

KARL GSCHNEIDNER, JR.*

University of California
Los Alamos Scientific Laboratory
Los Alamos, New Mexico

and
Department of Physics and Materials Research Laboratory
University of Illinois
Urbana, Illinois

*Influence of Magnesium on Some
of the Physical Properties of Cerium***

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ABSTRACT

The lattice parameters and low-temperature thermal expansion behaviors of a number of cerium-rich alloys containing up to 13 a/o magnesium have been examined. The lattice parameter data indicate a maximum solid solubility of 5.9 a/o magnesium in γ -Ce, and a positive deviation from Vegard's law. The dilation data show that magnesium decreases the temperature of the γ - α electronic transformation in cerium at the rate of about 11°K per 1 a/o magnesium. The composition dependence of the transformation temperature, the length change at the transformation and the coefficient of expansion indicate that a critical point would exist at about 10 a/o magnesium, 1 atm and 0°K, if this amount of magnesium were soluble in cerium. Magnesium is found to stabilize γ -Ce with respect to β -Ce; i.e., it tends to prevent the formation of the hexagonal phase. A comparison of these results with those reported earlier indicate that the α - γ transformation temperature depends on the average concentration of electrons in the valence band.

Some of the properties of the cerium stock used in this investigation are compared with those of cerium metal previously used in earlier studies.

* Permanent address: Department of Metallurgy and Institute for Atomic Research, Iowa State University, Ames, Iowa.

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