

The Defect Structure of CdTe; Self-Diffusion Data. S. S. CHERN AND F. A. KROGER. Department of Materials Science, University of Southern California, University Park, Los Angeles, California 90007. Cadmium and Te tracer self-diffusion was studied for pure and indium-doped CdTe. Analysis of the results leads to a point defect model in which imperfections with various charges play a role. Expressions for the tracer diffusion coefficients by various mechanisms and for the diffusion coefficients of individual point defects are arrived at.

Magnetic Susceptibility and Torque Measurements of FeV_2S_4 , FeV_2Se_4 , and $FeTi_2Se_4$. S. MURANAKA AND T. TAKADA. Institute for Chemical Research, Kyoto University, Uji, Kyoto-fu, Japan. Magnetic susceptibility and torque measurements of FeV_2S_4 , FeV_2Se_4 , and $FeTi_2Se_4$ were made using the powder and the single-crystal samples. The inverse susceptibility of FeV_2S_4 , FeV_2Se_4 , and $FeTi_2Se_4$ changed its slope at 850, 820, and 700 K, respectively, at which temperature the order-disorder transition of cation vacancies should seem to take place. Above these temperatures the paramagnetic moment obtained for these compounds was in the range of 5.26–5.37 μ_B , close to that of the high spin state Fe^{2+} . Below these temperatures the paramagnetic moment was reduced to 4.23–4.35 μ_B . The antiferromagnetic spin axis of FeV_2S_4 was in the neighborhood of the [101] direction and that of FeV_2Se_4 and $FeTi_2Se_4$ in the direction of the c -axis. The large magnetic anisotropy observed of the c axis were attributed to the spin-orbit interaction of Fe^{2+} electrons in the trigonal crystal field.

An ^{57}Fe Mössbauer Effect of Magnetic Ordering in the Fe_2O_3 - Cr_2O_3 System. T. BIRCHALL AND A. F. REID. Division of Mineral Chemistry, CSIRO, Box 124, Port Melbourne, Australia. ^{57}Fe Mössbauer effect spectra have been obtained as a function of temperature for a series of Fe_2O_3 - Cr_2O_3 compositions in the range 0.2–75% Fe_2O_3 . From 30% of Fe_2O_3 upwards, the dependence of the reduced internal magnetic field $H_{eff}(T)/H_{eff}(T=0)$ on reduced temperature, T/T_N , was found to be identical with that for α - Fe_2O_3 , indicating the persistence of Fe_2O_3 -type ordering over this composition range. For 0.2% of $^{57}Fe_2O_3$ in Cr_2O_3 , the reduced field values fall far below those for α - Fe_2O_3 or Cr_2O_3 , and weak coupling of Fe^{3+} with Cr^{3+} has been inferred. A Morin transition similar to that for α - Fe_2O_3 was not present for samples containing 75% of Fe_2O_3 . Quadrupole shifts e were found to be negative and diminishing between 75 and 30% Fe_2O_3 , and positive between 20 and 0.2%. The limiting value at lowest dilution of $0.113 \pm .010$ mm/sec corresponds to a nuclear quadrupole coupling constant e^2qQ of $0.45 \pm .04$, approximately half that for α - Fe_2O_3 . Cone angles for Fe^{3+} spin vectors in the spin-spiral arrangements for intermediate compositions have been derived, and are similar to, but less extreme than those deduced from neutron diffraction data.

Sur les Propriétés Electriques et Magnétiques des Phases M_xZrS_2 ($M = Fe, Co, Ni$). L. TRICHET, J. ROUXEL, AND M. POUCHARD. Laboratoire de Chimie Minerale A, E.R.A. No. 472, 38 Boulevard Michelet, 44037 Nantes Cedex, France. The M_xZrS_2 systems with $M = Fe, Co, Ni$ have been investigated. Nonstoichiometric phases are observed with M in the tetrahedral sites between ZrS_2 layers. Electric measurements characterize a semiconducting behavior and suggest the occurrence of trigonal zirconium + III clusters. Magnetic measurements seem to confirm also M-M bond formation.

The Synthesis and Crystal Structure of $CaCu_3Mn_4O_{12}$: A New Ferromagnetic Perovskite-like Compound. J. CHENAVAS, J. C. JOUBERT, M. MAREZIO, AND B. BOCHU. Laboratoire des Rayons X, C.N.R.S., Rue des Martyrs, B.P. 166, 38042 Grenoble Cedex, France. Single crystals of $CaCu_3Mn_4O_{12}$, a new ferromagnetic perovskite-like compound ($T_c \simeq 160^\circ C$), have been synthesized at 50 kbar and $1000^\circ C$. By X-ray analysis it was found to be cubic ($a = 7.241 \text{ \AA}$), space group $Im\bar{3}$ with two molecules per unit cell. The $2Ca^{2+}$ and $6Cu^{2+}$ cations occupy the A -sites of the ideal perovskite structure while the $8Mn^{4+}$ cations occupy the B -sites. In the $Im\bar{3}$ space group the sites occupied by the calcium and copper cations have different point symmetry and therefore the 12-oxygen polyhedra have different distortions. The Ca cations are surrounded by slightly distorted isosahedra, the Ca-O distance being 2.562 \AA . The 12 oxygens around the copper cations are arranged as three mutually perpendicular rectangles of different size, the smallest and the largest being almost squares. The three sets of Cu-O distances are 1.942, 2.707, and 3.181 \AA , respectively. The octahedral Mn-O distance is 1.915 \AA . This arrangement is similar to that one found in $NaMn_3O_{13}$. A comparison between the two structures and a discussion of their thermal data are given.