

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 FeV₂S₄, FeV₂Se₄, and FeTi₂Se₄. S. MURANAKA AND T. TAKADA. Institute for Chemical Research, Kyoto University, Uji, Kyoto-fu, Japan. Magnetic susceptibility and torque measurements of FeV₂S₄, FeV₂Se₄, and FeTi₂Se₄ were made using the powder and the single-crystal samples. The inverse susceptibility of FeV₂S₄, FeV₂Se₄, and FeTi₂Se₄ 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 Fe²⁺. Below these temperatures the paramagnetic moment was reduced to 4.23–4.35 μ_B . The antiferromagnetic spin axis of FeV₂S₄ was in the neighborhood of the [101] direction and that of FeV₂Se₄ and FeTi₂Se₄ in the direction of the *c*-axis. The large magnetic anisotropy observed of the *c* axis were attributed to the spin-orbit interaction of Fe²⁺ electrons in the trigonal crystal field.

An ⁵⁷Fe Mössbauer Effect of Magnetic Ordering in the Fe₂O₃-Cr₂O₃ System. T. BIRCHALL AND A. F. REID. Division of Mineral Chemistry, CSIRO, Box 124, Port Melbourne, Australia. ⁵⁷Fe Mössbauer effect spectra have been obtained as a function of temperature for a series of Fe₂O₃-Cr₂O₃ compositions in the range 0.2–75% Fe₂O₃. From 30% of Fe₂O₃ upwards, the dependence of the reduced internal magnetic field $H_{\text{eff}}(T)/H_{\text{eff}}(T=0)$ on reduced temperature, T/T_N , was found to be identical with that for α -Fe₂O₃, indicating the persistence of Fe₂O₃-type ordering over this composition range. For 0.2% of ⁵⁷Fe₂O₃ in Cr₂O₃, the reduced field values fall far below those for α -Fe₂O₃ or Cr₂O₃, and weak coupling of Fe³⁺ with Cr³⁺ has been inferred. A Morin transition similar to that for α -Fe₂O₃ was not present for samples containing 75% of Fe₂O₃. Quadrupole shifts ϵ were found to be negative and diminishing between 75 and 30% Fe₂O₃, 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 -Fe₂O₃. Cone angles for Fe³⁺ 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_xZrS₂ (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_xZrS₂ systems with M = Fe, Co, Ni have been investigated. Nonstoichiometric phases are observed with M in the tetrahedral sites between ZrS₂ 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 CaCu₃Mn₄O₁₂: 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 CaCu₃Mn₄O₁₂, a new ferromagnetic perovskite-like compound ($T_c \simeq 160^\circ\text{C}$), have been synthesized at 50 kbar and 1000°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 2Ca²⁺ and 6Cu²⁺ cations occupy the *A*-sites of the ideal perovskite structure while the 8Mn⁴⁺ 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 Å. 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 Å, respectively. The octahedral Mn–O distance is 1.915 Å. This arrangement is similar to that one found in NaMn₃O₁₃. A comparison between the two structures and a discussion of their thermal data are given.