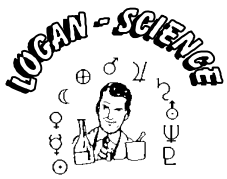

Mineral Properties

I. Nonferromagnesian Silicates

Quartz
SiO_2
Silicon Dioxide
Hardness 7.5
Hexagonal crystals
No clevage
Chonchoidal fracture
Variable color varieties
Uses: electronics, lenses, jewelry, main component of sand

Plagoioclase

Sodium feldspar
H = 6
Perfect clevage in 2 directions not quite at 90 deg.
irregular fracture on ends
variable color
Uses: ceramics, common Simatic rock forming mineral
Weathers to form clay
Shows striations on one crystal face in good samples

Orthoclase

$K(AlSi_3O)$
Potassium feldspar
H = 6
Perfect clevage in 2 directions near 90^o
Irregular fracture on ends of crystals
Uses: ceramics, coating for paper, common Sialic rock former
Weathers to form Kaolinite clay minerals

Muscovite (white mica) (isenglas)

$KAl_3Si_3O_{10}(OH)_2$ Structural family: Phyllosilicate
H = 2-2.5
Clevage good in one direction, flexible
Uses: electronic dielectric, heat resistant gaskets, paint,
used as windows before plateglass
Mined extensively near Spruce Pine and Kings Mountain

II. **Ferromagnesian Silicates**

Hornblende

Complex ferromagnesian silicate
Structural family: amphibole (double chain silicate tetrahedra)

H = 5 - 6
Elongated crystals
C - Black ->green, S - pale green
Common in granitic, basaltic and metamorphic rocks

Augite

Complex ferromagnesian silicate
Structural family: pyroxene (single chain silicate tetrahedra)
H - 5.6
Stubby crystals
C - blackish green to pale green, S - pale green
Found in basalt, peridotite and high grade metamorphic rocks

Olivine

$(Mg,Fe)_2SiO_4$ independent silicate tetrahedra bound by metals
H = 6.5 - 7
uneven fracture or granular masses
C - green, S - white
Common in peridotite and basalt
Gemstone (peridot), refractory brick

Biotite (black mica)

Complex ferromagnesian silicate
Clevage perfect in one plane
H = 2.2 - 2.5
C - black, brown, green; S - white to gray
mineral of granite and other igneous rocks, metamorphic rocks

III. Other Silicates

Garnet

Complex aluminum silicates
No clevage
H = 5.6 - 7.5
C - deep red (almandine), white, yellow, brown (grossular)
S - White
Found in metamorphic rocks
Gemstones (January), abrasives

Chlorite

Complex Iron, magensium, silicon, aluminum, hydroxide
Perfect fine scale clevage
H = 2.0 - 2.5
C - green, S - Gray, white, pale green
Common low grade metamorphic accessory mineral

Talc (soapstone)

Hydrous Magnesium Silicate
H = 1
Formed from alteration of augite, olivine or hornblende
Used in talcum powder for cosmetics and the rubber industry

IV. **Sulfides**

Pyrite (fool's gold)

FeS_2 Iron Sulfide
Cubic crystals, uneven fracture, striated faces
H - 6 - 6.5
C - pale brass yellow, paler than Chalcopyrite
S - greenish black
metallic luster, unlike gold pyrite is brittle
The most common sulfide mineral, Ig, Met, Sed, Hydrothermal veins
Ore of Sulfur

Chalcopyrite

$CuFeS_2$ Copper, Iron Sulfide
Uneven fracture
H = 3.5 - 4.5
C - Brass yellow, S - greenish black
metallic luster, softer than pyrite
Copper ore, forms in hydrothermal veins

Sphalerite

ZnS (Zinc Sulfide)
Perfect clevage in 6 directions at 120^o
H = 3.5
C - Shades of brownish to reddish resinous metallic luster
S - Reddish brown and smells of sulfur when streaked vigorously
Occurs with galena and pyrite in hydrothermal veins
The principle ore of Zinc

Galena

PbS (Lead Sulfide)
Perfect clevage in three directions all at 90^o (cubic)
H = 2.5
C = metallic gray or silver, S - Gray
Specific gravity 7.6 (heaviest of our mineral samples)
Most important lead ore, contains silver
Occurs in hydrothermal veins

V. Sulfates

Gypsum (Alabaster, Sellenite, Satin Spar)

$CaSO_4 . H_2O$ (Hydrated Calcium Sulfate)
Tabular Crystals, fibrous, Massive or granular

H - 1 - 2.5
C - White, pearly; S - white
Sheets (Sellenite), Fibrous (Satin Spar), Massive (Alabaster)
Sedimentary EVAPORITE deposit

VI. Oxides

Corundum

Al_2O_3 (Aluminum oxide)
Short hexagonal crystals
H - 9 (hardest except for diamonds)
C - Light gray, blue, red etc. S - none (cuts streak plate)
Gems (rubies and sapphires), Abrasives, Laser optics
Occurs in metamorphic and igneous rocks

Hematite

Fe_2O_3 (Iron Oxide)
Specular - Metallic gray, granular or massive
Oolitic - Rusty red masses, beady, earthy
H = 2.5
Common in all types of rocks. Causes red color in soils and rock
An ore of Iron

Magnetite

Fe_3O_4
Unvevn fracture, granular masses
H = 5.5
C - Iron black, S - Iron black
Metallic luster, strongly magnetic
An ore of Iron, found in most igneous rocks

VII. Carbonates

Calcite

$CaCO_3$ (Calcium Carbonate)
Perfect rhomboid clevage
H = 3
C - usually clear to white, some tinting, S - White
Effervesces strongly in HCl
Main component of limestone, dolomite and marble
In cave deposits and travertine

Dolomite

$CaMg(CO_3)_2$ (Calcium Magnesium Carbonate)
Cleves into rhombs or occurs in granular masses
H = 3.5 - 4
C - white, pink, gray, brown; S - white to pale gray

Effervesces if pulverized or in hot dilute HCl
Makes up dolomitic rock

VIII. Native element minerals

Graphite

C (pure carbon)
Foliated scaley or earthy masses
H = 1 - 2
C = Steel gray to black, S = gray or black
Occurs in metamorphic rocks
Feels greasy, marks on paper
Used as a dry lubricant, electrical applications, sporting equipment, high temperature crucibles

Sulfur

S
Bright yellow masses
Smells of sulfur

IX. Halides

Halite (rock salt)

NaCl (Sodium Chloride)
Perfect cubic clevage or granular masses
H = 2.5 - 3
C = white, clear, pale colors; S - white
Salty taste, soluble in water
A sedimentary EVAPORITE mineral
Many uses

Fluorite

CaF_2 (Calcium Fluoride)
Octahedral and cubic crystals
H = 4
C - white, yellow, green, purple; S - white
Cleves easily, vitreous, transparent to translucent
Would be nice gems but too soft
Source of Fluorine for toothpaste and mouth rinse, hydrofluoric acid, a flux for steel making
Fluoresces in UV light

X. Mineraloids

Kaolinite

Hydrated aluminum silicate, a clay mineral
Derived from the weathering of feldspar
Mined in North Carolina for the ceramics industry

Bauxite
Aluminum Oxide
C - Reddish to brown with small round concretions in it
Component of Lateritic soils of the tropical rainforests
The principle ore of the Aluminum industry

Limonite

Iron Oxide (rust)
Rusty yellowish brown
Redeposited iron oxide derived from weathering of hematite
Ore of Iron

XI. Phosphates

Apatite
Calcium fluorophosphate
H = 5
Source of fertilizer due to calcium and phosphate content
Some gem use but too soft for much value