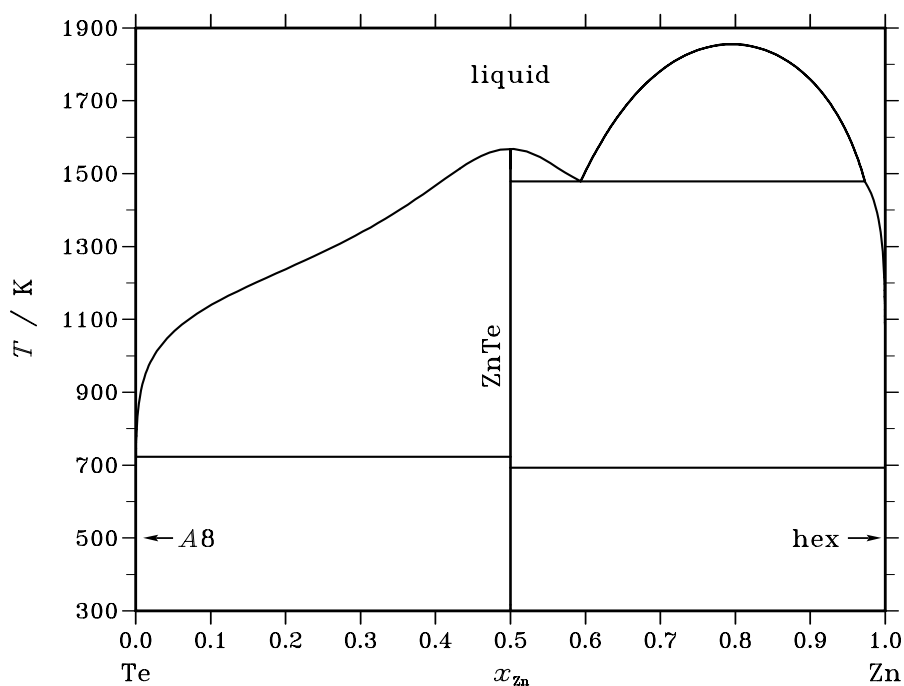


Te – Zn (Tellurium – Zinc)**Fig. 1.** Calculated phase diagram for the system Te-Zn (constrained system).

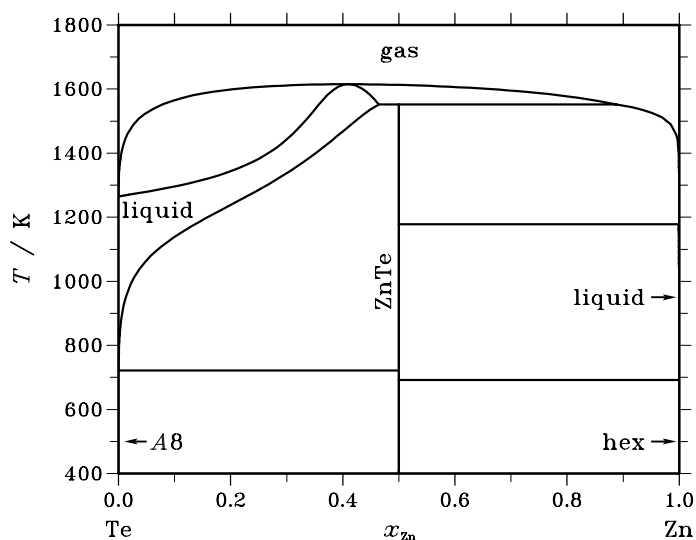
The Te-Zn system has been assessed by [97Feu] using an associated model for the liquid. Calculations were performed for various pressures between 0.1 MPa and 10 MPa. One intermediate compound exists, ZnTe, with a congruent melting point calculated at 1570 K for a pressure of 0.2 MPa. The heat content of ZnTe has been measured by drop calorimetry. C_p was measured from 56 K up to 300 K and from 15 K to 150 K. The data are in fair agreement. The heat of formation of ZnTe was measured by several techniques. The chemical potential of Zn was obtained by EMF, vapour pressure for the liquid was also measured. At a pressure of 0.1 MPa (Fig. 2), ZnTe decomposes in a peritectic type reaction at 1553 K into a Te-rich liquid and a Zn-rich gas. Another peritectic type reaction occurs at 1177 K on the very Zn-rich side: the liquid gives a Zn-rich gas and ZnTe. No terminal solid solutions have been determined, and invariants are degenerated on Zn and Te.

Table I. Phases, structures and models.

Phase	Strukturbericht	Prototype	Pearson symbol	Space group	SGTE name	Model
liquid					LIQUID	(Te,Zn) ₁
A8	A8	γ Se	<i>hP3</i>	$P3_121$	TRIGONAL_A8	Te ₁
ZnTe	B3	ZnS	<i>cF8</i>	$F\bar{4}3m$	TEZN	Zn ₁ Te ₁
hex	A3	Mg	<i>hP2</i>	$P6_3/mmc$	HCP_ZN	Zn ₁

Table II. Invariant reactions.

