

As – Cu (Arsenic – Copper)

Phase diagram

In a short discussion Okamoto [94 Oka] shows that the phase diagram assessed by [91 Tep] is more realistic than other phase diagrams of this system, which have been published up to that time. At least the assessment of the phase equilibria by Pei et al. [94 Pei] should be mentioned. The resulting assessed phase diagram is given in Fig. 1. It is very similar to that one proposed by [91 Tep]. The partial phase diagram in an enlarged version is redrawn in Fig. 2.

Crystal structure

Crystallographic data of intermediate phases are compiled in Table 1.

Table 1. As–Cu. Crystal structure and lattice parameters of intermediate phases (taken from [Massalski] and [Pearson]).

Phase	Composition [at% As]	Structure	Prototype	Lattice parameters [nm]		
				<i>a</i>	<i>b</i>	<i>c</i>
β	11.1 ... 14.3	hex	Mg	0.2588		0.4226
γ (H)	25.0 ... 27.8	hex	Na ₃ As			
γ' (L)	25.5 ... 27.8	hex	Cu ₃ As	0.7088		0.7232
δ (H)	28.6 ... 29.6	cub	BiF ₃			
δ' (L)	28.6 ... 29.6	ort	Cu ₅ As ₂	0.5977	1.577	0.5491

H = High temperature modification

L = Low temperature modification

Thermodynamics

Using high-temperature calorimetry Wypartowicz et al. [95 Wyp] have determined the standard enthalpy of formation of the intermediate phase AsCu₃. The value amounts to

$$\Delta H^S = -14.6 \pm 3.8 \text{ kJ g-atom}^{-1}$$

From the optimized thermodynamic data the assessment of the phase diagram has been obtained, here only the thermodynamic activities in the liquid alloys should be mentioned (Fig. 3), the enthalpies of mixing as well as the values of the excess entropies of the mixing of the liquid alloys (Fig. 4).

Figures

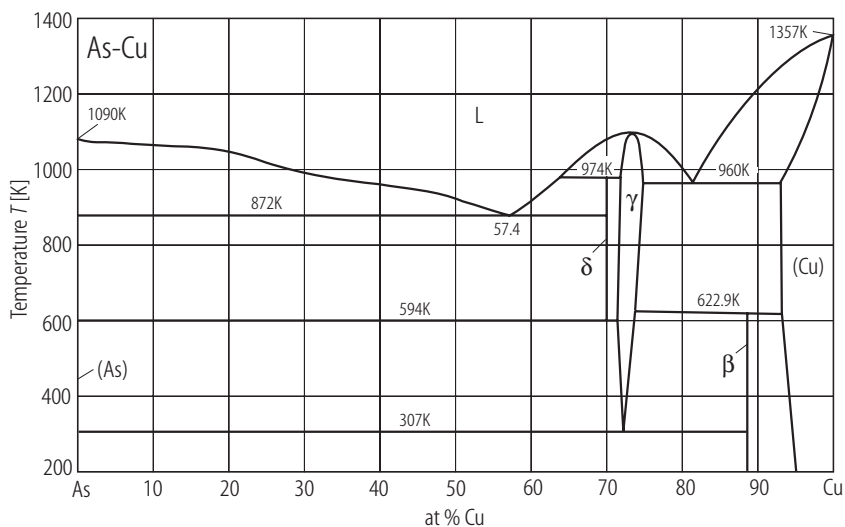


Fig. 1. As-Cu. Phase diagram of the As-Cu system (taken from [94 Pei]).

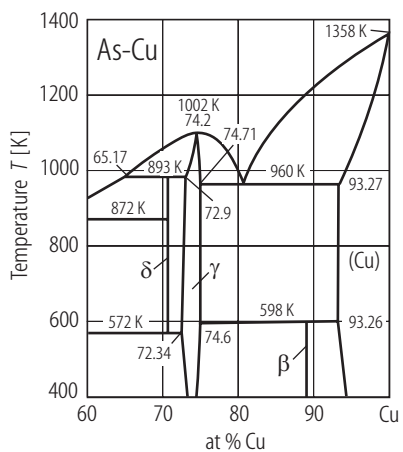


Fig. 2. As-Cu. Partial phase diagram in an enlarged version taken from [94 Pei].

