

CLASS : SILICATES

SUBCLASS:TECTOSILICATES

Tectosilicates are three dimensional frameworks of Si and O atoms. The silicon tetrahedra share all four corners. This results in an Si:O ratio of 1:2, the lowest ratio of oxygen to silicon of any subclass. In some cases Al^{3+} ions replace the Si^{4+} , allowing replacements for other cations in the structure while still maintaining charge balance.

QUARTZ - SiO_2 The simplest formula of all silicates, but the mineral with the most varieties. Some of these are crystalline, generally meaning that the crystals may be large enough to be easily seen. Some are cryptocrystalline, meaning the material is crystalline but that the crystals are so tiny that individual crystals can never be seen.

Crystalline varieties

Clear (Rock crystal)

Rose

Smoky

Amethyst

Citrine

Milky

Chrysoprase

Cryptocrystalline varieties

Chalcedony

Jasper

Flint

Chert

*Novaculite

Cristobalite - SiO_2

Opal - $SiO_2 \cdot nH_2O$

Diatomaceous Earth (Diatomite) - Formed on the ocean floor from the siliceous tests of diatoms.

FELDSPAR GROUP - The feldspars are the most common minerals on earth, making up about 51% of the earth's crust. There are two major divisions, the potassium feldspars and the plagioclase feldspars. The latter are the most common at about 39% of the earth's crust. The plagioclase feldspars are a solid solution series between albite (Na) and anorthite (Ca). Albite is conventionally denoted as Ab, anorthite as An. The intermediate names in this series are important and should be learned.

POTASSIUM FELDSPARS (K-spars)

MICROCLINE - (KAlSi₃O₈)

variety amazonstone (= amazonite)

ORTHOCLASE - (KAlSi₃O₈)

Anorthoclase (Intermediate composition between sanidine and high albite,
(K,Na)AlSi₃O₈)

PLAGIOCLASE FELDSPARS

ALBITE An₀₋₁₀ NaAlSi₃O₈

OLIGOCLASE An₁₀₋₃₀

ANDESINE An₃₀₋₅₀ We have no specimen, largely because this mineral rarely occurs in the pure form but rather as grains in the igneous rocks andesite or dacite.

LABRADORITE An₅₀₋₇₀

*BYTOWNITE An₇₀₋₉₀

*ANORTHITE An₉₀₋₁₀₀ CaAl₂Si₂O₈

Other feldspars

Danburite CaB₂Al₂Si₂O₈

FELDSPATHOID GROUP - The feldspathoids are chemically similar to the feldspars but are less common. The major difference is that the feldspathoids have less silica content than the feldspars.

LEUCITE KAlSi₂O₆

NEPHELINE (Na,K)AlSiO₄

SODALITE Na₈(AlSiO₄)Cl₂

Petalite Li(AlSi₄O₁₀)

ANALCIME NaAlSi₂O₆·H₂O

Analcime is sometimes classified as a zeolite but its structure, chemistry, and occurrence indicate that it is a feldspathoid.

Scapolite Series - There is a solid solution series between marialite (Na₄ClSi₉Al₃O₂₄) and meionite (Ca₄CO₃Si₆Al₆O₂₄). Since these are hard to distinguish in hand specimen we may refer to them as simply scapolite.

Scapolite

ZEOLITE GROUP - The zeolites are a large group of hydrous framework aluminosilicates with highly variable water contents. They have open structures and are usually capable of easy ion exchange. For this reason both natural and synthetic zeolites have found uses as catalysts.

STILBITE CaAl₂Si₇O₁₈·7H₂O

NATROLITE Na₂Al₂Si₃O₁₀·2H₂O

* REFERENCE SPECIMEN - DO NOT TEST!