

Patterns in the compositions of minerals II: silicates and phosphates

This is the second of a series of pages presenting the chemistry of minerals in the context of part of the Earth Scientist's Periodic Table of the Elements and Their Ions. The first page, which was concerned with sulfate minerals, argued that mineral compositions could be understood, and predicted, in terms of ionic potential. Ionic potential is charge divided by radius (z/r) and is a

measure of density of charge. Ionic potential of cations increases from lower left to upper right across this part of the periodic table.

As we saw on the first page with regard to carbonates and sulfates, minerals vary in character across the plots below. Cations of relatively low ionic potential form simple minerals with no OH^- or H_2O , but

cations of increasingly higher ionic potential increasingly incorporate H_2O , OH^- and finally more O^{2-} , which shield and counterbalance the charge of the cations. Here that pattern can be seen in the silicate and phosphate minerals. The next page in this series will look at combined trends across the nitrate, sulfate, carbonate, phosphate, and silicate minerals.