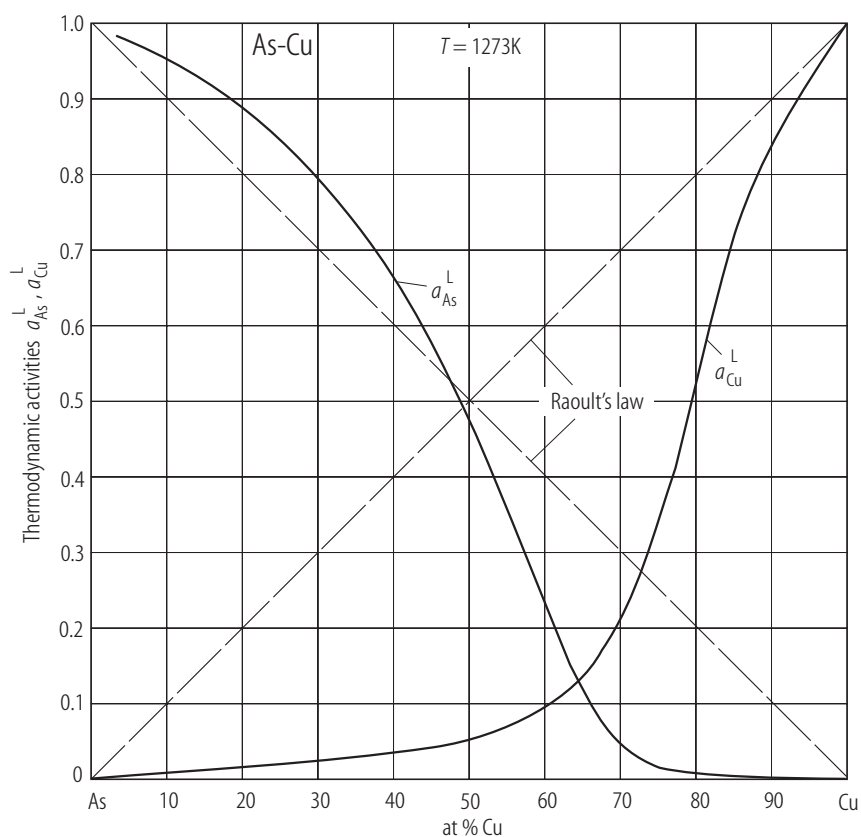


Fig. 3. As–Cu. Thermodynamic activities in liquid alloys [94 Pei].

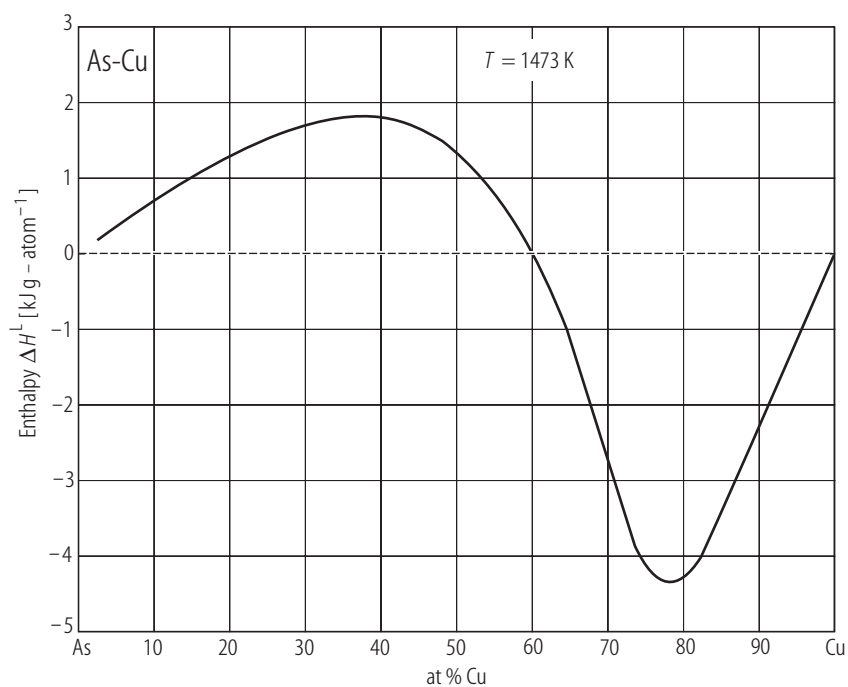


Fig. 4. As–Cu. Enthalpies of mixing of liquid alloys taken from [94 Pei].

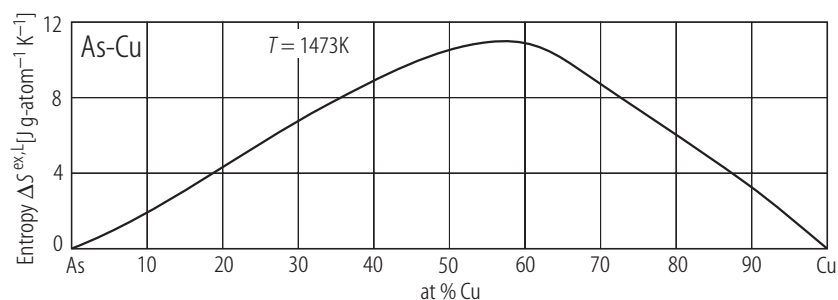


Fig. 5. As–Cu. Excess entropies of mixing of liquid alloys [94 Pei].

References

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