curves transform from Q type for Fe_2NiO_4 to P type for $x \geqslant 0.1$. The nature of interactions between magnetic ions has been deduced from sign and values of n, α, β.

Etude Magnetique de Compose $SrTb_2Fe_2O_7$. Determination des Structures Magnetiques par Diffraction Neutronique. D. Samaras, A. Collomb, J. C. Joubert and E. F. Bertaut. Laboratoire des Rayons X, C.N.R.S., B. P. No. 166, Centre de Tri, 38042 Grenoble Cedex, France. Magnetic properties of the compound $SrTb_2Fe_2O_7$ (space group $P4_2/mnm$) have been investigated by magnetic measurements of susceptibility and magnetization and by neutron diffraction. The Néel temperature of the iron sublattice is 628°K. At 295°K the configuration of the Fe^{3+} spins is $G_x^- \pm A_y^-$ (antiferromagnetic). At 4.2°K the configuration of Tb^{3+} spins is represented by the modes $F_x^+ C_y^+ A_z^-$ coupled in the representation Eg with the mode A_z^- of the Fe^{3+} spins. The values of the magnetic moments corresponding to the different modes are obtained from the magnetic structure refinement. The value of the F_x^+ ferromagnetic mode of Tb^{3+} is 2.6 μ_B/ion at 4.2°K. At room temperature the orientation of Fe^{3+} spins perpendicularly to the c axis seems to be due to a site anisotropy, the easy direction coinciding with the axis of the FeO_5 bipyramids. The reorientation of Fe^{3+} spins along the c axis observed at 4.2°K can be explained by a strong Fe^{3+}–Tb^{3+} coupling which overcomes the Fe^{3+} one ion anisotropy. The low site symmetry (m) of Tb lifts the degeneracy completely and gives rise to a pseudodoublet (formed by two singlets of small separation) associated with an Ising-like behavior. In fact the Tb^{3+} spins are in the m planes, containing the c-axis.

Etude de Nouveaux Oxydes Ternaires d'Europium Divalent, de Type Bronze Oxygene de Tungstene Quadratique et de Type Perovskite. J. P. Fayolle, F. Studer, G. Desgardin, and B. Raveau. Groupe de Cristallographie et Chimie du Solide, ERA 305, Laboratoire de Chimie Minérale du Solide, Université de Caen, 14032 Caen, France. New divalent europium ternary oxides have been isolated and studied by X-ray diffraction and electron microscopy. Fifteen of them crystallize with tetragonal bronzelike structures: EuM_2O_6; $Eu_9M_{34}O_{94}$ (M = Ta, Nb); $EuBCM_5O_{15}$ (B = Ca, Eu, Ba; C = Na, K; M = Ta, Nb) and $Eu_{0.60}NbO_3$. The compound Eu_xNbO_3 ($0.80 \leqslant x \leqslant 0.90$) is of perovskite type. Structural evolution of these phases, compared to the strontium homologous compounds, is discussed.

Etude Structurale des Systemes Ln_2S_3–GeS_2. A. Michelet, A. Mazurier, G. Collin, P. Laruelle, and J. Flahaut. Laboratoire de Chimie Structurale, C.N.R.S. No. 200, Faculté des Sciences Pharmaceutiques et Biologiques, 4, Avenue de l'Observatoire, Paris 6, France. In the systems formed between the Ln_2S_3 sulfides of the rare earth and GeS_2, three kinds of new crystal structures are observed: $Ln_4Ge_3S_{12}$, rhombohedral $R3c$; Ln_2GeS_5 monoclinic $P2_1/a$; $Ln_6Ge_{2.5}S_{14}$, hexagonal superstructure $P6_3$ of the $Ce_6Al_{10/3}S_{14}$ structure. The three structures are established from single crystals studies. Germanium atoms are inside isolated tetrahedra of sulfur atoms. Lanthanide atoms are inside two or three-capped trigonal prisms, often with very long equatorial Ln–S distances. The La_2GeS_5 compound belongs to the series of two anions compounds, with layers of [LaS] composition alternating with GeS_4 tetrahedra.

Influence de la Substitution de fer sur les Proprietes Magnetiques des Solutions Solides $Ca_2Fe_{2-x}M_xO_5$ (M = Al, Sc, Cr, Co, Ga). J. C. Grenier, M. Pouchard, and P. Hagenmuller. As dicalcium ferrite the derived phases of formula $Ca_2Fe_{2-x}M_xO_5$ (M = Al, Sc, Cr, Co, Ga) contain two different sites for the trivalent cations. The cationic distribution between the sites is obtained by Mössbauer spectroscopy. The evolution of the ordering temperature can be explained by this distribution; the thermal variation of the magnetic susceptibilities allows an estimation of the relative values of the couplings.

