AEC-NASA TECH BRIEF

Crystal Structure Analysis of Intermetallic Compounds

A continuing study on the alloy chemistry of the transition elements concerns crystal structures and lattice parameters for a number of new intermetallic compounds. Crystal structure data have been collected on equiatomic compounds, formed between an element of the Sc, Ti, V, or Cr group and an element of the Co or Ni group. The data, obtained by conventional methods, are presented in an easily usable tabular form. Representatives of the orthorhombic B19, B_f, and B27 structures and the cubic B2 structures have been found and confirmed.

The study has been published as "Equiatomic Compounds of the Transition and Lanthanide Elements with Rh, Ir, Ni and Pt," by A. E. Dwight, R. A. Conner, Jr., and J. W. Downey, Argonne National Laboratory, which is published in *Acta Crystallographica*, (1965) vol. 18, p. 835. This report includes experimental procedures, results and discussion, and the following tables:

(1) Lattice parameters of equiatomic compounds. The table covers 59 alloys, their type, structure, and metallographic observations.
(2) Calculated and observed d spacings and intensities for TiPt.
(3) Calculated and observed d spacings and intensities for GdNi.
(4) Calculated and observed d spacings and intensities for LuNi.
(5) Observed and calculated values of d spacings and intensities for HoIr.

The alloys were prepared by arc melting on a water-cooled copper hearth under argon atmosphere. The arc-melted buttons were homogenized in evacuated capsules at temperatures approximately below their melting points. Powder specimens for X-ray diffraction were then prepared and heat treated at the same temperature of homogenation.

X-ray powder photographs were taken with CrKα or CuKα radiation and a powder camera. The lattice parameters for patterns showing a bc cubic structure were obtained by an extrapolation method. For patterns showing an orthorhombic structure, indices were obtained by the use of Battelle Indexing Charts. A computer was used to calculate d spacings, for comparison with observed d spacings, and to calculate F^2. Intensity calculations were made to verify the assignment of indices.

Notes:

1. This information should be of interest to metallurgists and crystallographers working with new metal alloys.
2. Inquiries concerning this innovation may be directed to:

Office of Industrial Cooperation
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439
Reference: B68-10198
Source: A. E. Dwight, R. A. Conner, Jr., and J. W. Downey
Metallurgy Division
(ARG-10092)

Patent status:

Inquiries about obtaining rights for commercial use of this innovation may be directed to:

Mr. George H. Lee, Chief
Chicago Patent Group
U.S. Atomic Energy Commission
Chicago Operations Office
9800 South Cass Avenue
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