The eight most important Rock Forming Minerals

- Quartz
- Orthoclase feldspar
- Plagioclase feldspar
- Muscovite mica
- (Felsic minerals)
- Olivine
- Augite
- Hornblende
- Biotite mica
- (Mafic minerals)

What is a mineral?

How can we identify minerals?

The main way we can distinguish minerals is by their physical properties.

Hardness-resistance to scratching Mohs Hardness Scale

- 1. Talc
- 2. Gypsum
- 3.Calcite
- 4. Fluorite
- 5. Apatite
- 6. Orthoclase Feldspar
- 7. Quartz
- 8. Topaz
- 9. Corundum
- 10. Diamond

- Other implements to use for hardness.
- Fingernail 2.5
- Penny 3.5
- Glass plate 5.5
- Nail or knife 5.5

Luster- how a mineral reflects light

- Metallic-looks "metallic"
- Submetallic-looks slightly metallic
- Nonmetallic
  - Adamantine=brilliant
  - Vitreous=glassy
  - Resinous=like resin
  - Waxy=like wax
  - Pearly=like a pearl
  - Silky=parallel fibers
  - Earthy=dull

Metallic luster

- Reflects light like a metal
  - Galena, Copper,
  - pyrite

Submetallic luster

- Looks slightly metallic
  - magnetite

Nonmetallic luster

- Vitreous luster
  - Glassy look
  - Quartz

Nonmetallic luster

- Waxy luster-looks like wax
  - Serpentine

Nonmetallic luster

- Pearly luster-like a pearl
  - Gypsum

Nonmetallic luster

- Silky-parallel fiber
  - Gypsum-satin spar

Nonmetallic luster

- Dull- earthy
- Little reflection
  - limonite

Diaphaneity

- Transparent- can see through it
- Translucent- lets light through but you can't see image
- Opaque- doesn't let light through

Color

- Some minerals it is very distinctive
- Some minerals occur in many colors

Color

- Sulfur- always yellow

Color

- Quartz- color variable
  - Smoky-black
  - Rock crystal- colorless
  - Amethyst-purple
  - Rose-pink
  - Milky- white
  - Citrine-yellow brown

Streak

- Color of the mineral on a porcelain tile
  - Pyrite-black
  - Hematite- red brown

Specific gravity

- The ratio of the mass of a substance to an equal volume of water
  - Water- 1.0
  - Graphite-2.2
  - Quartz-2.65
  - Pyrite-5.0
  - Galena-7.5
  - Gold-19.3

Crystal shape

- Based on crystal symmetry
- 6 crystal classes
  - Isometric
  - Tetragonal
  - Hexagonal
  - Monoclinic
  - Orthorhombic
  - Triclinic

Fracture- non-planar breakage

- Conchoidal fracture
  - Quartz

Cleavage

- Tendency of a mineral to break along planes determined by the internal atomic arrangement
  - 1-direction
  - 2-direction =90
  - 2 direction not = 90
  - 3 direction=90
  - 3 direction not = 90
  - 4 directions
  - 6 directions

Cleavage

- 1 direction- basal cleavage
- Muscovite mica

Cleavage

- 2 directions at 90
- Orthoclase feldspar

Cleavage

- 2 directions not at 90
- Hornblende

Cleavage

- 3 directions at 90
- Cubic cleavage
- Halite

Cleavage

- 3 directions not at 90
- Rhombic cleavage
- Calcite

Cleavage

- 4 directions
- Octahedral cleavage
- Fluorite

Cleavage

- 6 directions
- Dodecahedral cleavage
- Sphalerite

Other properties

- Double refraction
- Magnetism- magnetite
- Feel- talc-greasy
- Odor-sulfur
- Taste- halite
- Reaction with Hydrochloric acid
- Fluorescence

The properties of minerals are very distinctive and determine how the mineral can be used

Quartz
$Si0_2$

- Color variable
- Vitreous luster
- Hardness 7
- Hexagonal crystals
- Conchoidal fracture
- S.G. 2.7
- Used for making glass, clocks, silicon metal for computer chips

Orthoclase Feldspar
$KAlSi_3O_8$

- Pink to White
- 2 directions of Cleavage at 90
- H 6
- Used for making porcelain and as a mild abrasive

Muscovite mica
$KAl_3Si_3O_{10}(OH)_2$

- Colorless to gray
- Vitreous luster
- H 2-2.5
- 1 direction of Cleavage
- Used in toothpaste, cosmetics, lamp shades.

