Phyllosilicates – Sheets

Phyllosilicates, or sheet silicates, form parallel sheets of silicate tetrahedra with Si_2O_5 or a 2:5 ratio. All phyllosilicate minerals are hydrated with either water or hydroxyl (OH) groups attached. Bonds within the sheets are strong, but bonds between them are quite weak.

Fe, Mg

11. Biotite - $K(Mg,Fe)_3(AlSi_3)O_{10}(OH)_2$

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____/_____
Use (if any) - _____
Other _____

_____

Al

37. Muscovite - $KAl_2(AlSi_3)O_{10}(OH)_2$

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____/_____
Use (if any) - _____
Other _____

_____

Phyllosilicates – Sheets (cont.)

Biotite, muscovite, and lepidolite are sheet silicates from a group of minerals called the MICA group.

Li (lithium)

34. Lepidolite - $K(Li,Al)_{2-3}(AlSi_3)O_{10}(OH)_2$

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____ /_____
Use (if any) - _____
Other _____

_____

Most clay minerals are also phyllosilicates typically with microscopic clay sized crystals (less than 0.02 mm). You are responsible for only one aluminum rich variety.

33. Kaolinite - $Al_2Si_2O_5(OH)_4$

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____ /_____
Use (if any) - _____
Other _____

_____

Framework silicates – Feldspars and more

In a framework silicate, or tektosilicate, each tetrahedron shares all 4 oxygen atoms with its neighbours, forming a 3D-4D structure. Feldspars carry a Si-O ration of 3-8 except where Al substitutes for some Si. **Feldspars** make up as much as 60% of the earth's crust.

There are two main groups of feldspar

1) Plagioclase Group (with Na, Ca) --- you have 1 to learn
2) Microcline-Orthoclase Group (with K) -- you have 2 to learn

1. Albite - $NaAlSi_3O_8$

Note lamellar twinning

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____ /_____
Use (if any) - _____
Other _____

_____

beryl
albite

3. Microcline - $KAlSi_3O_8$ *variety - Amazonite*

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____ /_____
Use (if any) - _____
Other _____

_____

Framework silicates – (cont.)

3. Orthoclase - $KAlSi_3O_8$

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____ /_____
Use (if any) - _____
Other _____

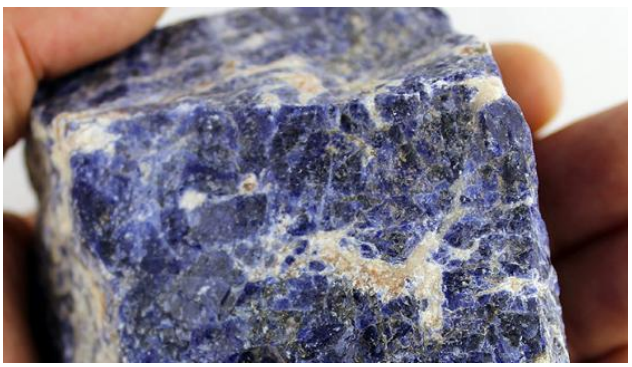
_____

Pink color in granite
is due to orthoclase

51. Sodalite - $Na_8(Al_6Si_6O_{24})Cl_2$

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____ /_____
Use (if any) - _____
Other _____

_____



Framework silicates - QUARTZ

Quartz is the second most abundant mineral in the erath's continental crust, after feldspar. Its crystal structure is a continuous framework of SiO_4 (silicon tetratehdra) with each oxygen being shared between two tetrahedra, giving an overall chemical formula of SiO_2.

There are many different varieties of quartz, several of which are semi-precious gems. Since antiquity, varieties of quartz have been the most commonly used minerals in the making of jewelry.

General	
Category	oxide mineral[1][2]
Formula (repeating unit)	SiO_2
Strunz classification	4.DA.05 (Oxides)
Dana classification	75.01.03.01 (tectosilicates)
Crystal system	α-quartz: trigonal β-quartz: hexagonal
Color	Colorless through various colors to black
Crystal habit	6-sided prism ending in 6-sided pyramid (typical), drusy, fine-grained to microcrystalline, massive
Twinning	Common Dauphine law, Brazil law and Japan law
Cleavage	{0110} Indistinct
Fracture	Conchoidal
Tenacity	Brittle
Mohs scale hardness	7 – lower in impure varieties (defining mineral)
Luster	Vitreous – waxy to dull when massive
Streak	White

Forms of Silica – SiO_2

Quartz- SiO_2 common crystalline form with all the properties of a mineral. Pure quartz is colorless and transparent. Inclusions and impurities can impart color.

Clear quartz

Rose quartz

Citrine

Amethyst

milky quartz

Chalcedony– general name for cryptocrystalline quartz

Agate/Onyx – variety of chalcedony with curved or angular banding, onyx has black and white banding

Japser– red/orange variety of chalcedony where color is due to iron

Opal – hydrated (contains water) amorphous form of silica, the water in the structure causes light to be refracted in a multitude of colors. Opal is the gemstone of Australia