

Al-Sb-Y (Aluminum-Antimony-Yttrium)

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Muraveva et al. [1971Mur] reported a partial isothermal section of this system at 500 °C up to 33.3 at.% Y. Recently, [2003Zen] determined an isothermal section at 527 °C (800 K) for the entire composition range. No ternary compounds were found.

Binary Systems

The Al-Sb phase diagram has the equiatomic compound AlSb, which melts congruently at 1,058 °C. The Al-Y phase diagram [2006Liu, Massalski2] has the following intermediate phases: α Al₃Y (D0₁₉, Ni₃Sn-type hexagonal), β Al₃Y (BaPb₃-type rhombohedral), Al₂Y (C15, MgCu₂-type cubic), AlY (*B*₇, CrB-type orthorhombic), Al₂Y₃ (Al₂Zr₃-type tetragonal), and AlY₂ (C23, Co₂Si-type orthorhombic). The Sb-Y phase diagram [Massalski2] depicts the following intermediate phases: Y₃Sb (PTi₃-type tetragonal), Y₅Sb₃ (D8₈, Mn₅Si₃-type hexagonal), Y₄Sb₃ (D7₃, P₄Th₃-type cubic, stable between 2,120 and 1,660 °C), and YSb (B1, NaCl-type cubic).

Ternary Isothermal Section

With starting metals of 99.8% Al, 99.9% Sb and 99.7% Y, [2003Zen] arc-melted under Ar atm 99 alloy compositions. The samples were given a final anneal at 527 °C (800 K) for 200 h and quenched in water. The phase equilibria were studied using x-ray powder diffraction and scanning electron microscope with energy dispersive analyzer. The isothermal section at 527 °C (800 K) constructed by [2003Zen] is shown in Fig. 1. The metastable phase AlY₃ indicated by [2003Zen] is replaced tentatively with AlY₂ in Fig. 1. Y₃Sb₅ dissolves up to 27 at.% Al at constant Y content. The third component solubility in the other binary phases is negligible. No ternary compounds were found.

References

1971Mur: A.M. Muraveva, O.S. Zarechnyuk, and E.I. Gladyshevskii, The Systems Y-Al-Si (Ge,Sb) in the Range 0-0.33.3 at.% Y, *Neorg. Mater.*, 1971, 7(1), p 38-40 in Russian; TR: *Inorg. Mater.*, 1971, 7(1), p 34-36

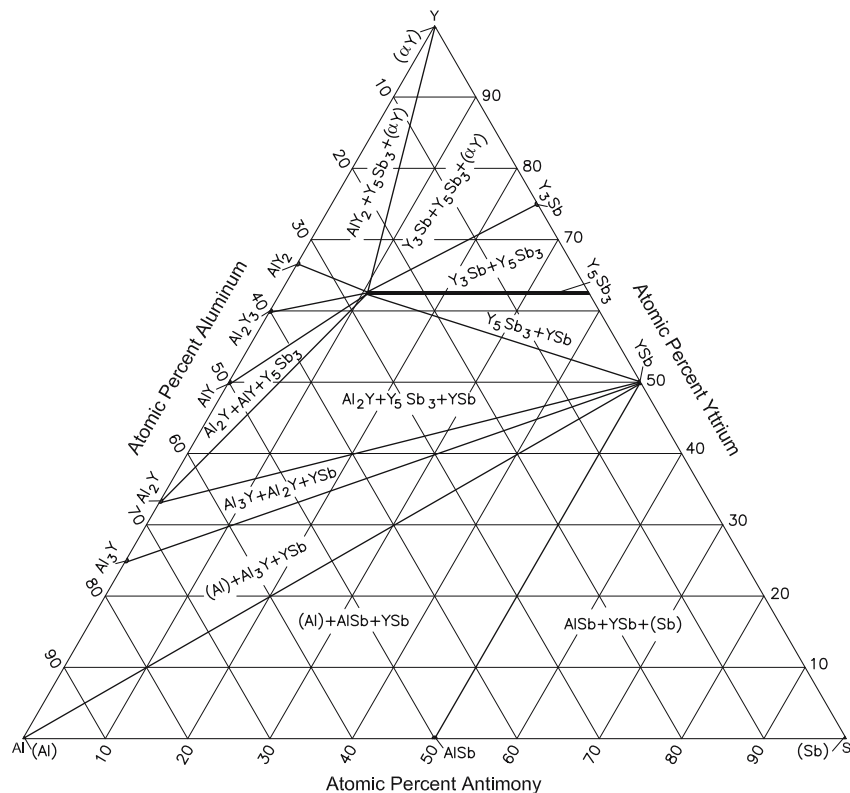


Fig. 1 Al-Sb-Y isothermal section at 527 °C (800 K) [2003Zen]. Narrow two-phase regions are omitted

2003Zen: L. Zeng and S. Wang, The 800 K Isothermal Section of the Y-Al-Sb Phase Diagram, *J. Alloys Compd.*, 2003, **351**, p 176-179

2006Liu: S. Liu, Y. Du, H. Xu, C. He, and J.C. Schuster, Experimental Investigation of the Al-Y Phase Diagram, *J. Alloys Compd.*, 2006, **414**, p 60-65