1.954, and 1.986 Å. These values are interpreted as evidence for charge localization in the insulating phase with alternate strings of V^{4+} ions and predominantly V^{3+} ions running along the pseudorutile c-axis (3^+-chain is atoms 6-4-2-4-6 and 4^+-chain is 5-3-1-3-5). The oxygen atoms in the insulating phase relax toward V^{4+} string in the a_R and b_R directions and away from the V^{3+} string. The shear planes allow the vanadium atoms to move along the c_R axis so as to compensate for the change in length of alternate chains. Short V–V distances comparable to those in VO_2 are not observed; however, the structure has multiple possible patterns of metal–metal-bonds due to edge sharing of octahedra both along the pseudorutile c axis and between adjacent chains at the shear planes.

Transition Metal Iodates–V: Preparation and Characterization of the Smaller Lanthanide Iodates. K. Nassau, J. W. Shiever, B. E. Prescott, and A. S. Cooper. Bell Laboratories, Murray Hill, New Jersey 07974. The $Ln(IO)_3 \cdot xH_2O$ compounds of Eu through Lu, including Y, were prepared by precipitation; thermal decomposition; and by crystallization from the gel, from ambient and boiling water, and from boiling HNO_3. Six groups of compounds were obtained and characterized by powder X-ray diffraction, DTA, TGA, and infrared spectroscopy.
Two distinct structures with $x = 0$ occur for the iodates; one occurs for Eu to Lu plus Y, and the other for Yb and Lu. Two distinct structures occur for $x = 2$; one occurs for Eu–Er plus Y, and the other for Tm–Lu. One structure with $x = 4$ occurs for Gd to Lu plus Y. An amorphous phase appears as an intermediate stage during the decomposition of the tetrahydrates. All of these phases (except the amorphous one) were prepared in single crystal form and structural data will be reported elsewhere. Only the tetrahydrates have been previously reported; other compounds previously reported appear to have been mixtures.

Fluorine–Chlorine Interaction in Fluor-Chlorapatite. P. E. Mackie and R. A. Young. Georgia Institute of Technology, Atlanta, Georgia 30332. When fluorine is partially substituted for chlorine in chlorapatite, steric interactions between the F and Cl ions produce effects not directly predictable from the properties of the end members, fluorapatite and chlorapatite, alone. The proximity of the remaining chlorine ions causes some of the substituting fluorine ions to be located ~0.6 Å from their normal sites (0, 0, $\frac{1}{4}$ and 0, 0, $\frac{3}{4}$) on the halogen ion column. Some of the chlorine ions are similarly shifted >0.2 Å farther away from 0, 0, $\frac{1}{2}$. The details of the displacements have been determined from least-squares analyses of X-ray data from synthetic single-crystals. Two fluor-chlorapatite compositions were used, ~14% and ~34% substitution of F^- and Cl^- with excess halogen becoming incorporated to raise the $F/(F + Cl)$ ratios to 0.17 and 0.41, respectively. The substitution models developed are capable of explaining (i) the nonlinear effects of the fluorine–chlorine substitution and (ii) the initial stabilization and later inhibition of the monoclinic phase, with respect to the hexagonal phase, with increasing substitution of fluorine into the chlorapatite structure, and (iii) in part, the occurrence of halogens in excess of the stoichiometric two per unit cell.

Etude Structurale de Quatre Nouvelles Perovskites au Cobalt. D. Harari, P. Poix, et J. C. Bernier. Laboratoire de Chimie minérale, Batiment 420, Faculté des Sciences, 91405 Orsay, France. Four new perovskite-type compounds have been prepared: $Sr_3Co_2TeO_9$, $Sr_3Co_2WO_9$, $Ba_3Co_2TeO_9$, are cubic with unit cell parameters: $a = 4.930$ Å, $a = 7.910$ Å, and $a = 8.181$ Å. $Ba_3Co_2WO_9$ is hexagonal with unit cell parameters $a = 5.728$ Å and $c = 14.050$ Å. $Sr_3Co_2TeO_9$, $Sr_3Co_2WO_9$ and $Ba_3Co_2WO_9$ are ferrimagnetic at low temperatures. The values of the Curie constants show that the trivalent cobalt exists as the 2 electronic configurations (t_{2g}^6) and ($t_{2g}^4 e_g^2$).

Converning the Activation Energy of Solid State Reactions. N. N. Oleynikov, Yu. D. Tretyakov, and A. V. Shumyantzev. Department of Chemistry, Moscow State University, Moscow 117234, U.S.S.R. Determination of the activation energy of solid state reactions without accounting for changes in reagent defects leads one to obtain values of the energy of activation and the preexponential factor that are devoid of real physical significance. The behaviour of reacting systems is investigated with the help of $\ln k = f(1/T)$ diagrams for various lattice defect concentrations. A formula is derived which allows one to determine the solid state reaction rate constant for reacting systems with a constant concentration of lattice imperfections. Application of the derived equation is illustrated for the reaction $MgO + Fe_2O_3$ with reagents of different thermal prehistory.