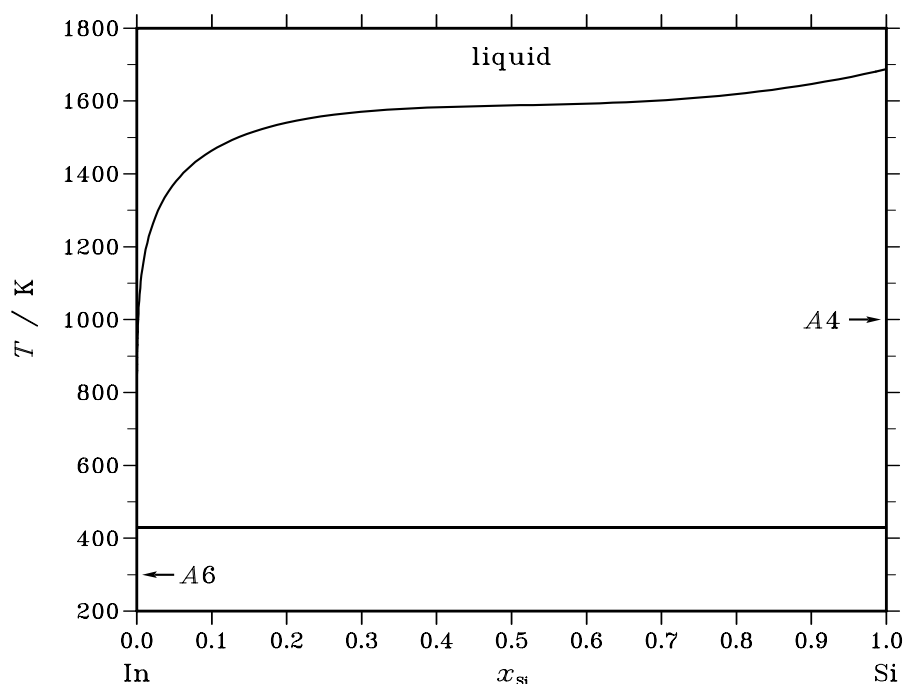


In – Si (Indium – Silicon)**Fig. 1.** Calculated phase diagram for the system In-Si.

The phase diagram for the In-Si system is very simple showing a very flat liquidus surface corresponding to equilibrium between the liquid phase and essentially pure Si, a eutectic very close to pure In and negligible solubility of Si in the tetragonal crystalline phase of In. The flat liquidus surface indicates the existence of a metastable miscibility gap in the liquid. The limited phase diagram information for the system have been reviewed by Olesinski *et al.* [85Ole]. There appears to be only one experimental study of the thermodynamics in the system – by Tmar *et al.* [83Tma] who determined by calorimetry the partial molar enthalpy of Si in liquid In at infinite dilution. The critically assessed thermodynamic data adopted by SGTE for the system have been taken from the work of Olesinski *et al.* [85Ole] who used a regular solution model. The system had also been modelled from a thermodynamic perspective by Thurmond *et al.* [53Thu, 60Thu] and Girault [77Gir].

Table I. Phases, structures and models.

Phase	Strukturbericht	Prototype	Pearson symbol	Space group	SGTE name	Model
liquid					LIQUID	(In,Si) ₁
A6	A6	In	<i>tI</i> 2	<i>I</i> 4/ <i>mmm</i>	TETRAGONAL_A6	In ₁
A4	A4	C(diamond)	<i>cF</i> 8	<i>Fd</i> $\bar{3}$ <i>m</i>	DIAMOND_A4	Si ₁

Table II. Invariant reactions.

Reaction	Type	<i>T</i> / K	Compositions / <i>x</i> _{Si}			$\Delta_r H$ / (J/mol)
liquid \rightleftharpoons A6 + A4	degenerate	429.8	0.000	0.000	1.000	–3283

Table IIIa. Integral quantities for the liquid phase at 1700 K.

x_{Si}	ΔG_{m} [J/mol]	ΔH_{m} [J/mol]	ΔS_{m} [J/(mol·K)]	G_{m}^{E} [J/mol]	S_{m}^{E} [J/(mol·K)]	ΔC_P [J/(mol·K)]
0.000	0	0	0.000	0	0.000	0.000
0.100	–2494	4059	3.855	2101	1.152	0.000
0.200	–3339	7216	6.209	3734	2.048	0.000
0.300	–3733	9471	7.767	4901	2.688	0.000
0.400	–3911	10824	8.668	5602	3.072	0.000
0.500	–3962	11275	8.963	5835	3.200	0.000
0.600	–3911	10824	8.668	5602	3.072	0.000
0.700	–3733	9471	7.767	4901	2.688	0.000
0.800	–3339	7216	6.209	3734	2.048	0.000
0.900	–2494	4059	3.855	2101	1.152	0.000
1.000	0	0	0.000	0	0.000	0.000

