

# Al-B-Ho (Aluminum-Boron-Holmium)

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[1994Mik] determined an isothermal section at 600 °C for this ternary system, which depicts three ternary compounds.

hexagonal),  $\text{HoB}_4$  ( $D1_e$ ,  $\text{ThB}_4$ -type tetragonal),  $\text{HoB}_6$  ( $D2_1$ ,  $\text{CaB}_6$ -type cubic),  $\text{HoB}_{12}$  ( $D2_f$ ,  $\text{UB}_{12}$ -type cubic) and  $\text{HoB}_{66}$  (cubic).

## Binary Systems

There are two intermediate phases in the Al-B system:  $\text{AlB}_2$  ( $C32$ ,  $\text{AlB}_2$ -type hexagonal) and  $\text{AlB}_{12}$  ( $\text{AlB}_{12}$ -type tetragonal). The Al-Ho system [1988Gsc] depicts five intermediate phases:  $\text{HoAl}_3$  ( $hR20$ , rhombohedral),  $\text{HoAl}_2$  ( $C15$ ,  $\text{MgCu}_2$ -type cubic),  $\text{HoAl}$  ( $\text{ErAl}$ -type orthorhombic),  $\text{Ho}_3\text{Al}_2$  ( $\text{Zr}_3\text{Al}_2$ -type tetragonal), and  $\text{Ho}_2\text{Al}$  ( $C23$ ,  $\text{Co}_2\text{Si}$ -type orthorhombic). The B-Ho phase diagram [Massalski2] shows the following compounds:  $\text{HoB}_2$  ( $C32$ ,  $\text{AlB}_2$ -type

## Ternary Compounds

Three ternary compounds are known in this system.  $\text{HoAl}_3\text{B}_x$  ( $x = 0.4-0.5$ ) ( $\text{BaPb}_3$ -type rhombohedral, space group  $R\bar{3}m$ , denoted  $\tau_1$  here) [1980Mik],  $\text{HoAlB}_4$  ( $\text{YCrB}_4$ -type orthorhombic, space group  $Pbam$ ,  $a = 0.59283$  nm,  $b = 1.1553$  nm, and  $c = 0.35306$  nm, denoted  $\tau_2$  here) [1994Mik]; and  $\text{HoAlB}_{14}$  ( $\text{MgAlB}_{14}$ -type orthorhombic, space group  $Imma$ , denoted  $\tau_3$  here) [1989Kor].

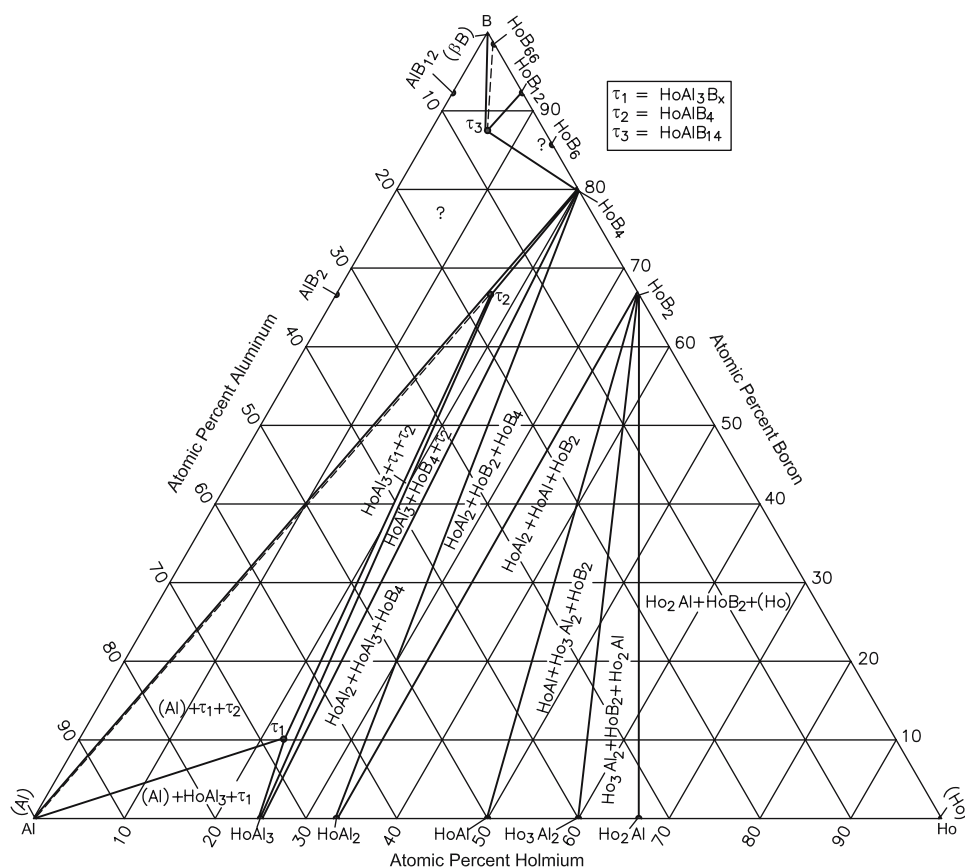


Fig. 1 Al-B-Ho isothermal section at 600 °C [1994Mik]. Thin two-phase regions are omitted

## Ternary Isothermal Section

With starting materials of purity  $\geq 99.5$  mass% purity, [1994Mik] arc-melted or sintered 70 ternary alloys. The alloys were annealed at 600 °C for not less than 500 h and quenched in water. The phase equilibria were studied by x-ray powder diffraction. Single crystals grown from aluminum-rich melts were examined by the Laue method. The isothermal section at 600 °C constructed by [1994Mik] is shown in Fig. 1. All three ternary compounds are present at this temperature. The phase equilibria involving  $\text{AlB}_2$ ,  $\text{AlB}_{12}$  and  $\text{HoAlB}_{14}$  ( $\tau_3$ ) were not determined by [1994Mik]. The binary phase  $\text{HoB}_6$  does not appear in the isothermal section given by [1994Mik].

## References

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