Reaction	Type	T / K	Compositions / x_{Zn}			$\Delta_r H / (\text{J/mol})$
liquid \rightleftharpoons liquid' + liquid''	critical	1855.6	0.795	0.795	0.795	0
liquid \rightleftharpoons ZnTe	congruent	1568.4	0.500	0.500		–36129
liquid' \rightleftharpoons ZnTe + liquid''	monotectic	1479.1	0.594	0.500	0.973	–32004
liquid' \rightleftharpoons A8 + ZnTe	eutectic	722.6	0.000	0.000	0.500	–17392
ZnTe + liquid'' \rightleftharpoons hex	degenerate	692.7	0.500	1.000	1.00	–7322

**Fig. 2.** Calculated phase diagram at 0.1 MPa.**Table IIIa.** Integral quantities for the liquid phase at 1900 K.

x_{Zn}	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	–12375	–5436	3.652	–7240	0.949	0.127
0.200	–21552	–11827	5.118	–13646	0.958	0.530
0.300	–28435	–19307	4.805	–18785	–0.274	2.087
0.400	–32538	–26981	2.925	–21906	–2.671	8.548
0.500	–33013	–29860	1.659	–22063	–4.104	17.109
0.600	–29428	–22464	3.665	–18796	–1.931	9.089
0.700	–23087	–11693	5.997	–13437	0.918	2.794
0.800	–15968	–4301	6.141	–8063	1.980	0.719
0.900	–8667	–673	4.207	–3532	1.504	0.059
1.000	0	0	0.000	0	0.000	0.000

Reference states: Te(liquid), Zn(liquid)

Table IIIb. Partial quantities for Te in the liquid phase at 1900 K.

x_{Te}	ΔG_{Te} [J/mol]	ΔH_{Te} [J/mol]	ΔS_{Te} [J/(mol·K)]	G_{Te}^{E} [J/mol]	S_{Te}^{E} [J/(mol·K)]	a_{Te}	γ_{Te}
1.000	0	0	0.000	0	0.000	1.000	1.000
0.900	−2027	442	1.299	−363	0.423	0.880	0.977
0.800	−5438	2044	3.938	−1913	2.083	0.709	0.886
0.700	−11559	4519	8.462	−5924	5.497	0.481	0.687
0.600	−22855	−831	11.592	−14785	7.344	0.235	0.392
0.500	−40816	−39685	0.595	−29866	−5.168	0.075	0.151
0.400	−61662	−89384	−14.591	−47187	−22.209	0.020	0.050
0.300	−71697	−77398	−3.000	−52677	−13.011	0.011	0.036
0.200	−73603	−47556	13.709	−48178	0.328	0.009	0.047
0.100	−76175	−18633	30.285	−39800	11.140	0.008	0.081
0.000	−∞	4999	∞	−30475	18.671	0.000	0.145

Reference state: Te(liquid)

Table IIIc. Partial quantities for Zn in the liquid phase at 1900 K.

x_{Zn}	ΔG_{Zn} [J/mol]	ΔH_{Zn} [J/mol]	ΔS_{Zn} [J/(mol·K)]	G_{Zn}^{E} [J/mol]	S_{Zn}^{E} [J/(mol·K)]	a_{Zn}	γ_{Zn}
0.000	−∞	−50286	∞	−75611	13.329	0.000	0.008
0.100	−105506	−58337	24.826	−69131	5.681	0.001	0.013
0.200	−86006	−67312	9.839	−60581	−3.543	0.004	0.022
0.300	−67813	−74899	−3.729	−48794	−13.740	0.014	0.046
0.400	−47063	−66206	−10.075	−32588	−17.693	0.051	0.127
0.500	−25210	−20035	2.724	−14260	−3.040	0.203	0.405
0.600	−7938	22149	15.835	132	11.588	0.605	1.008
0.700	−2254	16467	9.853	3381	6.887	0.867	1.239
0.800	−1560	6513	4.249	1966	2.393	0.906	1.132
0.900	−1166	1322	1.310	498	0.434	0.929	1.032
1.000	0	0	0.000	0	0.000	1.000	1.000

Reference state: Zn(liquid)

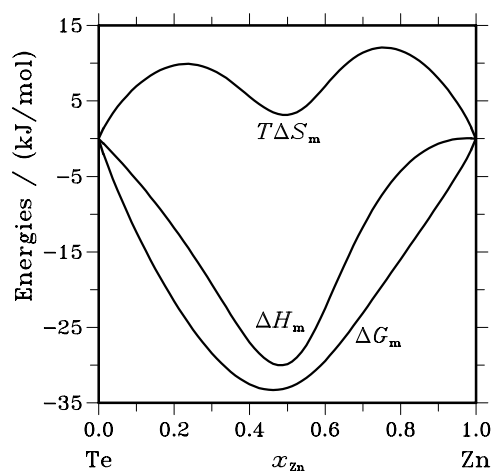
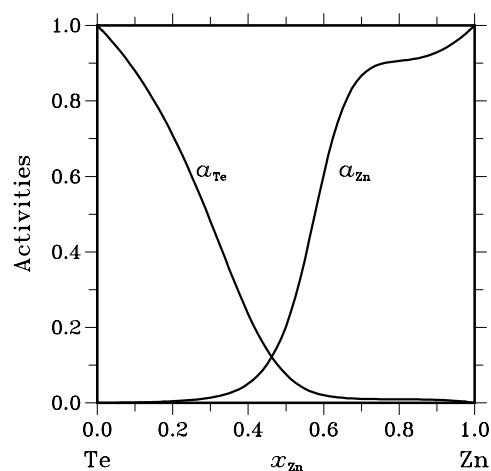
**Fig. 3.** Integral quantities of the liquid phase at $T=1900$ K.**Fig. 4.** Activities in the liquid phase at $T=1900$ K.

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

Compound	x_{Zn}	$\Delta_{\text{f}}G^{\circ} / (\text{J/mol})$	$\Delta_{\text{f}}H^{\circ} / (\text{J/mol})$	$\Delta_{\text{f}}S^{\circ} / (\text{J}/(\text{mol}\cdot\text{K}))$	$\Delta_{\text{f}}C_P^{\circ} / (\text{J}/(\text{mol}\cdot\text{K}))$
Zn_1Te_1	0.500	−57769	−59940	−7.280	−0.066

References

[97Feu] Y. Feutelais, A. Haloui, B. Legendre: J. Phase Equilibria **18** (1997) 48–61.