O1PT1, O1RE1, O1RU1, O1S1, O1S2, O1SI1, O1TA1, O1TI1, O1V1, O1W1, O1Y1, O1Y2, O1ZR1, O2, O2P1, O2PT1, O2RE1, O2RU1, O2S1, O2SI1,

Name	*Prototype*	*Info*	*Sublattices*	*Formula Unit*
				O2SI2, O2TA1, O2TI1, O2V1, O2W1, O2Y1, O2Y2, O2ZR1, O3, O3P2, O3RE1, O3RU1, O3S1, O3W1, O4P2, O4RU1, O5P2, O6P3, O6P4, O6RE2, O6W2, O7P4, O7RE2, O8P4, O8W3, O9P4, O9W3, P, P1S1, P1SI1, P1SI2, P2, P2SI2, P3, P4, P4S3, PD, PT, RE, RU, S, S1SI1, S1TA1, S1TI1, S1V1, S1W1, S1Y1, S1ZR1, S2, S2SI1, S2TI1, S2W1, S2ZR1, S3, S4, S5, S6, S7, S8, SI, SI2, SI3, TA, TI, TI2, V, W, Y, ZR, ZR2)1
LIQUID	Liquid	LIQUID mixture	1	(AL, AL1N1, AL2/3O1, AL2/3S, AL4/3O2, B, BO3/2, C, CA, CAO, CAS, CO, COO, COO3/2, COS, CR, CRO, CRO3/2, CRS, CU, CU2O, CU2S1, CUO, FE, FEO, FEO3/2, FES, H, HF, HF1/2O1, MG, MGO, MGS, MN, MNO, MNO3/2, MNS, MO, MO1/2O1, MO1/2S, MOO3, N, NB, NB1O1, NBO2, NBO5/2, NBS, NI, NIO, NIS, P, P2/5S1, PD, PDO, PT, PTO, RE, RE1/2O1, REO7/2, RU, RU1/2O1, RU1/2S1, S, SI, SI1/2O1, SI1/2S, SIO2, SI2O4, TA, TA2/5O1, TI, TIO, TIO2, TIS, V, VO, VO2, VO5/2, VS, W, W1/3O1, W1/3S1, Y, Y2/3O1, ZR, ZR1/2O1, ZR1/2S1)1

TCNI14: Current Version Changes

Current Database Version	
Database name (acronym):	TCS Ni-based Superalloys Database (TCNI)
Database owner:	Thermo-Calc Software AB
Database version:	14.0
First release:	TCNI1 was released in 2000

For earlier changes, see TCNI: Revision History.

TCNI13 to TCNI14

Software release version: 2026b (June 2026)

Improved Description of Co-based Superalloys

- TCNI14 significantly expands the scope of the database by extending its applicability beyond Ni-based superalloys to also include Co-based superalloys.
- The database is designed to describe Co–Al–W-based superalloys as well as W-free Co-based alloys, enabling predictions of key characteristics such as phase-transformation temperatures, γ’ and secondary-phase volume fractions, partition coefficients, and all previously available physical properties.

Hydrogen Fully Available

- Hydrogen (H) is now fully available. Previously it was only available in the GAS phase. There is a total of 31 elements available (where Ar is still only available in the GAS phase).

New Binary and Ternary Systems Including Hydrogen

- 21 new H-related binaries, H-X with X = Al, Ca, Co, Cr, Cu, Fe, Hf, Mg, Mn, Mo, Nb, Ni, Pd, Ru, Si, Ta, Ti, V, W, Y, Zr (total: 392)
- 9 new H-related ternaries, H–Ni–Ti, H–Hf–Ni, H–Ni–Zr, H–Mg–Ni, Al–H–Mg, Cu–H–Pd, H–Ti–Zr, Fe–H–Si, and Cu–H–Ti (total: 444)
- 16 new hydride phases (total: 752)

Thermophysical Properties

- Updated thermal conductivity and electrical resistivity of B

TCNI: Revision History

For the most recent changes, see TCNI14: Current Version Changes.

