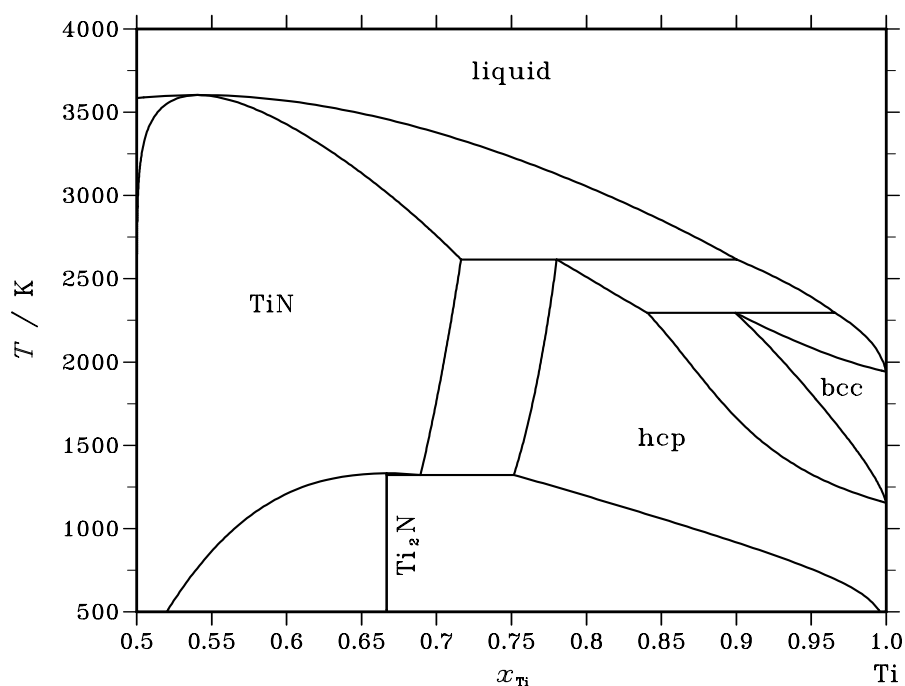


N – Ti (Nitrogen – Titanium)**Fig. 1.** Calculated phase diagram for the system N-Ti.

N and Ti are both alloying elements in steels and other alloys. Ti is a strong carbide and nitride former and this is used for hardening together with other carbide/nitride formers. The solubility of N in the Ti phases is rather high and in addition there is a cubic nitride with a wide composition range. At low temperature there is a special Ti_2N nitride. The selected assessment is from [96Jon]. The gas phase has been omitted from the calculated diagram in Fig. 1.

Table I. Phases, structures and models.

Phase	Strukturbericht	Prototype	Pearson symbol	Space group	SGTE name	Model
liquid					LIQUID	$(\text{N,Ti})_1$
TiN	B1	NaCl	$cF8$	$Fm\bar{3}m$	FCC_A1	$\text{Ti}_1(\text{N},\square)_1$
Ti_2N	C4	TiO_2	$tP6$	$P4_2/mnm$	TI2N	Ti_2N_1
bcc	A2	W	$cI2$	$Im\bar{3}m$	BCC_A2	$\text{Ti}_1(\text{N},\square)_3$
hcp	A3	Mg	$hP2$	$P6_3/mmc$	HCP_A3	$\text{Ti}_2(\text{N},\square)_1$

Table II. Invariant reactions.

Reaction	Type	T / K	Compositions / x_{Ti}			$\Delta_f H / (\text{J/mol})$
liquid \rightleftharpoons TiN	congruent	3602.4	0.541	0.541		–92431
TiN + liquid \rightleftharpoons hcp	peritectic	2615.2	0.716	0.900	0.780	–10054
hcp + liquid \rightleftharpoons bcc	peritectic	2294.5	0.841	0.966	0.899	–4145
TiN \rightleftharpoons Ti_2N	congruent	1332.0	0.667	0.667		–15117
TiN \rightleftharpoons Ti_2N + hcp	eutectoid	1322.3	0.689	0.667	0.752	–11270

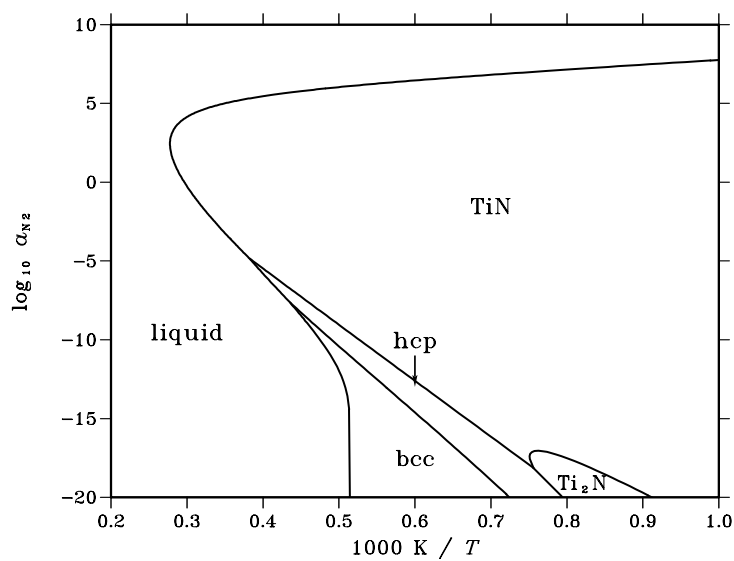


Fig. 2. Calculated temperature-activity phase diagram. Reference state: $\frac{1}{2}\text{N}_2(\text{gas}, 0.1 \text{ MPa})$.

Table III. Standard reaction quantities at 298.15 K for the compounds per mole of atoms.

Compound	x_{Ti}	$\Delta_f G^\circ / (\text{J/mol})$	$\Delta_f H^\circ / (\text{J/mol})$	$\Delta_f S^\circ / (\text{J}/(\text{mol}\cdot\text{K}))$	$\Delta_f C_P^\circ / (\text{J}/(\text{mol}\cdot\text{K}))$
Ti_2N	0.667	-121520	-133307	-39.534	-0.881

References

[96Jon] S. Jonsson: Z. Metallkd. **87** (1996) 691–702.