

Chapter 4 : Earth Minerals

- Solid
- Natural
- Inorganic
- Ordered internal structure
- Specific chemical composition



Figure 1: Examples of minerals

Is ice a mineral

Ice by definition it is a mineral (when solid) but as a liquid is not.



Figure 2: Ice, ice, baby

Mineral formation in other rocks

Composed of visible or microscopic crystals: **crystalline rock**



Figure 3: Crystalline Rocks

Composed of pieces (clasts): **clastic rocks**



Figure 4: Clastic Rock

Distinguishing One Mineral from Another

Crystal formation

Cleavage

- How it shears along smooth planes parallel to the zones of weak bonding.
- Sheets joined by long bonds between sheets break along the weakest bonds
- Bonds with the same strength can break along N sets of planes without passing through an atom
- In other arrangements, the mineral will break in nearly any direction so it will fracture instead of cleave.

Color

Luster

How much it reflects in the light

Hardness

How strong the bonds are between the atoms

Effervescence

The foaming and fizzing reaction when certain chemicals come in contact with it

Streak

What color does it leave behind if scraped on a porcelain plate

Magnetism

Does it attract magnets

Density

What controls a crystal's shape

- Sizes and packing of atoms
- Internal structure of the mineral
- orderly arrangement of atoms in repeating patterns

Different shapes

- Cube
- Tetrahedron
- Octahedron

Shape	Cube	Octahedron	Rhombohedron	Six-sided Prism center with six-side pyramids on both ends	Six-sided Platy
Minerals that can form this shape	Halite, Pyrite	Fluorite, Diamond	Calcite, Rhodochrosite	Quartz, Amethyst	Lepidolite, Mica

Figure 5: Crystal shape diagram

Major Classes of Rock-Forming Minerals

Silicate Minerals

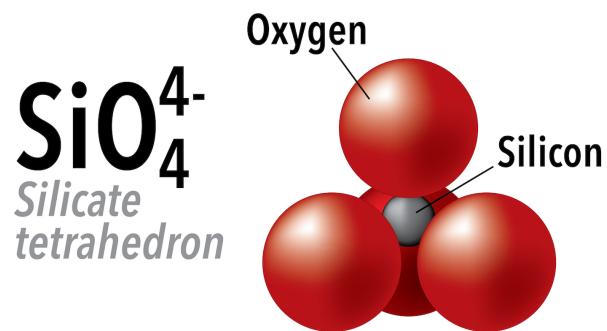


Figure 6: Silicate Tetrahedron

Can bond together and with other elements

Independent Tetrahedra

Tetrahedra bond to other elements, not other tetrahedra



Figure 7: Olivine

Single Chain



Figure 8: Pyroxene

Double Chain



Figure 9: Amphibole

Sheet Silicate



Figure 10: Mica

Frameworks



Figure 11: Quartz

Nonsilicate Minerals

Carbonates



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Figure 12: Calcite

Oxides



Figure 13: Magnetite

Sulfides



Figure 14: Pyrite

Halides



Figure 15: Halite

Sulfates



Figure 16: Gypsum

How Atoms Bond

Sharing

Covalent bond

Example: water

Loaning

Ionic bond

Example: salt

Free flow

Metallic bond

Example: copper

Stick together

Intermolecular bonds

Example: Oxygen and Hydrogen bond

Crystal Structure and Bonds

- Carbon makes up both graphite and diamonds
- The only difference between the two is the bonds that make up the substance
- Diamonds have an extremely strong network of bonds

Properties of Water

- Oxygen and hydrogen share electron
- Water molecules are polar
- Helps dissolve other compounds

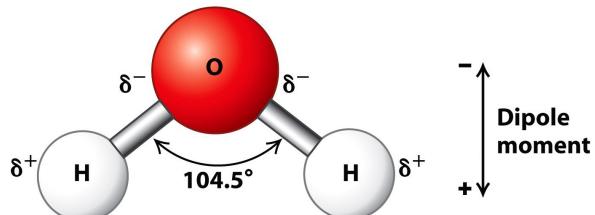


Figure 17: Water molecule diagram