

Al – U (Aluminum – Uranium)

Phase diagram

A comprehensive review of the system has been given by Kassner et al. [90 Kas]. The phase diagram reproduced is almost identical with that given by [Landolt-Börnstein].

Crystal structure

Sahu et al. [95 Sah] have investigated the crystal structure of Al_2U at pressures up to 28 GPa. At about 11 GPa there is a change of modification from cubic structure (Cu_2Mg -type) at room temperature to hexagonal structure (MgNi_2 -type) at 300 K. [95 Sah] expect from the electron per atom ratio c/a that at pressures > 11 GPa the structure of Al_2U should transform again to the cubic modification. Fig. 1 shows the ratio v/v_0 as a function of pressure p . There is almost no volume change with transformation. The cell parameters at ≈ 25 GPa are

$$a = 0.5165 \text{ nm and}$$

$$c = 1.6083 \text{ nm.}$$

Thermodynamics

Enthalpies of formation of intermediate phases are given in Table 1.

Table 1. Al–U. Standard enthalpies of formation of intermediate phases [90 Kas].

Phase	$(\alpha\text{-U}) + \text{Al}$ ΔH^0 (30 K) [kJ mol^{-1}]	Reference
Al_2U	-92.5 ± 8.4	[69 Chi]
	-99.6 ± 5.4	[74 Dan]
	-93.3 ± 10.0	[58 Iva]
Al_3U	-108.4 ± 8.4	[69 Chi]
	-105.4 ± 9.2	[58 Iva]
Al_4U	-124.7 ± 8.4	[69 Chi]
	-130.5 ± 13.0	[58 Iva]

Figure

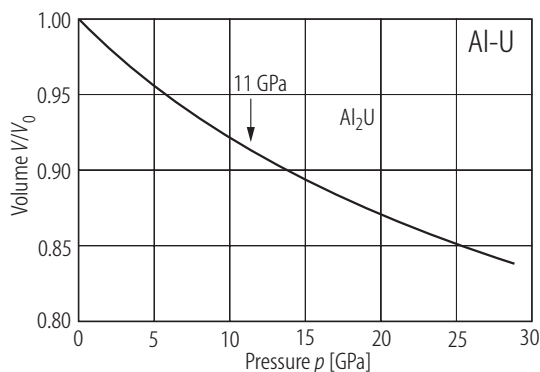


Fig. 1. Al–U. Change of the elementary cell of Al_2U as a function of pressure [95 Sah].

References

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