

## Standard reference states adopted in NASA-CEA thermodynamic entries

element	phase	description	T interval	element	phase	description	T interval
Ag	Ag(cr)	cubic	200-1235.08	Mn	Mn(a)	alpha	200-980
	Ag(L)	liquid	1235.08-6000		Mn(b)	beta	980-1361
Al	AL(cr)	cubic	200-933.61		Mn(c)	gamma	1361-1412
	AL(L)	liquid	933.61-6000		Mn(d)	delta	1412-1519
Ar	Ar(g)	ideal gas	200-20000		Mn(L)	liquid	1519-6000
B	B(b)	beta	200-2350	Mo	Mo(cr)	crystal	200-2896
	B(L)	liquid	2350-6000		Mo(L)	liquid	2896-6000
Ba	Ba(cr)	crystal	80-1000	N	N2(g)	ideal gas	200-20000
	Ba(L)	liquid	1000-6000	Na	Na(cr)	cubic	200-371.01
Be	Be(a)	alpha	100-1543		Na(L)	liquid	371.01-2300
	Be(b)	beta	1543-1563	Nb	Nb(cr)	crystal	200-2750
	Be(L)	liquid	1563-6000		Nb(L)	liquid	2750-6000
Br	Br2(cr)	rhombic	200-265.9	Ne	Ne(g)	ideal gas	200-20000
	Br2(L)	liquid	265.9-6000	Ni	Ni(cr)	below $\lambda$ trans	200-631
C	C(gr)	Graphite	200-6000		Ni(cr)	above $\lambda$ trans	631-1728
Ca	Ca(a)	alpha	200-716		Ni(L)	liquid	1728-6000
	Ca(b)	beta	716-1115	O	O2(g)	ideal gas	200-20000
	Ca(L)	liquid	1115-6000	P	P(cr)	White	195.4-317.3
Cd	Cd(cr)	crystal	100-594.258		P(L)	liquid	317.3-6000
	Cd(L)	liquid	594.258-6000	Pb	Pb(cr)	cubic	200-600.65
Cl	CL2(g)	ideal gas	200-6000		Pb(L)	liquid	600.65-3600
Co	Co(a)	alpha	200-700.1	Rb	Rb(cr)	cubic	100-312.47
	Co(b)	beta; below $\lambda$ trans	700.1-1394		Rb(L)	liquid	312.47-2100
	Co(b)	beta; above $\lambda$ trans	1394-1768	Rn	Rn(g)	ideal gas	200-20000
	Co(L)	liquid	1768-6000	S	S(a)	alpha	200-368.3
Cr	Cr(cr)	below $\lambda$ trans	200-311.5		S(b)	beta	368.3-388.36
	Cr(cr)	above $\lambda$ trans	311.5-2130		S(L)	liquid	388.36-6000
	Cr(L)	liquid	2130-6000	Sc	Sc(a)	alpha	100-1609
Cs	Cs(cr)	crystal	100-301.59		Sc(b)	beta	1609-1814
	Cs(L)	liquid	301.59-2000		Sc(L)	Liquid	1814-6000
Cu	Cu(cr)	cubic	200-1358	Si	Si(cr)	cubic	200-1690
	Cu(L)	liquid	1358-6000		Si(L)	liquid	1690-6000
D	D2(g)	ideal gas	200-20000	Sn	Sn(cr)	tetragonal	200-505.118
e-	e-(g)	ideal gas	298.15-20000		Sn(L)	liquid	505.118-4700
F	F2(g)	ideal gas	200-6000	Sr	Sr(a)	alpha	100-820
Fe	Fe(a)	alpha; below $\lambda$ trans	200-1042		Sr(b)	beta	820-1041
	Fe(a)	alpha; above $\lambda$ trans	1042-1184		Sr(L)	liquid	1041-6000
	Fe(c)	gamma	1184-1665	Ta	Ta(cr)	crystal	200-3258
	Fe(d)	delta	1665-1809		Ta(L)	liquid	3258-6000
	Fe(L)	liquid	1809-6000	Th	Th(a)	alpha	200-1650
Ga	Ga(cr)	rhombic	100-302.92		Th(b)	beta	1650-2023
	Ga(L)	liquid	302.92-6000		Th(L)	liquid	2023-6000
Ge	Ge(cr)	cubic	200-1211.4	Ti	Ti(a)	alpha	200-1156
	Ge(L)	liquid	1211.4-6000		Ti(b)	beta	1156-1944
H	H2(g)	ideal gas	200-20000		Ti(L)	liquid	1944-6000
He	He(g)	ideal gas	200-20000	U	U(a)	alpha	200-942
Hg	Hg(cr)	tetragonal	100-234.29		U(b)	beta	942-1049
	Hg(L)	liquid	234.29-2000		U(c)	gamma	1049-1408
I	I2(cr)	rhombic	200-386.75		U(L)	liquid	1408-4000
	I2(L)	liquid	386.75-6000	V	V(cr)	crystal	200-2190
In	In(cr)	tetragonal	100-429.784		V(L)	liquid	2190-6000
	In(L)	liquid	429.784-6000	W	W(cr)	crystal	200-3680
K	K(cr)	cubic	200-336.86		W(L)	liquid	3680-6000
	K(L)	liquid	336.86-2200	Xe	Xe(g)	ideal gas	200-20000
Kr	Kr(g)	ideal gas	200-20000	Zn	Zn(cr)	crystal	200-692.73
Li	Li(cr)	crystal	200-453.69		Zn(L)	liquid	692.73-6000
	Li(L)	liquid	453.69-6000	Zr	Zr(a)	alpha	200-1135
Mg	Mg(cr)	hexagonal	100-923		Zr(b)	beta	1135-2125
	Mg(L)	liquid	923-6000		Zr(L)	liquid	2125-6000