Reference states: In(liquid), Si(A4)

Table IIIb. Partial quantities for In in the liquid phase at 1700 K.

x_{In}	ΔG_{In} [J/mol]	ΔH_{In} [J/mol]	ΔS_{In} [J/(mol·K)]	G_{In}^{E} [J/mol]	S_{In}^{E} [J/(mol·K)]	a_{In}	γ_{In}
1.000	0	0	0.000	0	0.000	1.000	1.000
0.900	–1256	451	1.004	233	0.128	0.915	1.017
0.800	–2220	1804	2.367	934	0.512	0.855	1.068
0.700	–2941	4059	4.118	2101	1.152	0.812	1.160
0.600	–3486	7216	6.295	3734	2.048	0.781	1.302
0.500	–3962	11275	8.963	5835	3.200	0.756	1.511
0.400	–4549	16236	12.226	8402	4.608	0.725	1.812
0.300	–5581	22099	16.282	11437	6.272	0.674	2.246
0.200	–7811	28864	21.574	14938	8.192	0.575	2.877
0.100	–13641	36531	29.513	18905	10.368	0.381	3.810
0.000	– ∞	45100	∞	23340	12.800	0.000	5.214

Reference state: In(liquid)

Table IIIc. Partial quantities for Si in the liquid phase at 1700 K.

x_{Si}	ΔG_{Si} [J/mol]	ΔH_{Si} [J/mol]	ΔS_{Si} [J/(mol·K)]	G_{Si}^{E} [J/mol]	S_{Si}^{E} [J/(mol·K)]	a_{Si}	γ_{Si}
0.000	– ∞	45100	∞	23340	12.800	0.000	5.214
0.100	–13641	36531	29.513	18905	10.368	0.381	3.810
0.200	–7811	28864	21.574	14938	8.192	0.575	2.877
0.300	–5581	22099	16.282	11437	6.272	0.674	2.246
0.400	–4549	16236	12.226	8402	4.608	0.725	1.812
0.500	–3962	11275	8.963	5835	3.200	0.756	1.511
0.600	–3486	7216	6.295	3734	2.048	0.781	1.302
0.700	–2941	4059	4.118	2101	1.152	0.812	1.160
0.800	–2220	1804	2.367	934	0.512	0.855	1.068
0.900	–1256	451	1.004	233	0.128	0.915	1.017
1.000	0	0	0.000	0	0.000	1.000	1.000

Reference state: Si(A4)

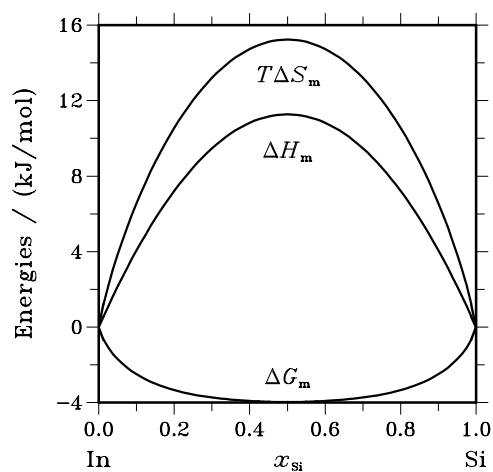


Fig. 2. Integral quantities of the liquid phase at $T=1700$ K.

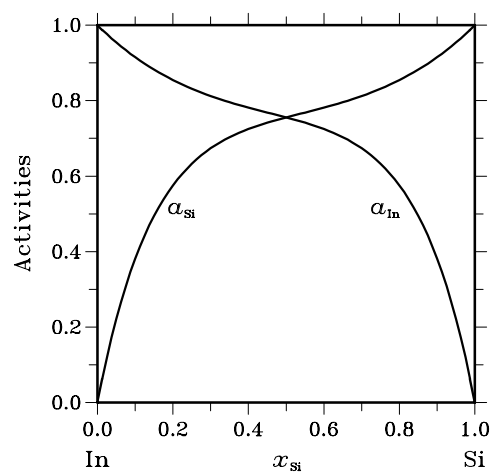


Fig. 3. Activities in the liquid phase at $T=1700$ K.

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