

# Fe-Ho-Sb (Iron-Holmium-Antimony)

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An isothermal section was determined for this system at 500 °C by [2004Zen], which depicts a ternary compound FeHo<sub>4</sub>Sb.

## Binary Systems

In the Fe-Ho system [1982Kub], there are four intermediate phases: Th<sub>2</sub>Ni<sub>17</sub>-type hexagonal phase Fe<sub>17</sub>Ho<sub>2</sub>, Th<sub>6</sub>Mn<sub>23</sub>-type cubic phase Fe<sub>23</sub>Ho<sub>6</sub>, PuNi<sub>3</sub>-type rhombohedral phase Fe<sub>3</sub>Ho, and MgCu<sub>2</sub>-type cubic phase Fe<sub>2</sub>Ho. The Fe-Sb phase diagram [1993Oka] has two intermediate phases. The ε phase, with the NiAs-type hexagonal structure, has a homogeneity range of 40-47 at.% Sb. FeSb<sub>2</sub> is a line compound with orthorhombic symmetry. The Ho-Sb phase diagram [1984Abd] depicts four line compounds: Ho<sub>5</sub>Sb<sub>3</sub>, Ho<sub>4</sub>Sb<sub>3</sub>, HoSb, and HoSb<sub>2</sub>. At 500 °C, Ho<sub>5</sub>Sb<sub>3</sub> (Mn<sub>5</sub>Si<sub>3</sub>-type hexagonal), the low-temperature form of HoSb (NaCl-type cubic), and HoSb<sub>2</sub> (orthorhombic) are present [1984Abd]. [2004Zen] did not find HoSb<sub>2</sub> at 500 °C.

## Ternary Isothermal Section

Using starting metals of 99.5% Fe, 99.9% Ho, and 99.95% Sb, [2004Zen] arc melted or induction melted 122

alloy compositions under Ar atm. The samples were given a final anneal at 500 °C for 200 h and quenched into liquid nitrogen. The phase equilibria were studied by x-ray powder diffraction and scanning electron microscope with energy dispersive analytical attachment. The isothermal section constructed by [2004Zen] at 500 °C is redrawn in Fig. 1. The binary phases show little solubility for the third component. A ternary compound FeHo<sub>4</sub>Sb of fixed stoichiometry is present. It has hexagonal symmetry with *a* = 0.8126 nm and *c* = 0.4142 nm [2004Zen].

## References

- 1982Kub:** O. Kubaschewski, Iron-Holmium, *Iron—Binary Phase Diagrams*, Springer-Verlag, Berlin, Germany, 1982, p 111-112
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- 1993Oka:** H. Okamoto, Fe-Ho (Iron-Holmium), *Phase Diagrams of Binary Iron Alloys*, H. Okamoto, Ed., ASM International, 1993, p 179-181
- 2004Zen:** L. Zeng and H. Zhao, The 773 K Isothermal Section of the Ho-Fe-Sb Ternary System, *J. Alloys Compd.*, Vol 366, 2004, p 201-204

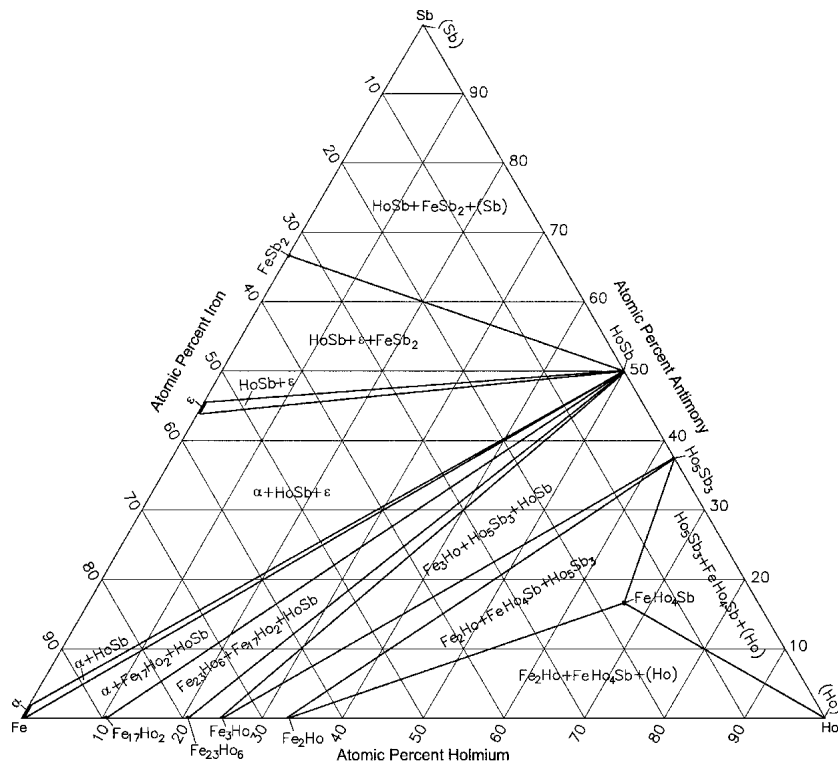


Fig. 1 Fe-Ho-Sb isothermal section at 500 °C [2004Zen]