in the iron sulfide-iron oxide-silica system. Activity of FeO, a(FeO), is the main factor controlling sulfide solubility in magma. Lowering of a(FeO) causes saturation and separation of an immiscible sulfide-oxide liquid phase. In this way crystallization of FeO-bearing minerals may cause sulfide liquid separation, but since these deposits are usually at or near the base of intrusions the sulfide would have to separate and settle before extensive silicate crystallization. The value of a(FeO) is also lowered by oxidizing FeO to Fe_2O_3 which may remain in the liquid or separate in magnetite and other minerals. In the experimental system, ferric-iron silicate liquids dissolve much less sulfide than ferrous liquids. Hence, rapid oxidation of silicate magma would release dissolved sulfide as sulfide-oxide liquid. Water, being readily available in the upper crust and soluble in magma, is considered to be the major source of oxygen. It can raise the oxidation state to the required degree for sulfide separation, especially when the system is open for the release of hydrogen. Igneous rocks associated with these sulfide deposits need not be highly oxidized. If the oxidized magma is sealed by solidification at its margin, it may precipitate Fe_2O_3-rich minerals and subsequently crystallize under a low oxidation state.

NEW DATA ON THE OPTICAL PROPERTIES AND TRACE ELEMENT DISTRIBUTION IN THE FELDSPARS AND WERNERITES OF S.E. MADAGASCAR

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The feldspars and the wernerites were separated from the pyroxenites, which occur in close association with the charnockites and have been considered to be of metamorphic origin. The indices of refraction of the feldspars, α, vary from 1.555 to 1.559, and γ, from 1.562 to 1.566; birefringence from 0.005 to 0.009; 2V from 73° to 85° with a negative optic sign and their anorthite contents vary from An_{52} to An_{62}—a labradorite variety. The wernerites are uniaxial negative whose indices of refraction, ϵ, vary from 1.551 to 1.568, and ω, from 1.580 to 1.607; birefringence from 0.029 to 0.039—a meionite variety. Wernerites seem to be after the feldspars, as evidenced by the presence of the skeletal lamellar twinning in wernerites. The spectrographic analyses of the feldspars and wernerites are as follows: *Feldspars*—Be, 10–110 ppm; B, 30–110 ppm; Cr, 10–25 ppm; Mn, 30–115 ppm; Co, 10–30 ppm; Ni, 3–10 ppm; Cu, 20–35 ppm; Zn, 10–38 ppm; Ga, 30–41 ppm; Sr, 1000–2000 ppm; Y, 3–10 ppm; Ba, 30–180 ppm; Yb, 1–8 ppm; and Pb, 3–15 ppm. *Wernerites*—Be, 3–36 ppm; B, 10–35 ppm; Cr, 3–7 ppm; Mn, 30–151 ppm; Co, 10–13 ppm; Ni, 3–6 ppm; Cu, 3–35 ppm; Zn, 10–15 ppm; Ga, 10–39 ppm; Sr, 315–2950 ppm; Y, 3–10 ppm; Ba, 30–150 ppm; Yb, 3–5 ppm; and Pb, 10–40 ppm. The mean R values of the feldspars and wernerites are 1.647 and 1.200 respectively, which are conspicuously similar to the R values obtained by others.

ZEMANNITE, A NEW TELLURITE MINERAL FROM MOCTEZUM, SONORA, MEXICO

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The mineral occurs as minute (less than one mm) hexagonal prisms terminated by a dipyramid. It is light to dark brown, has an adamantine lustre, and is very brittle. Optically, it is uniaxial positive; $\omega = 1.85$, $\epsilon = 1.93$. The density is greater than 4.05 g/cm³. Crystal structure study gave the following: space group $P6_3/m–C^2_{6h}$, $a = 9.41 \pm 0.02$ Å, $c = 7.64 \pm 0.02$ Å, Z = 2. The structure shows that the mineral is a zeolite-like tellurite with a negatively charged framework of $Zn_2(TeO_3)_3$ having large (diam. = 8.28 Å) open channels parallel [001]. These channels are statistically occupied by Na and H ions and possibly by H_2O. Some Fe substitutes for Zn. Partial analyses and the crystal structure analysis indicate the formula: $(Zn, Fe)_2 (TeO_3)_3 Na_xH_{2-x} \cdot yH_2O$. Strongest lines in the x-ray powder pattern (in Å for Cu $K\alpha$) are: 8.15 (10) (100), 2.778 (9) (202), 4.07 (8) (200), 2.96 (6) (112), 2.845 (6) (211), and 1.726 (6) (204, 223). Thirty-nine spacings were measured and indexed from d = 8.15 Å to d = 1.316 Å. The name is in honor of Prof. Dr. Josef Zemann, University of Vienna, who has contributed so greatly to our knowledge of the structure of tellurium compounds. The mineral and name were approved by the Commission on New Minerals and Mineral Names, I.M.A.

NICKEL-CARBONATE FROM NORTHEAST TRANSVAAL

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The first occurrence of anhydrous nickel carbonate of the calcite group is reported from the Native Pafuri Trust of Northeast Transvaal in the Republic of South Africa. The mineral is shown to be the end-member $NiCO_3$ with virtually no magnesium or calcium in substitution. A comparative analysis is presented of this material with magnesian gaspeite from both the Gaspe peninsula and from the new Kambalda nickel mine in Western Australia. Complete chemical analyses are given including extensive electron microprobe analyses. X-ray lattice parameters of these minerals are refined and compared with the chemical analyses. Infrared analyses are also presented. In addition to the first occurrence of end-member $NiCO_3$, it is found that an extensive solid solution also exists between $NiCO_3$ and $ZnCO_3$. A thorough petrological and geochemical study has been made of the associated minerals leading to the paragenesis of the mineral assemblage. Field evidence and laboratory studies indicate the $NiCO_3$ from Pafuri is a surface weathering product of primary nickel sulfides.

METASOMATIC AUREOLE OF THE WHITESTONE ANORTHOSITE

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In the area of Whitestone Lake, 20 miles N.N.E. of Parry Sound, Ontario, a massif-type anorthosite is intruded into an upper amphibolite-grade assemblage of migmatites, amphibolites and marble. Iron and titanium rich fluids emanating from the anorthosite have metasomatically altered the juxtaposed gneisses to a degree controlled by their mineralogy and, with concomitant heat, have raised these rocks to granulite facies. It is proposed that the paragenesis developed in the rocks of the aureole, cpx + garnet + qtz ± opx, is a function of an increase in the Fe/Mg ratio due to the metasomatism rather than an increase in pressure. There has been no significant regional metamorphism subsequent to the development of this aureole, implying that the intrusion of the anorthosite is one of the youngest events in the history of this Grenville province locale.

CRYSTAL CHEMISTRY OF THE BASIC IRON PHOSPHATES

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A general structural principle is widespread among the basic phosphates of ferrous and ferric iron. This principle is based on a highly stable polyatomic complex involving ferrous-ferric oxy-hydroxy octahedral face-sharing triplets. The orientation of the associated corner-linked octahedra and tetrahedra is so similar in several mineral structures that a general hierarchy of structure types has been derived. Crystal structures of the various members are dictated by the ways in which the fundamental polyatomic