Magnetic Ordering in Ba_2MnReO_6. C. P. Khattak, D. E. Cox and F. F. Y. Wang. Department of Materials Science, SUNY at Stony Brook, New York 11790. The ordered perovskite Ba_2MnReO_6 has been reported to be ferrimagnetic with a Curie temperature of 105°K and a saturation moment of 3.9 μ_B, consistent with antiparallel coupling of spin-only moments of the combination Mn^{2+}–Re^{6+}. Neutron diffraction studies on polycrystalline material have confirmed that the Mn and Re ions are completely ordered chemically. At 4.6°K, two sets of magnetic peaks were observed, the stronger consistent with the ferrimagnetic model, and the weaker characteristic of antiferromagnetic ordering of the first kind, indicative of some canting of the moments in adjacent (001) planes. The moment on the Mn ion was found to be 4.8 μ_B, but that on the Re ion was found to be less than 0.2 μ_B if a localized free-ion factor is assumed. These results can be interpreted in terms of an extended spin density distribution due to covalent bonding in the ReO_6 clusters.

Les Phases Na_4XO_4 ($X = Si, Ti, Cr, Mn, Co, Ge, Sn, Pb$) et K_4XO_4 ($X = Ti, Cr, Mn, Ge, Zr, Sn, Hf, Pb$). R. OLAZCUAGA, J. M. REAU, M. DEVALETTE, G. LE FLEM, AND P. HAGENMULLER. Service de Chimie Minérale Structurale de l'Université de Bordeaux I, C.N.R.S., 351 cours de la Libération, 33405 Talence, France. The isotypic Na_4XO_4 (X = Si, Ti, Cr, Mn, Co, Ge, Sn, Pb) and K_4XO_4 (X = Ti, Cr, Mn, Ge, Zr, Sn, Hf, Pb) phases crystallize in the triclinic system. Optical and magnetic properties of the chromium, manganese and cobalt compounds show that the transition element has a tetrahedral surrounding.

First Order Magnetic Transition, Magnetic Structure and Vacancy Distribution in Fe_2P. R. WÄPPLING, L. HÄGGSTRÖM, T. ERICSSON, S. DEVANARAYANAN, E. KARLSSON, B. CARLSSON, AND S. RUNDQVIST. Institute of Physics and Chemistry, Uppsala University, S-751 21 Uppsala 1, Sweden. The para to ferromagnetic transition in Fe_2P has been studied using Mössbauer spectroscopy. The magnetic hyperfine fields drop abruptly from about half of their saturation values to zero at 214.5°K indicating a first order transition. The isomer shifts show a discontinuous change at the transition point. For some samples the transition takes place over a wide temperature range, probably due to impurities and other imperfections in the samples. From the magnetic hyperfine fields at 15°K the magnetic moments can be deduced to be 1.14 μB and 1.78 μB for Fe(1) and Fe(2), respectively. An assignment of the components in the Mössbauer spectra to the two crystallographically nonequivalent iron positions has been made from the temperature variation of the spectra. The ordering of metal vacancies has been investigated by a Mössbauer study of a nonstoichiometric Fe_2P sample and by an X-ray diffraction study of a nonstoichiometric Mn_2P crystal.

Mössbauer and X-Ray Studies of Fe_5PB_2. L. HÄGGSTRÖM, R. WÄPPLING, T. ERICSSON, Y. ANDERSSON, AND S. RUNDQVIST. Institute of Chemistry and Institute of Physics, Uppsala University, S-751 21 Uppsala 1, Sweden. Mössbauer spectroscopic and X-ray crystallographic studies of the ternary compound Fe_5PB_2 have been undertaken. It is suggested that in the nonstoichiometric compound part of the phosphorus positions are occupied by boron atoms. The Mössbauer data indicate that Fe_5PB_2 is a simple ferromagnet with the tetragonal axis as the direction of easy magnetization, the moments being ~1.6 μB and ~2.2 μB for Fe(1) and Fe(2), respectively.

Les Bronzes de Cobalt K_xCoO_2($x < 1$). L'Oxyde $KCoO_2$. C. DELMAS, C. FOUASSIER, AND P. HAGENMULLER. Service de Chimie Minérale Structurale de l'Université de Bordeaux I, C.N.R.S., 351 cours de la Libération, 33405 Talence, France. The reaction between potassium and cobalt oxides leads to two bronze-type phases with formula K_xCoO_2 ($x = 0.50$ and $x = 0.67$) and to a $KCoO_2$ oxide with two allotropic forms. The lattice of K_xCoO_2 is built up by sheets of $(CoO_2)_n$ octahedra between which potassium ions are inserted with a prismatic coordination; they have a metallic behaviour. The structures of both $KCoO_2$ varieties are related to the cristobalite type. The oxidations state of cobalt is discussed on the basis of structural, optical and magnetical data.