phase could be obtained by proper cooling techniques. All attempts to produce this phase, however, were unsuccessful.

Although these results were negative, they may be helpful in determining the impurity or impurities which may be responsible for the different behaviors.

Lattice Parameters of Cerium-Magnesium Alloys. The lattice parameter-versus-composition data are shown in figure 2, where it is seen that magnesium decreases the lattice parameter of cerium until the solubility limit (corresponding to $450°C \pm 10°C$, $723° \pm 10°K$) of 5.9 a/o magnesium is reached. A complete listing of the lattice parameters of these alloys is given in Appendix I. At magnesium concentrations greater than 5.9 a/o, two phases co-exist, γ-Ce solid solution and the intermetallic compound CeMg (CsCl, *B2* type). In the two-phase region the weighted, mean lattice parameter of γ-Ce saturated with magnesium was found to be 5.1321 ± 0.0002 Å.

The solubility limit at $450° \pm 10°C$ as determined from figure 2 was used to draw the solid solvus line between γ-Ce and the two phases γ-Ce + CeMg in figure 1. It should be noted that the slope of this line is not known. It was drawn with the positive slope shown in figure 1, since this slope agrees quite well with the construction proposed by Vogel and Heumann[4] for the cerium-magnesium phase diagram.

The lattice parameter-composition curve appears to be linear between 0.5 and 4.2 a/o and is reasonably assumed to remain linear between 4.2 and 5.9 a/o magnesium, the solid solubility limit. Because of its linearity and the large change in lattice parameter with composition (0.0049 Å per 1 a/o), this curve was used in determining the compositions of specimens that were not chemically analyzed. The uncertainty in the compositions determined by this technique is generally less than ± 0.10 a/o (see Appendix I). The uncertainty in the composition was estimated in the following manner: (1) a change of 0.0001 Å in the lattice parameter is equivalent to a change of 0.02 a/o; (2) the uncertainty of the true location of the a_0-versus-composition line in the single phase region (figure 2) was estimated to be ± 0.0002 Å or ± 0.04 a/o; and (3)

the uncertainty of the lattice parameter of the alloy, which is of the order of ± 0.0003 Å or ± 0.06 a/o, was added to that obtained [in] (2) to give the estimated error for the composition. Thus, it is [seen] that this technique afforded a rapid and reasonably accurate method of determining the compositions of the single-phase alloys.
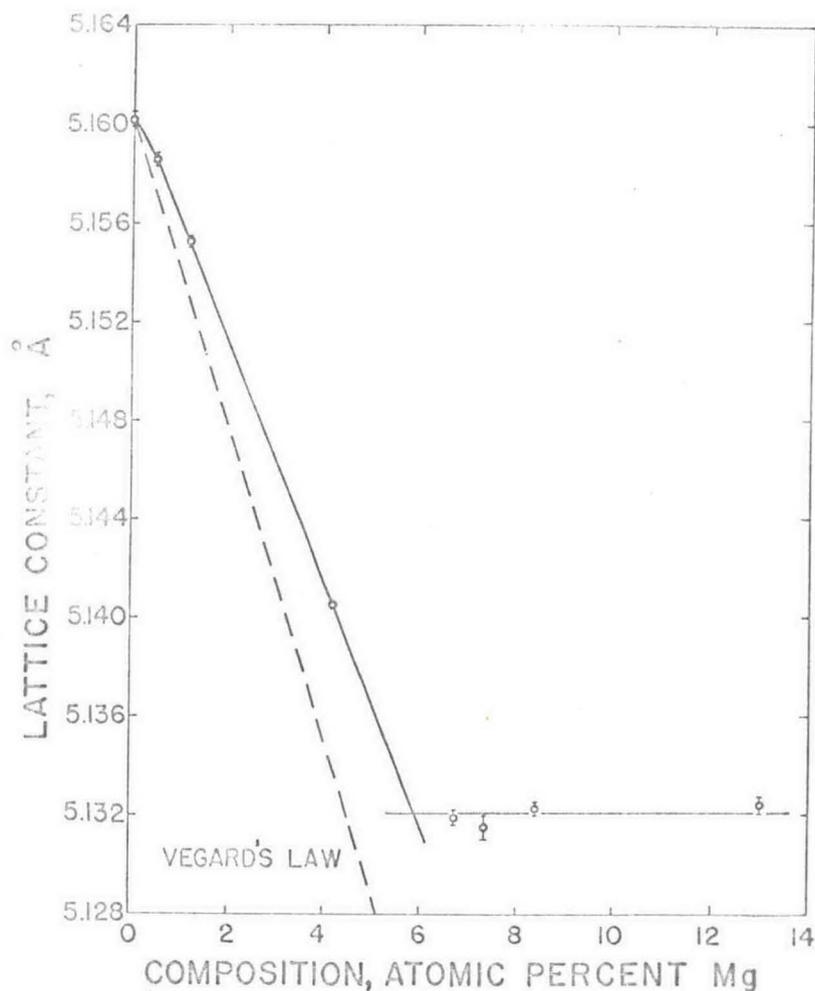
Fig. 2. Lattice parameters of some cerium-magnesium alloys as a function of composition.