

# 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

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

Figure 5: Crystal shape diagram

## Major Classes of Rock-Forming Minerals

### Silicate Minerals

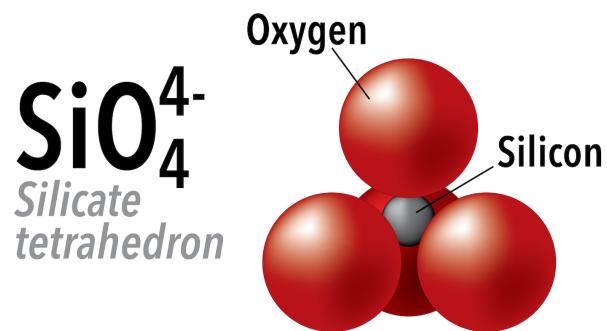


Figure 6: Silicate Tetrahedron

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

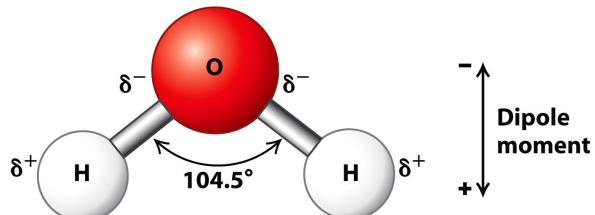


Figure 17: Water molecule diagram