TCNI12.1 to TCNI13.0

Software release version: 2025b (June 2025).

New Thermodynamic Models

- The Effective Bond Energy Formalism (EBEF) is implemented to describe the complex and important topologically close-packed (TCP) sigma (σ) and mu (μ) phases.
  - New Density Functional Theory (DFT) data is used to support the implementation of the EBEF.
  - The five-sublattice (5-SL) model is used to describe both phases, which better reflects their real crystallographic structures.
- Oxygen (O) and sulfur (S) are added in the LIQUID phase (previously only available in the IONIC_LIQ phase) and the IONIC_LIQ is removed from the database.

Binary Systems

- The Hf-Pt system is added. Previously the system was incorrectly listed as assessed in the last version of the database, TCNI12.
- The description of phase equilibria involving σ and/or μ phases is improved in several systems.
  - Co-Nb, Co-Ta, Fe-Ta, Nb-Ni, Ni-Ta, Ni-V, Pd-Ta, Pt-Ta, and Re-Ta.

Ternary Systems

- 2 new ternary systems are assessed: Cr-Ni-Pt and Hf-Ni-Ti.
- The liquidus projection of the Mg–Mn–Ni system is corrected.
- Several improvements are obtained in the description of the σ and μ phases as a result of the implementation of the EBEF. Some examples:
  - σ description in the Cr-Ni-Re, Cr-Fe-Mn, and Mo-Ni-Re.
  - μ description in the Co-Cr-W, Cr-Fe-Nb, and Fe-Mo-Nb.

Thermophysical Properties

- Added viscosity, surface tension, and THCD/ELRS descriptions for the above newly added systems.

Elastic Properties

- Added elastic properties for BCC (A2 & B2), FCC (A1 & L12), and HCP (A3) phases.

TCNI12.0 to TCNI12.1

Software release version: 2023b (June 2023).

- Mismatches between the two liquid descriptions (IONIC_LIQ and LIQUID) were found and fixed for:
  - Gibbs energy parameters in Al-N, Mg-Ni, Co-Ni-V, Mn-Ni-P, Mn-Ni-Si, Mo-Ni-P
  - Volume parameters in Ni-Re, Cr-Fe-Ni
- Fixed the magnetic model applied to the M2B_TETR phase
- Updated the Diamond molar volume
- The surface tension was re-assessed based on the Redlich-Kister-Muggianu (R-K-M) sub-regular solution model.
- The surface tension was added for the IONIC_LIQ.

TCNI11.0.1 to TCNI12

Software release version: 2022b (June 2022).

New Element

- Phosphorus (P) is added to make it a 31 element framework.

20 New Binary Systems

The following systems are at least partially assessed.

- Al-P, B-P, C-P, Ca-P, Co-P, Cu-P, Cr-P, Fe-P, Mn-P, Mo-P, Nb-P, Ni-P, P-Pd, Pt-P, Ru-P, S-P, Si-P, Ti-P, V-P, and W-P

30 New Ternary Systems

Al-Fe-P	B-Ni-P	B-Ni-P	C-Fe-P	Co-Fe-P	Co-Ni-P
Co-P-V	Co-P-W	Cr-Fe-P	Cr-Nb-P	Cr-Ni-P	Cr-P-Ti
Cu-Fe-P	Cu-Ni-P	Fe-Mn-P	Fe-Mo-P	Fe-Nb-P	Fe-Nb-Si
Fe-Ni-P	Fe-P-Si	Fe-P-Ti	Fe-P-V	Fe-P-W	Nb-Ni-P
Nb-P-Ti	Ni-P-Ti	Ni-P-V	Ni-P-W	Ni-SI-P	P-V-W

