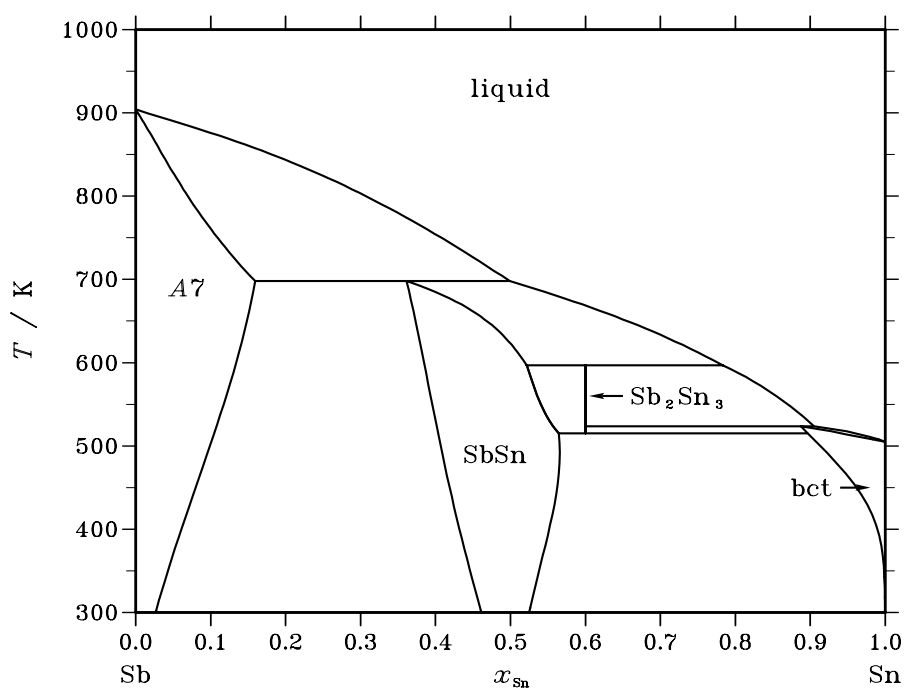


Sb – Sn (Antimony – Tin)**Fig. 1.** Calculated phase diagram for the system Sb-Sn.

The Sb-Sn system is encountered in various low-melting alloys which are used for solders and typesetting materials. The accepted critical thermodynamic assessment for this system has been reported in [86Jon]. Later, another dataset has been given by [95Oht] but this seems to have problems with the description of the SbSn phase. The optimisation of [86Jon] is based on literature data for the melt (EMF data and mixing enthalpies) and on investigations on the phase diagram (DTA, metallography, X-ray diffraction), mainly from [31Iwa, 71Pre].

Table I. Phases, structures and models.

Phase	Struktur-bericht	Prototype	Pearson symbol	Space group	SGTE name	Model
liquid					LIQUID	(Sb,Sn) ₁
A7	A7	α As	<i>hR2</i>	$R\bar{3}m$	RHOMBOHEDRAL_A7	(Sb,Sn) ₁
SbSn	B1	NaCl	<i>cF8</i>	$Fm\bar{3}m$	B1_SB1SN1	(Sb,Sn) ₁ (Sb,Sn) ₁
Sb ₂ Sn ₃	SB2SN3	Sb ₂ Sn ₃
bct	A5	β Sn	<i>tI4</i>	$I4_1/amd$	BCT_A5	(Sb,Sn) ₁

Table II. Invariant reactions.

Reaction	Type	<i>T</i> / K	Compositions / <i>x</i> _{Sn}			$\Delta_r H$ / (J/mol)
A7 + liquid \rightleftharpoons SbSn	peritectic	697.8	0.159	0.499	0.361	−7690
SbSn + liquid \rightleftharpoons Sb ₂ Sn ₃	peritectic	597.0	0.522	0.783	0.600	−1511
Sb ₂ Sn ₃ + liquid \rightleftharpoons bct	peritectic	523.8	0.600	0.905	0.888	−3880
Sb ₂ Sn ₃ \rightleftharpoons SbSn + bct	eutectoid	515.3	0.600	0.564	0.896	−1166

Table IIIa. Integral quantities for the liquid phase at 970 K.

x_{Sn}	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	–3121	–350	2.857	–499	0.154	0.000
0.200	–5031	–730	4.434	–995	0.273	0.000
0.300	–6343	–1068	5.438	–1417	0.359	0.000
0.400	–7137	–1312	6.006	–1709	0.410	0.000
0.500	–7429	–1424	6.190	–1838	0.427	0.000
0.600	–7212	–1387	6.006	–1785	0.410	0.000
0.700	–6475	–1200	5.438	–1548	0.359	0.000
0.800	–5181	–880	4.434	–1146	0.273	0.000
0.900	–3234	–463	2.857	–612	0.154	0.000
1.000	0	0	0.000	0	0.000	0.000

