

0; 0.5; 1; 1.5; 2; 2.5; 3; 3.5; 4). A thermoelectric cell was constructed, which works automatically between 14 and 320 K with a precision better than 5%. For high concentrations in selenium, the thermoelectric power remains negative over the whole temperature range. Such is not the case with tellurium-rich compounds where the Seebeck coefficient, negative at 320 K, becomes positive at lower temperatures. Anomalies are observed on the $S = f(T)$ curves at temperatures T_i in the vicinity of the magnetic transitions. Transport properties for selenium-rich compounds are discussed in terms of narrow-band conduction. Hole conduction, which appears for $x \geq 3$ at low temperature, is interpreted as due to an overlapping band conduction between $3d$ levels and the valence band.

About Stannous Fluoride SnF_2 , III. Thermal Expansion. G. DENES, Laboratoire de Chimie Minérale D, Université de Rennes I, 35042 Rennes Cédex, France. The unit cell parameters of SnF_2 were measured from -200 to 190°C . The tensor of thermal expansion of the three phases (α , β , and γ) was computed from the expansion in each ($h k l$) direction by a least-squares method. The thermal expansion of each phase is related to its crystal structure and physical properties (molecular structure of α - SnF_2 , ferroelastic properties of the β -phase).

Phase Equilibria of the Oxide-Hydroxide-Halide Systems of Sm, Eu, and Gd. The Crystal Structure of $\text{Gd}_2\text{O}(\text{OH})_5\text{Br}_2$. EDWARD T. LANCE-GOMEZ* AND JOHN M. HASCHKE, Procter and Gamble Company, Winton Hill Technical Centers, 6060 Center Hill Road, Cincinnati, Ohio 45224. An investigation of hydrothermal phase equilibria in the halide-containing (Cl, Br, I) systems of Sm, Eu, and Gd has shown that diversities in behavior occur across the lanthanide (Ln) series and within the halide group. In the chloride systems, the trihydroxide, two phases at a Cl/Ln ratio of 0.4 and $\text{Ln}(\text{OH})_2\text{Cl}$ phases are found. Equilibria in the bromide systems are more complex; $\text{Ln}(\text{OH})_3$, $\text{Ln}_2(\text{OH})_{18}\text{Br}_3$, a high-temperature phase at $\text{Br}/\text{Ln} = 0.45$, $\text{Ln}_2\text{O}(\text{OH})_5\text{Br}_2$, and $\text{Ln}(\text{OH})_2\text{Br}$ are observed. A single iodide-containing phase, $\text{Ln}(\text{OH})_{2.67}\text{I}_{0.33}$ is found. X-Ray diffraction data are reported for all the previously unreported phases and the thermal decomposition behavior of representative phases is described. The results of a single crystal X-ray structure determination of orthorhombic ($Pmmn$) $\text{Gd}_2\text{O}(\text{OH})_5\text{Br}_2$ are reported and discussed.

Neutron Powder Diffraction and Magnetic Measurements on CsMnI_3 . H. W. ZANDBERGEN, Gorlaeus Laboratories, University of Leiden, P.O. Box 9502, 2300 RA Leiden, The Netherlands. Results of neutron powder diffraction and magnetic measurements on single crystals of CsMnI_3 are reported. Three-dimensional ordering takes place at $T_c = 11.1(3)$ K. Above T_c very broad peaks occur in the neutron powder diffraction diagram, indicating one-dimensional correlations along the chain. Below T_c the Mn^{2+} ions are coupled antiferromagnetically along the chain. Interchain exchange leads to a 120° structure, slightly distorted due to anisotropy. One-third of the chains have their magnetic moment parallel to the c axis and the rest of the chains have magnetic moments making an angle of $50(2)^\circ$ with the c axis. The magnetic moment as found from neutron diffraction extrapolated to 0 K is $3.7(1) \mu_B$, indicating a considerable zero-point spin reduction. The intrachain exchange J/k was found to be $-9.1(1)$ K, whereas the ratio of the inter- to intrachain interaction was determined as $|J'/J| = 5 \times 10^{-3}$. A spin flop occurs at $H = 54$ kOe on application of a magnetic field parallel to the x axis. When a field perpendicular to the c axis is applied a spin reorientation occurs at 1 kOe.

Phase Transition in the Family $\text{La}_x\text{Bi}_{4-x}\text{Ti}_3\text{O}_{12}$ in Relation to Lattice Symmetry and Distortion. MASAJI SHIMAZU*, JUNZO TANAKA, KUNITAKA MURAMATSU, AND MASAYUKI TSUKIOKA, National Institute for Research in Inorganic Materials, Sakura-mura, Niihari-gun, Ibaraki 305, Japan. The ferroelectric phase transition in the family $\text{La}_x\text{Bi}_{4-x}\text{Ti}_3\text{O}_{12}$ was investigated by X-ray diffractometry and differential scanning calorimetry. The crystal symmetry is orthorhombic in the range $1 > x \geq 0$ and tetragonal in $x \geq 1$. It was found that the shift of the phase transition temperature is closely related to crystallographic symmetry and lattice distortion. (1) As the value of x increases, the ratio of lattice parameters, a/b , decreases toward 1. (2) In the range $1 > x \geq 0$, the lattice distortion increases with increase of x ; just before x exceeds about 1, the distortion reaches a maximum. (3) As x exceeds about 1, the distortion decreases distinctively. (4) In the orthorhombic region, the phase-transition temperature decreases with increase of x . (5) In the tetragonal region, the transition does not occur. (6) The relation of transition temperature T to x is represented by a nonlinear function.

Heat Capacity Measurements of $\text{Mn}_2\text{Fe}_{3-x}\text{O}_4$. KEIJI NAITO*, HIDEAKI INABA, AND HARUYOSHI YAGI, Department of Nuclear Engineering, Nagoya University, Furo-cho, Chikusa-ku, Nagoya,