Binary and Ternary Updates

- Fe-Nb updated, improved MU and C14_LAVES boundaries.
- Nb-Ni, Fe-Si, Nb-Si updated metastable C14_LAVES description.
- Co-W updated so that Co3W D019 is stable to low temperature.
- Fe-Nb-Si added.
- Fe-Nb-Ni updated, improved Laves boundaries.
- Co-Ni-Ti updated to correspond better with available phase diagram data.
- Al-Co-Ni updated to better fit thermodynamic and phase diagram data.
- Al-Co-W updated to destabilize FCC_L12#2 (gamma-prime)
- Co-Ni-W updated metastable FCC_L12 towards an improved description of Al-Co-Ni-W
- Nb-Ni-Ti fixed a bug relating to a slightly destabilized ternary phase.

Thermophysical Properties

- Viscosity and Surface tension updated:
  - Viscosity is now described for the ionic liquid phase (IONIC_LIQ)
- Electrical and thermal properties improved:
  - High-temperature trends of THCD are now better for commercial alloys
  - ELRS of Cr-Fe rich Ni-base alloys were before quite over-estimated, now improved.

Phase Names/Phase Information

- AL-FE-SI ternary phases renamed to use their modern Greek letters. ALFESI_ALPHA > ALFESI_ALPHA_TAU5
- D0I_MO2B5 renamed to MO2B5_D8I, correct strukturbericht.
- All phase description updated to our new standardized crystallographic information format.

Minor Bug Fix

- Corrected minor typo in the Gibbs energy of the MUFEMO function, used in the MU_PHASE

TCNI11 to TCNI11.0.1

Software release version: 2022a (December 2021/January 2022).

- A typographical correction was made to the molar volume of the M6C phase
- Functions corrected for consistency: F1756T, F2048T, GFECEM, THCDLQCU

TCNI10 to TCNI11

Software release version: 2021b (June 2021).

Addition of the thermophysical properties Electrical Resistivity (ELRS) and Thermal Conductivity (THCD), which can also be expressed through the derived properties Electrical Conductivity (ELCD), Thermal Resistivity (THRS) and Thermal Diffusivity (THDF). It is recommended to use the Property Model "Equilibrium with Freeze-in Temperature" to correctly predict these properties for an alloy.

TCNI9.1 to TCNI10.0

Software release version: 2020b (June 2020).

Binary and Unary System Updates

- Surface tension for the liquid phase is assessed in all unary and binary systems.
- Viscosity for the liquid phase is assessed in all unary and 142 binary systems.
- Nb-Ni metastable BCT_D022 updated to fit data on γ'' solvus temperature in commercial superalloys.
- The solubility of S in γ-Ni has been assessed.
- Bug fixed for metastable BCT_D022 destabilized in Cr-Nb and pure Cr to avoid low-temperature metastable miscibility gaps.

Ternary System Updates

- Al-Co-W system updated to fit better experimental data and no longer have stable L12 at 900 C
- Al-Hf-Ni system revised to better describe liquidus, solidus, and liquid activity as well as γ' boundaries and activity (see references 1-4 at the end of this section).
- Al-Ni-Pt system updated to better describe liquid activity and melting interval data by Copland (2007) (see reference 5 at the end of this section).
- Al-Ni-W system revised to better fit known melting interval and improve liquid/γ partitioning in higher-order alloys
- Co-Hf-Ni liquid and γ phases updated to better describe the melting intervals of high-Co Ni-base alloys. (see reference 6 at the end of this section)
- Co-Ni-W system updated to fit more recent data on the varying ternary solubility of the ALTI3_D019 phase
- Co-Ni-V has been partially assessed by adding Co to BCT-D022, and FCC and liquid have been adjusted to give approximate isothermal and isoplethal sections.
- Nb-Ni-Ti system modified to be closer to the known phase diagram (see reference 7 at the end of this section)

