columbite and the $M^{II}Ta_2^VO_6$ and $M^{II}sb_2^VO_6$ trirutile series. It is shown that the trirutile structure is remarkably more rigid than the columbite structure, which explains that it exists only for divalent cations of small size. Then the vibrational spectra of the rutile $FeSbO_4$ are compared with those of the trirutile MSb_2O_6 compounds.

The Crystal Structure of AgTlX Phases ($X = S$, Se, Te). J. C. TEDENAC, B. GARDES, G. BRUN, E. PHILIPPOT, AND M. MAURIN, Laboratoire de Chimie Minerale C, Universite des Sciences et Techniques du Languedoc Place E, Bataillon-34060 Montpellier Cedex, France. The isomorphism of ternary compounds AgTlX (X = S, Se, Te) is pointed out. The compounds have an orthorhombic unit cell with four formulas and the space group is *Pnam*. The crystal structure of AgTlTe has been solved with a final R value: 0.098. Silver and tellurium atoms are covalently bonded in chains of $AgTe_4$ tetrahedra delimiting channels where thallium atoms are located.

High-Pressure Synthesis of Rock Salt-Type CdS Using Metal Sulfide Additives. KENZO SUSA, TOSHIO KOBAYASHI, AND SATOSHI TANIGUCHI, Central Research Laboratory, Hitachi Ltd., Tokyo 185, Japan. The retention of the high-pressure phase for CdS with the rock salt structure is investigated in the presence of metal sulfide additives. The most effective metal sulfides for the retention are CaS, SrS, PbS, SnS, GeS, and rare earth sulfides. X-Ray measurements of lattice parameters indicate that the retained CdS phases are metal-substituted solid solutions. The retention properties are discussed from the crystal chemistry point of view.

A Study of Magnetic Interactions in M_2EuRuO_6 (M = Ca, Sr, Ba) by ^{151}Eu Mössbauer Spectroscopy. T. C. GIBB AND R. GREATREX, Department of Inorganic and Structural Chemistry, The University of Leeds, Leeds LS2 9JT, England. The series of compounds M_2EuRuO_6 (M = Ca, Sr, Ba) has been studied by ^{151}Eu Mössbauer spectroscopy. X-Ray data show them to be structurally derived from the ABO_3 perovskite lattice, but only the Ba compound gives positive evidence to suggest ordering of the Eu^{3+}/Ru^{5+} cations. The ^{151}Eu resonance shows magnetic hyperfine splitting at 4.2 K. The Ru^{5+}–O–Eu^{3+}–O–Ru^{5+} exchange takes place by admixture of low-lying excited states into the diamagnetic $J = 0$ ground-state of the Eu^{3+}. The Curie temperatures are approximately 18, 31, and 42°K for the Ca, Sr, and Ba compounds. Detailed analysis shows that substantial disorder of cations occurs, being quite large for Ca, <8% for Sr, and <5% for Ba. However, it appears that considerable canting of the Ru^{5+} spins takes place in the Ba compound immediately below the Curie temperature as a result of the disorder and low anisotropy at the Ru sites. This effect is much reduced in the more distorted Sr compound.

Ionic Conductivity in Sodium, Potassium, and Silver β''-Alumina. JACQUELINE L. BRIANT AND GREGORY C. FARRINGTON, General Electric Corporate Research and Development, P.O. Box 8, Schenectady, New York 12301. This paper presents measurements of the ionic conductivity in single crystals of β''-alumina ($0.84M_2O \cdot 0.67MgO \cdot 5.2Al_2O_3$, M = Na, K, Ag). Single crystals of sodium β''-alumina were grown from a melt of Na_2O, MgO, and Al_2O_3 at 1660 to 1730°C. Selected crystals were converted to the other isomorphs by ion exchange. The conductivity of sodium β''-alumina varies from 0.18 to 0.010 $(\text{ohm cm})^{-1}$ at 25°C according to crystal growth conditions. Potassium β''-alumina has the unusually high room temperature conductivity of 0.13 $(\text{ohm cm})^{-1}$. Silver β''-alumina has a slightly lower conductivity, $4 \cdot 10^{-3}$ $(\text{ohm cm})^{-1}$ at 25°C. The activation energies of sodium and potassium β''-alumina decrease with increasing temperature while that of silver β''-alumina is constant from −80 to 450°C.

Electrical, Magnetic, and EPR Studies of the Quaternary Chalcogenides $Cu_2A^{II}B^{IV}X_4$ Prepared by Iodine Transport. L. GUEN AND W. S. GLAUNSINGER, Laboratoire de Chimie des Solides, Faculte des Sciences, Universite de Nantes 44072 Nantes Cedex, France. Electrical, magnetic, and electron paramagnetic resonance (EPR) measurements have been made on crystals and powders of several quaternary chalcogenides of the type $Cu_2A^{II}B^{IV}X_4$, where A^{II} = Zn, Mn, Fe, or Co; B^{IV} = Si, Ge, or Sn; and X = S or Se. The electrical properties of these compounds are extrinsic, but their magnetic properties do not appear to be affected by impurities. The magnetic moments of the Cu_2MnBX_4 compounds decrease with increasing covalency of the Mn–X bond, and those of Cu_2FeGeS_4 and Cu_2CoGeS_4 reflect an orbital contribution to the moment. Both the Weiss constants and the magnetic ordering temperatures in these compounds show an evolution from antiferromagnetism to ferromagnetism with increasing separation between the moments. Magnetic measurements on single crystals of Cu_2MnGeS_4, Cu_2CoGeS_4, and Cu_2FeGeS_4 indicate that only the latter is anisotropic. EPR measurements on crystals and powders of Cu_2ZnGeS_4 doped nominally with 0.1% Mn reveal that Mn^{2+} experiences an axial distortion and that the bond ionicity is the same as in ZnS.