

Al – B (Aluminum – Boron)

Phase diagram

After thorough discussion of data concerning phase equilibria in this system, Carlson [90 Car] has presented an assessed phase diagram reproduced in Fig. 1.

An enlarged version of the Al-rich part is shown in Fig. 2.

[94 Dus] have calculated phase equilibria at concentrations < 0.7 at% B. This assessed part of the phase diagram is presented in Fig. 3.

Crystal structure

Crystallographic data of intermediate phases are listed in Table 1.

Table 1. Al–B. Structure and lattice parameters of intermediate phases (taken from [Pearson]).

Phase	Composition [at% B]	Structure	Type	Lattice parameters [nm]		
				<i>a</i>	<i>b</i>	<i>c</i>
AlB ₁₀	90.9	ort	AlB ₁₀	0.5690	0.8881	0.9100
β-AlB ₁₂	92.3	tet	AlB ₁₂	1.0161		1.4283

Thermodynamics

By high-temperature direct synthesis calorimetry Meschel et al. [95 Mes] have determined at 1473 K ± 2 K the average value of the standard enthalpy of formation ΔH^F of α-AlB₁₂. They found:

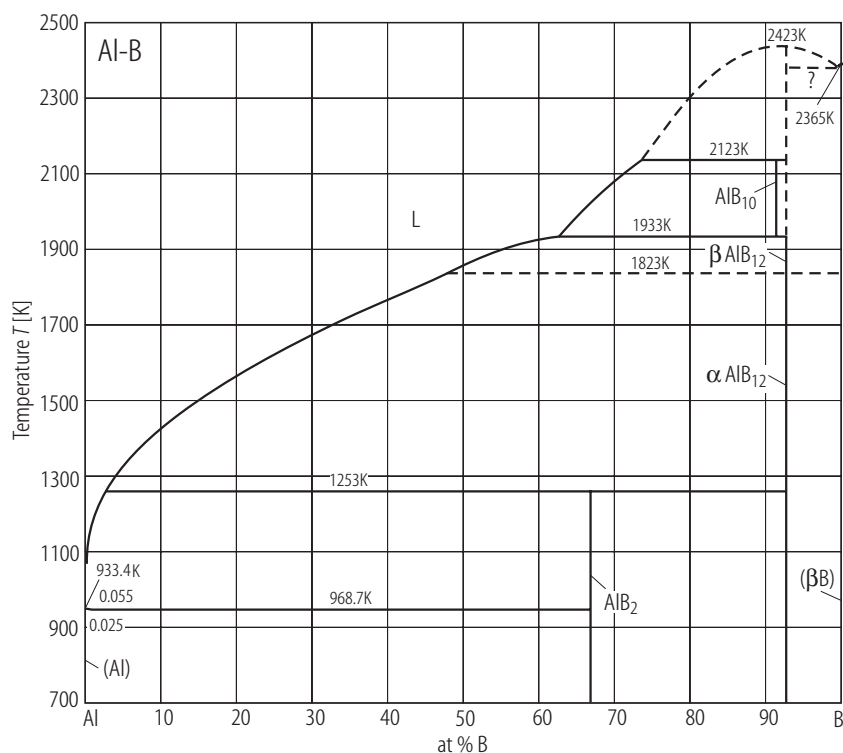
$$\Delta H^F = -11.4 \pm 0.6 \text{ kJ g-atom}^{-1}$$

Enthalpies of formation and entropies of formation of intermediate phases are listed in Table 3.

The data were taken from Duschanek et al. [94 Dus].

Table 2. Al–B. Enthalpies of formation of intermediate compounds in kJ g-atom⁻¹

Phase	Temperature [K]	ΔH^S	ΔS^S	Reference
AlB ₂	298	- 66.9 ± 12.6	-	[67 Dom]
	298	- 66.9	34.7	[76 Jon]
α -AlB ₁₂	0	146.4 to - 154.8		[77 Kan]
	298	- 208.8 ± 41.8		[67 Dom]
„AlB ₄₀ “	298	-	-	
	1673 to 2273	- 171.5	88.4	[88 Kap]
	0	- 196.6 to - 209.2	-	[77 Kan]
	1673 to 2273	- 223.8	40.4	[77 Kan]

Figures**Fig. 1.** Al–B. Assessed phase diagram [90 Car].

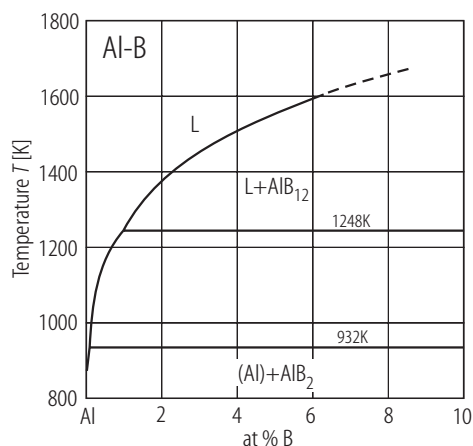


Fig. 2. Al-B. Enlarged version of the Al-rich part of the phase diagram [90 Car].

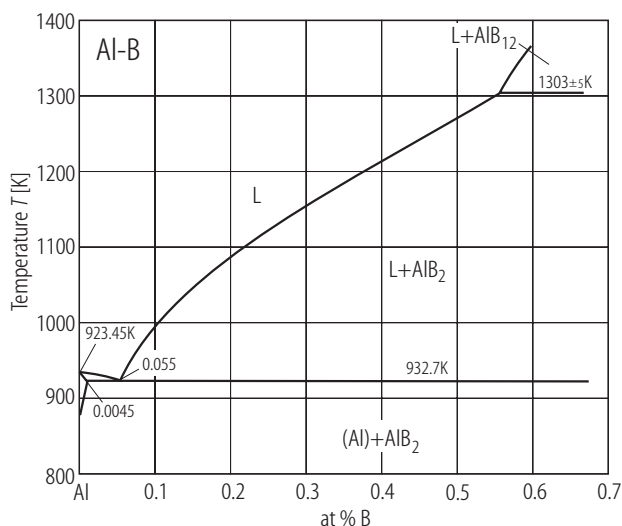


Fig. 3. Al-B. Assessed phase diagram calculated for concentrations < 0.7 at% B [94 Dus].

References

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