Ternary System Bug Fixes

- L12 destabilized in Cr-Ni-W and Cr-Ni-Si
- ALTI3_D019 destabilized in Cr-Ni-W
- Corrected M4SI3 in Cr-Ni-Si, now metastable in Cr-Si and Ni-Si
- Corrected M5Si3_D88 in C-Cr-si
- Al-Cr-Pt extrapolation corrected

Quality Improvement

- The DATABASE_INFORMATION command accessed via the DATABASE module in Console Mode now includes an exact revision number to make it easier to communicate support questions.
- The additional phase information now contains crystallographic information (if known) for all phases. The command is invoked in the DATABASE module via LIST_SYSTEM and CONSTITUENTS
- The database is automatically validated against a large range of commercial and model alloys to verify that every revision improves solidus, liquidus, γ' solvus and liquid/solid partitioning data. This ensures that no alloy should fall through the cracks.

Phase Renaming

- ALTI3_DO19 (where O is a letter) has been changed to be named ALTI3_D019 (where 0 is zero), which is consistent with the Strukturbericht designation. Users are advised to update their macros involving this phase.

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7. K. P. Gupta, The Nb-Ni-Ti (Niobium-Nickel-Titanium) System—Update. J. Phase Equilibria Diffus. 29, 194–197 (2008).

TCNI9.0 to TCNI9.1

Software release version: 2020a (January 2020).

- A new description of Al-Ni-Pt system.
- Merged all L10 phases into FCC_L10 phase.
- Revised Mn-Pt description.
- Revised default composition sets (type_defs).
- Updated the reference states of elements according to PURE5.

TCNI8.1 to TCNI9.0

Software release 2019a (December 2018).

The major updates in TCNI9 is addition of Ca, Mg and S elements. In total 58 binary and many ternary systems are added to the database. More than 150 new phases are added for a total of 680 phases.

The calculation of W-partitioning between the liquid and solid phase during the solidification of nickel alloys was improved with the help new experimental data.

The stability and composition profile of B2 phase in Ni-Al-Co-Cr alloys was improved.

The thermodynamic description of several ternary systems were revised including B-Ni-Si, Cr-Mo-Nb, Cr-Nb-V, Al-Ni-V, and Mo-Ni-Si.

The Laves phase description was modified in several system to improve the predictions of stability and composition profile of this phase.

In addition several bugs from the previous versions were fixed such as one that erroneously causes ordering in copper containing FCC_A1 phase.

TCNI8.0 to TCNI8.1

Software release version: 2017a (March 2017)

The major change in 8.1 is an update of several Y-systems. The solubility of Y in gamma phase has been increased by changing Al-Y, Co-Y, Cr-Y, Cu-Y, Fe-Y, Nb-Y, Ni-Y, Pt-Y, Re-Y and Ru-Y systems.

Al-Ni-Y and Nb-Ni-Y have also been added to the database. In Al-Ni-Y the solubility of Al in Ni5Y (called NI5ZR in TCNI8) and the addition of several ternary phases are the most significant improvements. For Nb-Ni-Y the liquid description is also greatly improved and TCNI8 now correctly predicts the liquid miscibility that occurs in this system.

TCNI7.1 to TCNI8.0

Software release version: 2015a (June 2015). Also an update released with the 2015b update in March 2016.

The major update to TCNI8.0 is the addition of Copper, Cu. In total 24 binary systems and 29 ternary systems have been added to the database and can easily be calculated using the BINARY/TERNARY module in CLASSICAL MODE or by using the BINARY/TERNARY CALCULATION template in GRAPHICAL MODE using Thermo-Calc.

The following binary systems have been added to TCNI8: Al-Cu, B-Cu, C-Cu, Co-Cu, Cr-Cu, Cu-Fe, Cu-Hf, Cu-Mn, Cu-Mo, Cu-N, Cu-Nb, Cu-Ni, Cu-O, Cu-Pd, Cu-Pt, Cu-Re, Cu-Ru, Cu-Si, Cu-Ta, Cu-Ti, Cu-V, Cu-W, Cu-Y, Cu-Zr.