Reference states: Sb(liquid), Sn(liquid)

Table IIIb. Partial quantities for Sb in the liquid phase at 970 K.

x_{Sb}	ΔG_{Sb} [J/mol]	ΔH_{Sb} [J/mol]	ΔS_{Sb} [J/(mol·K)]	G_{Sb}^{E} [J/mol]	S_{Sb}^{E} [J/(mol·K)]	a_{Sb}	γ_{Sb}
1.000	0	0	0.000	0	0.000	1.000	1.000
0.900	–838	28	0.893	12	0.017	0.901	1.001
0.800	–1857	9	1.924	–57	0.068	0.794	0.993
0.700	–3200	–174	3.119	–323	0.154	0.673	0.961
0.600	–4968	–583	4.521	–848	0.273	0.540	0.900
0.500	–7233	–1228	6.190	–1643	0.427	0.408	0.816
0.400	–10054	–2067	8.234	–2664	0.615	0.287	0.719
0.300	–13525	–3003	10.848	–3815	0.837	0.187	0.623
0.200	–17928	–3886	14.475	–4947	1.094	0.108	0.541
0.100	–24430	–4516	20.529	–5859	1.384	0.048	0.484
0.000	– ∞	–4637	∞	–6295	1.709	0.000	0.458

Reference state: Sb(liquid)

Table IIIc. Partial quantities for Sn in the liquid phase at 970 K.

x_{Sn}	ΔG_{Sn} [J/mol]	ΔH_{Sn} [J/mol]	ΔS_{Sn} [J/(mol·K)]	G_{Sn}^{E} [J/mol]	S_{Sn}^{E} [J/(mol·K)]	a_{Sn}	γ_{Sn}
0.000	– ∞	–3072	∞	–4729	1.709	0.000	0.556
0.100	–23669	–3756	20.529	–5098	1.384	0.053	0.531
0.200	–17727	–3686	14.475	–4747	1.094	0.111	0.555
0.300	–13678	–3156	10.848	–3968	0.837	0.183	0.611
0.400	–10392	–2405	8.234	–3002	0.615	0.276	0.689
0.500	–7624	–1619	6.190	–2034	0.427	0.389	0.777
0.600	–5318	–933	4.521	–1199	0.273	0.517	0.862
0.700	–3453	–427	3.119	–576	0.154	0.652	0.931
0.800	–1995	–129	1.924	–195	0.068	0.781	0.976
0.900	–879	–12	0.893	–29	0.017	0.897	0.996
1.000	0	0	0.000	0	0.000	1.000	1.000

Reference state: Sn(liquid)

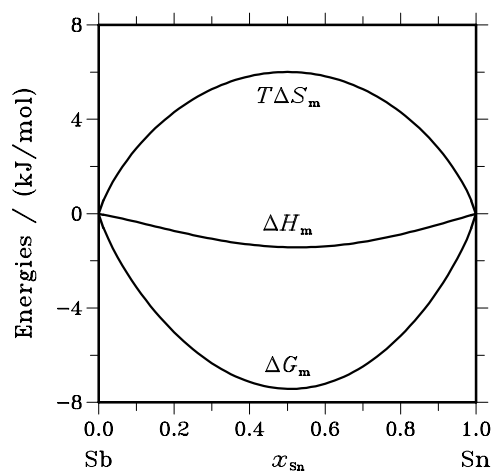


Fig. 2. Integral quantities of the liquid phase at $T=970$ K.

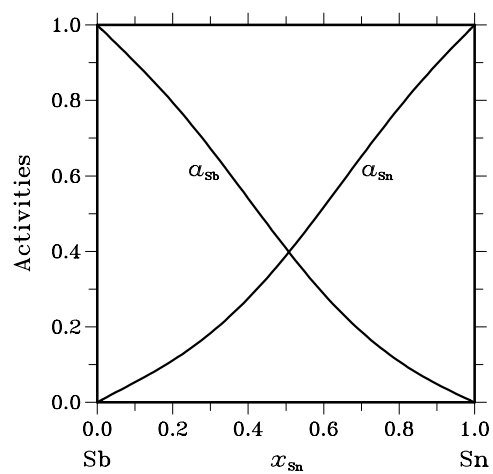


Fig. 3. Activities in the liquid phase at $T=970$ K.

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