# Unit 3

# Building Blocks of Minerals

- To fully understand Rocks and Minerals you must consider the chemistry behind them.
- These things include:
  1. Atoms (and the parts)
  2. Elements
  3. Molecules
  4. Compounds

Reference:
Chapter 2

# Atoms

- Definition: the smallest unit of matter
- Sub-atomic Particles that make up an atom include:

  1) Proton - positively charged particle located in the nucleus.

  2) Neutron - particle located in the nucleus with no charge.

  3) Nucleus - central portion of an atom that comprise the majority of the atoms mass. has both protons and neutrons.

  4) Electron - negatively charged particle located in the surrounding energy levels.

  5) Energy Level - shells that surround the nucleus that contain the electrons.

- **Remember: Atoms make up Elements**

# Elements

- Definition: any material made up of one type of atom.
- There are over 100 known elements, but only 8 of them make up over 98.5% of the earths crust by mass.

1) **O**xygen (46.6%)
2) **S**ilicon (27.7%)
3) **A**luminum (8.1%)
4) **I**ron (5.0%)
5) **C**alcium (3.6%)
6) **S**odium (2.8%)
7) **P**otassium (2.6%)
8) **M**agnesium (2.1%)

**Remember: Elements make up Minerals**

- Names and symbols of elements found in common minerals:

**1) Chlorine (Cl)**
**2) Calcium (Ca)**
**3) Carbon (C)**
**4) Aluminum (Al)**
**5) Copper (Cu)**
**6) Cobalt (Co)**
**7) Fluorine (F)**
**8) Gold (Au)**
**9) Hydrogen (H)**
**10) Iron (Fe)**
**11) Lead (Pb)**
**12) Magnesium (Mg)**
**13) Oxygen (O)**
**14) Nitrogen (N)**
**15) Nickel (Ni)**
**16) Manganese (Mn)**
**17) Silicon (Si)**
**18) Sodium (Na)**
**19) Silver (Ag)**
**20) Potassium (K)**
**21) Sulfur (S)**
**22) Tin (Sn)**
**23) Zinc (Zn)**

- For Example:
  - Halite - NaCl
  - Galena - PbS
  - Hematite - $Fe_2O_3$
  - Magnetite - $Fe_3O_4$

# Compound

- Definition: A substance that contains two or more elements chemically combined. A compound can have properties entirely different than the elements its made of.
- Example:

  Halite (NaCl) is commonly called salt. Salt can be eaten, but sodium (Na) and chlorine (Cl) are poisonous.

# Molecule

- Definition: The smallest part of a compound that still has all the properties of that compound.
- Example: Water molecule - $H_2O$

- **Remember: Atoms form Molecules and Compounds.**

# Minerals

- Definition: A naturally occuring inorganic solid that has a definite chemical composition and molecular structure.
- Can consist of elements or compounds
  - Usually Compounds.
    - PbS is Galena, $FeS_2$ is Pyrite
- Native minerals consist of only one type of element.
  - Gold, silver, sulfur, diamond
- To be a mineral, a substance must be:

1) naturally occurring
2) Inorganic
3) definite chemical composition
4) solid
5) definite molecular structure