The following ternary systems have been added to TCNI8: Al-Cu-Fe, Al-Cu-Mn, Al-Cu-Ni, Al-Cu-Si, C-Cu-Fe, Co-Cr-Cu, Co-Cu-Fe, Co-Cu-Mn, Co-Cu-Nb, Co-Cu-Ni, Co-Cu-Ti, Cr-Cu-Fe, Cr-Cu-Nb, Cr-Cu-Ni, Cr-Cu-Si, Cu-Fe-Mn, Cu-Fe-Mo, Cu-Fe-N, Cu-Fe-Nb, Cu-Fe-Ni, Cu-Fe-Si, Cu-Fe-Ti, Cu-Fe-V, Cu-Mn-Ni, Cu-Mn-Si, Cu-Mo-Ni, Cu-Ni-Si, Cu-Ni-Ti and Cu-Ti-Zr.

TCNI8 patch: 2015-08-27 - update to 2015a

Bug fix to TCNI8: The phase ALTI3_DO19 has been fixed in the Ni-Ti phase diagram when using the BIN module/Binary calculation in Thermo-Calc. It had been appearing incorrectly in TCNI6, TCNI7 and TCNI8.

Software release version: 2016b (November 2016)

Bug fix: Fixed a bug in TCNI8 that caused the GUI to crash on rare occasions. It was related to carbon in combination with non-Ni/Co superalloy composition.

TCNI7.0 to TCNI7.1

Software release version: 4.1 (November 2014)

By default, liquid containing no oxygen is now modeled with ordinary substitutional solution model. When oxygen is included the Ionic Liquid model will be used for the liquid phase. This change gives better performance for alloys where oxygen needs not to be considered.

The description for the M6C carbide in the C-Cr-Ni-Mo and C-Cr-Ni-W systems has been improved. The stability of M6C was underestimated, resulting in that M23C6 was predicted as primary carbide instead of M6C for some commercial alloys. This has now been fixed.

The description of the Cr-Ni-B system has been improved. The NI3B_D011 phase was too stable and resulted in wrong equilibrium with liquid. This has now fixed.

Constraint relations for parameters describing FCC_L12 phase have been added for ternary and quaternary systems containing newly introduced elements Y or/and Mn. This increases the stability of calculations.

An error concerning volume data for systems containing Fe has been fixed.

TCNI6.0 to TCNI7.0

Software release version: 4.0 (June 2014)

The major update to TCNI7.0 is the addition of Manganese, Mn. In total 23 binary systems and 19 ternary systems have been added to the database and can easily be calculated using the BINARY/TERNARY module in CLASSICAL MODE or by using the BINARY/TERNARY CALCULATION template in GRAPHICAL MODE using Thermo-Calc.

The following binary systems have been added to TCNI7: Al-Mn, B-Mn, C-Mn, Co-Mn, Cr-Mn, Fe-Mn, Hf-Mn, Mn-Mo, Mn-N, Mn-Nb, Mn-Ni, Mn-O, Mn-Pd, Mn-Pt, Mn-Re, Mn-Ru, Mn-Si, Mn-Ta, Mn-Ti, Mn-V, Mn-W, Mn-Y, Mn-Zr.

The following ternary systems have been added: Al-Fe-Mn, Al-Mn-Ni, Al-Mn-O, Al-Mn-Si, Al-Mn-Ti, C-Fe-Mn, C-Mn-V, Co-Mn-O, Cr-Mn-N, Cr-Mn-O, Fe-Mn-N, Fe-Mn-Ni, Fe-Mn-O, Fe-Mn-Si, Mn-Ni-O, Mn-Ni-Si, Mn-O-Si, Mn-O-Y, Mn-O-Zr.

Minor corrections e.g. the reappearence of phases above liquidus has been fixed for systems C-Fe, C-Mn, C-Mo, C-Ni, and Mo-Ni.