

Database name: TCS Cemented Carbide Database
Database acronym: TCCC
Database version: 1.0
Database owner: Thermo-Calc Software AB
Database segment: Cemented carbide alloys

Brief Description

TCCC1: Cemented carbide -alloys database for Thermo-Calc. TCCC can also be used with other software from Thermo-Calc Software such as the Software Development Kits (SDKs), DICTRA and TC-PRISMA.

Applications

Cemented carbide-alloy design and processing, including heat treatment. TCCC1 includes data for molar volumes enabling the calculation of density and lattice parameters (for cubic structures), coefficients of thermal expansion and/or relative length change. However, the molar volume data incorporated has no pressure dependence. It can be used with satisfactory results for cemented carbides with Cobalt, Iron and/or Nickel binder.

Included Elements (13)

C Co Cr Fe Mo N Nb Ni Ta Ti V W Zr

Included Phases

GAS	LIQUID	BCC_A2	CEMENTITE	CHI_A12	CO3VV
D019_CO3MO	DIAMOND_FCC_A4	FCC_A1	FE4N_LP1	FECN_CHI	GRAPHITE
G_PHASE	HCP_A3	KSI_CARBIDE	LAVES_PHASE_C14	M12C	M23C6
M3C2	M5C2	M6C	M7C3	MC_ETA	MC_SHP
MU_PHASE	NBNI3	NI3TI	NIT12	PI	P_PHASE
R_PHASE	SIGMA	TAN_EPS	TI2N	Z_PHASE	

Assessed Systems

TCCC1: Cemented carbide alloys database from Thermo-Calc Software covers the complete and critical assessments of many important binary and ternary systems, as well as some critical higher order systems, within the 13-element framework.

Scientific Models & References

See the Thermo-Calc Software reference list available at: <http://www.thermocalc.com/resources/>

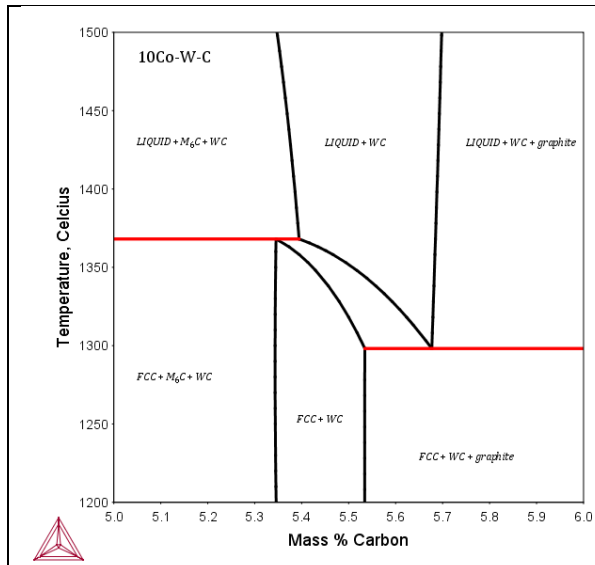


Figure 1. Phase diagram for 10w%Co-W-C.

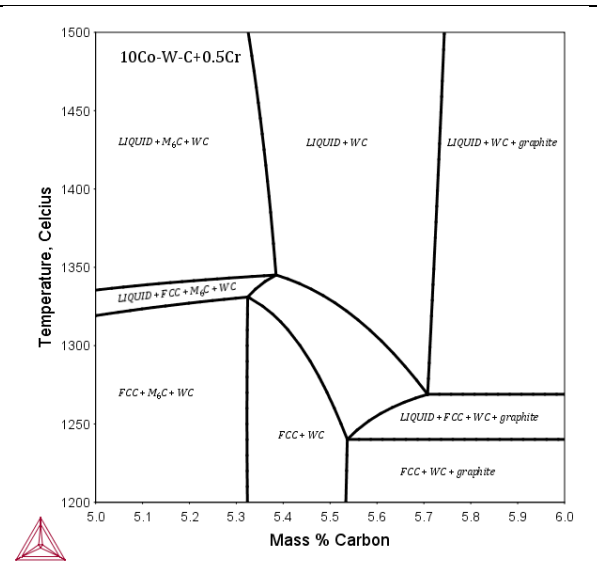


Figure 2. Phase diagram for 10w%Co-W-C with the addition of 0.5w%Cr

Table 1. Predicted invariant temperatures of solid/liquid equilibria including WC, (cubic carbide), and graphite or M6C compared with experimental data [31 and 32].

System	Invariant temperature graphite, °C		Invariant temperature M ₆ C, °C	
	Experimental	Calculated	Experimental	Calculated
Co-W-C	1298	1298	1368	1368
+Nb	1282	1287	1345	1349
+Ta	1289	1288	1352	1348
+Ti	1289	1292	1361	1363
+Zr	1283	1291	1358	1362