

Disordered Modifications of Cobalt Molybdate. J. CHOJNACKI AND R. KOZŁOWSKI. Department of Crystal Chemistry and Crystal Physics, Jagiellonian University, Cracow, Poland. The structures of recently discovered new high temperature modifications of cobalt molybdate, a' and a'' -CoMoO₄, were determined. a' and a'' -CoMoO₄ appear after the phase a -Co-MoO₄ is heated above the temperature range 700–1000°C. They seem to be the disordered modifications of a -CoMoO₄ with metal atoms distributed at random in a -CoMoO₄ oxygen network. The $F(hkl)$ -values, calculated for variously disordered a -CoMoO₄ structure, were compared with the observed intensities of diffraction lines changing in the course of $a \rightarrow a'$ and $a \rightarrow a''$ transitions. It was concluded that a'' -CoMoO₄ has completely disordered structure with random distribution of both Co and Mo atoms in oxygen interatomic voids. The a' -CoMoO₄ is partly disordered modification, with random distribution of some cations only. The temperature and the kind of order–disorder transition depend on the method of preparation of a -CoMoO₄ samples. The disordered modifications of cobalt molybdate may be supercooled even to room temperature, before it transforms rapidly into low-temperature b -CoMoO₄ form.

On the Crystal Structures of the Fluorite-Related Intermediate Rare-Earth Oxides. P. KUNZMAN AND L. EYRING. Department of Chemistry, Arizona State University, Tempe, Arizona 85281. The binary oxides of the rare earth elements are, except for the A- and B-type sesquioxides, members of a fluorite-related homologous series R_nO_{2n-2} ($n = 4, 6, 7, 9, 10, 11, 12, \infty$ are well established and a related phase with $n = 10\frac{1}{3}$ has been reported). In this paper an electron optical study of members of the series is discussed which reveals the unit cell dimensions and possible space groups of the intermediate phases as well as the transformation matrices in terms of the fluorite substructure. This information reveals the structural relationships among the members of the series as well as the highest common structural feature involved. Structures are proposed for members of this series consistent with the new results obtained and with the data already in existence.

Etude des Propriétés Magnétiques de la Variété Monoclinique du Monogermaniure de Fer. C. MAX, G. LE CAËR, AND B. ROQUES. Laboratoire de Chimie Minérale B, Université de Nancy I, Case Officielle No. 140, 54037, Nancy Cedex, France. One of the three allotropic varieties of iron monogermanide has been studied. This phase includes three iron sites located respectively at the lattice points $4(i)$, $2(a)$, and $2(c)$. Magnetic measurements revealed the existence of two transition points and an antiferromagnetic behavior, not totally compensated. Using the Mössbauer effect the nature of these magnetic transformations was further studied. It was confirmed by X-ray diffraction spectra and dilatometer measurements. The Mössbauer sites were identified with the crystallographic ones; the magnitude of the hyperfine fields and of the isomer shift are discussed in terms of spd hybridization. Mössbauer spectroscopy reveals further information on the magnetic interaction existing between the three iron sublattices. These conclusions are confirmed by the effects seen when cobalt and nickel are substituted for iron.

A Study of the New Perovskite Solid-Solution Series $SrFe_xRu_{1-x}O_{3-y}$ by Ruthenium-99 and Iron-57 Mössbauer Spectroscopy. T. GIBB, R. GREATREX, N. N. GREENWOOD, AND K. G. SNOWDON. Department of Inorganic and Structural Chemistry, The University of Leeds, Leeds LS2 9JT, England. The magnetic and structural properties of the solid solution $SrFe_xRu_{1-x}O_{3-y}$ ($0 \leq x \leq 0.5$) have been studied using ⁵⁷Fe and ⁹⁹Ru Mössbauer spectroscopy and other techniques. These phases, which are here reported for the first time, have a distorted perovskite structure. The iron substitutes exclusively as Fe³⁺ and thereby causes oxygen deficiency, but has little effect on the magnetic behavior of the Ru⁴⁺ until $x > 0.2$, whereupon the metallic band-system begins to revert to a localized electron structure. The properties of a sample with $x = 0.3$ are complex and intermediate in character. For $x > 0.3$ the oxygen deficiency is reduced by substantial oxidation to Ru⁵⁺ until at $x = 0.5$ the system corresponds to Sr₂Fe³⁺Ru⁵⁺O₆.