Sorosilicates Encyclopedia Article

Sorosilicates

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Sorosilicates

The most abundant rock-forming **minerals** in the **crust** of the earth are the silicates. They are formed primarily of **silicon** and **oxygen**, together with various **metals**. The fundamental unit of these minerals is the silicon-oxygen tetrahedron. These tetrahedra have a pyramidal shape, with a relatively small silicon cation (Si^{+4}) in the center and four larger oxygen anions (O^{-2}) at the corners, producing a net charge of −4. **Aluminum** cations (Al^{+3}) may substitute for silicon, and various anions such as hydroxyl (OH–) or fluorine (F–) may substitute for oxygen. In order to form stable minerals, the charges that exist between tetrahedra must be neutralized. This can be accomplished by the sharing of oxygen atoms between tetrahedra, or by the binding together of adjacent tetrahedra by various metal cations. This in turn creates characteristic silicate structures that can be used to classify silicate minerals into **cyclosilicates, inosilicates, nesosilicates, phyllosilicates**, sorosilicates, and **tectosilicates**.

Minerals formed by two silicon-oxygen tetrahedra sharing oxygen atoms are called sorosilcates. These double tetrahedra contain two silicon cations and seven oxygen anions, giving them a net charge of −6. Various metal cations neutralize the charges between double tetrahedra. Most of the minerals in the sorosilicate group are rare, and many are found in metamorphic rocks. Examples of sorosilicates that form during **metamorphism**, as well as during the crystallization of **igneous rocks**, include those in the epidote group. Epidote has the formula $Ca_2(Al,Fe)Al_2O(SiO_4)(Si_2O_7)(OH)$, and epidote group minerals are comprised of both single and double silicon-oxygen tetrahedra. Another sorosilicate mineral is hemimorphite ($Zn_4(Si_2O_7)(OH)_2 \cdot H2O$). Hemimorphite is a secondary mineral (meaning that it is an alteration product), found in the oxidized portions of zinc ore deposits.

See Also

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