Plagioclase Feldspar
$NaAlSi_3O_8$-$CaAl_2Si_2O_8$

- White to Dark Gray sometimes Blue gray
- Vitreous luster
- H-6
- 2 directions of cleavage at 90
- Striations
- Used for making porcelain, ceramics

Plagioclase Feldspar
$NaAlSi_3O_8$-$CaAl_2Si_2O_8$

- White to Dark Gray sometimes Blue gray
- Vitreous luster
- H-6
- 2 directions of cleavage a 90
- Striations
- Called Labradorite
- Used for ceramics and building stone

Biotite mica
$K(MgFe)_3Al_3Si_3O_{10}(OH)_2$

- Dark green to black
- Vitreous luster
- H 2-2.5
- 1 direction of cleavage

Augite
$Ca(Mg,Fe,Al)(Al,Si)0_6$

- Color- Dark green
- Vitreous Luster
- Hardness 6
- 2 directions of Cleavage at about 90

Hornblende
$(Na,Ca)_{2-3}(Mg,Fe,Al)_5Si_6(Si,Al)_2O_{22}(OH)_2$

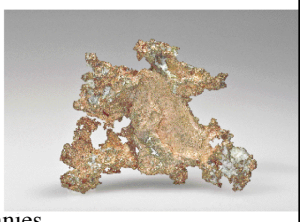
- Black to Dark Green
- Vitreous luster
- Hardness- 6
- 2 directions of cleavage not at 90
- SG 3.4

Olivine
$(Fe,Mg)_2SiO_4$

- Olive green
- Vitreous luster
- Hardness-6.5
- Conchoidal fracture
- SG-3.4
- Used as gemstone (Peridot)

Copper
Cu

- Metallic luster
- Hardness 3.5
- Cleavage –none
- Color –copper red
- Streak- copper red
- Used for wire, pennies



Sulfur
S

- Yellow color
- Vitreous-resinous luster
- Distinctive odor
- Used for matches, fertilizers, drugs.

Graphite
C

- Dark gray to black
- Dull to metallic
- Hardness 1-2
- Low Specific Gravity
- Used for pencil lead, dry lubricants, electrodes, fishing poles, tennis rackets.

Halite
NaCl

- Colorless to white
- Dull to vitreous luster
- Hardness about 2
- Cleavage 3=90(cubic)
- Used for food flavoring and preservation, salting roads.

Fluorite
CaF_2

- Color variable
- Vitreous Luster
- Hardness 4
- 4 directions of cleavage (octahedral)
- Used in Toothpaste

Hematite
Fe_20_3

- Dull to metallic luster
- Color gray to red brown
- Hardness 1-6
- Streak red brown
- Used for making steel and as a pigment

Magnetite
Fe_30_4

- Dull to Submetallic luster
- Color-gray to black
- Moderate specific gravity
- Magnetic
- Used for making steel

Bauxite
$Al(OH)_3$

- Color yellow brown
- Luster dull
- Hardness 2-4
- Composed of circular fragments
- Used as an ore of Aluminum

Corundum
Al_2O_3

- Dull to vitreous luster
- Red brown-blue gray
- Hardness 9
- Hexagonal crystals
- Used as a gemstone and abrasive

Pyrite
FeS_2

- Metallic luster
- Brassy yellow color
- Streak black
- H-6-61/2
- Specific gravity is moderate
- Used for making sulfuric acid and for collectors

Galena
PbS

- Metallic luster
- Gray color
- Hardness 2.5
- Gray Streak
- Specific gravity very heavy
- Cleavage 3=90(cubic)
- Lead ore- weights, batteries, x ray shields

Chalcopyrite
$FeCuS_2$

- Sub-Metallic luster
- Brassy yellow color
- H-4
- Moderate specific gravity
- Streak greenish black
- Major ore of copper

Calcite
$CaCO_3$

- Vitreous luster
- Color variable
- Hardness 3
- Cleavage 3 not = 90
- (rhombohedral)
- Reacts with Hydrochloric acid
- Used for cement, antacids, soil amendment

Gypsum
$CaSO_4 . 2H_2O$

- Dull –vitreous-silky-pearly luster
- Colorless-white
- Hardness 2
- Cleavage 3 not=90
- Used for sheetrock, fertilizer and plaster o paris

Apatite
$Ca5(PO4)3(OH,F,Cl)$

- Vitreous luster
- Color variable-brown, golden, green, blue
- Hardness 5
- Hexagonal crystals
- Used in fertilizers, detergents.

Garnet
Complex Silicate

- Vitreous luster
- Color variable
- Hardness 7.5
- Dodecahedral crystals
- Conchoidal fracture
- Used for gemstone and abrasive

Talc
$Mg_3Si_4O_{10}(OH)_2$

- Dull to vitreous luster
- Hardness 1
- Color white to light green
- Greasy feel
- Used for baby powder and cosmetics

Topaz
$Al_2SiO_4(F,OH)_2$

- Vitreous luster
- Color variable
- Hardness 8
- Basal cleavage
- Used as a gemstone