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Abstracts of Forthcoming Articles

Influence of Local Charge Compensation on Site Occupation and Luminescence of Apatites. G. BLASSE. Solid State Department, Physical Laboratory, University of Utrecht, Utrecht, The Netherlands. The apatite structure contains two different sites for the larger cations. It is shown that the principle of local charge compensation can predict the site occupation. This is especially important for an interpretation of the luminescence properties of a number of apatites. The predictions are compared with experimental data. The agreement is satisfactory.

Transition Metal Iodates VI: Preparation and Characterization of the Larger Lanthanide Iodates. K. NASSAU, J. W. SHIEVER, AND B. E. PRESCOTT. Bell Laboratories, Murray Hill, New Jersey 07974. In the continuation of this work, the $Ln^{III}(IO_3)_3\chi H_2O$ type N compounds (abbreviated χ_N) of La through Sm were prepared by precipitation; thermal decomposition; and by crystallization from the gel, from ambient and boiling water, and from boiling HNO_3. A total of 39 different compounds with $6 \geqslant \chi \geqslant 0$ was obtained occurring in 14 structural types including one amorphous; in addition $La_5(IO_6)_3$ and four isostructural double salts of the type $Ln(IO_3)_3 \cdot HIO_3$ were obtained. Characterization techniques used included powder X-ray diffraction, differential thermal analysis, thermogravimetric analysis, second harmonic generation, and infrared spectroscopy. Out of the total of 18 crystalline iodate structures occurring for all the lanthanides, single crystals were obtainable in 12, comprising a total of 54 compounds.

Structural Behavior of the Ferromagnetic Spinels $Al_xMo_2S_4$ and $Ga_xMo_2S_4$ Containing Tetrahedral Clusters of Molybdenum Atoms. J M VANDENBERG AND D. BRASEN. Bell Laboratories, Murray Hill, New Jersey 07974. The structure of the ferromagnetic spinels $Al_xMo_2S_4$ and $Ga_xMo_2S_4$ ($x \sim 0.5$) was determined from powder diffraction data. The Al and Ga atoms order on the tetrahedral sites. The space group is $F\bar{4}3m$; $a = 9.726$ Å for $Al_xMo_2S_4$ and 9.739 Å for $Ga_xMo_2S_4$. The Mo atoms were found to shift towards the tetrahedral site vacancies, created by the lower Al and Ga concentrations. This results in tetrahedral clusters of Mo around the vacancies. Their semiconducting and magnetic behavior was explained on the basis of the structural behavior of the molybdenum lattice in these spinel compounds.

Crystal Structure of Vanadium Suboxide $V_2O_{1\pm x}$. K. HIRAGA AND M. HIRABAYASHI. Research Institute for Iron, Steel and Other Metals, Tohoku University, Sendai, Japan. A monoclinic structure with the unit cell content $2V_7O_3$ as its derivative structure designated as V_7O_{3+x} have been determined by X-ray and electron diffraction study. In both the structures, the oxygen atoms occupy regularly special octahedral interstitial sites in the body-centered monoclinic (or pseudotetragonal) metal lattice with the axial ratio $c/a \approx 1.2$. The ordered distribution of the oxygen atoms is interpreted from the condition of minimization of the elastic strain in the vanadium lattice.

Zur Kinetik der Spinellbildung Von β-Ga_2O_3 mit Zweiwertigen Oxiden. II. Tracerdiffusion von $^{63}Ni^{2+}$ und $^{67}Ga^{3+}$ im Nickel–Gallium–Spinell. W. LAQUA. Institut für Anorganische und Analytische Chemie der Technischen Universität, Berlin, Germany. The self-diffusion coefficients of $^{63}Ni^{2+}$ and $^{67}Ga^{3+}$ have been measured in nickel–gallium spinels of the general formula $Ni_{1-y}Ga_{2+2y/3}O_4$ between 1653 and 1838°K using the restactivity method. Thin radioactive oxide layers are produced on inactive sample surfaces by sedimentation from aqueous solution. The sample composition corresponds to the solubility limit of NiO respectively β-Ga_2O_3 in the spinel lattice. It has been concluded that diffusion of Ni^{2+}- and Ga^{3+}-ions occurs via vacant cation sites. The obtained values for the two cations, which are in the same order of magnitude, are used to calculate the rational reaction constants for $NiGa_2O_4$ formation after Schmalzried. There is a satisfying agreement between these reaction constants and those values determined by thickness measurement of spinel reaction layers; the agreement between values of activation energy is very good. It is suggested that $NiGa_2O_4$ formation proceeds after the Wagner mechanism of counterdiffusion of cations.