
Minerals

What is a Mineral?

- A mineral is a naturally occurring, inorganic solid that has a crystal structure and a definite chemical composition.

Pyromorphite

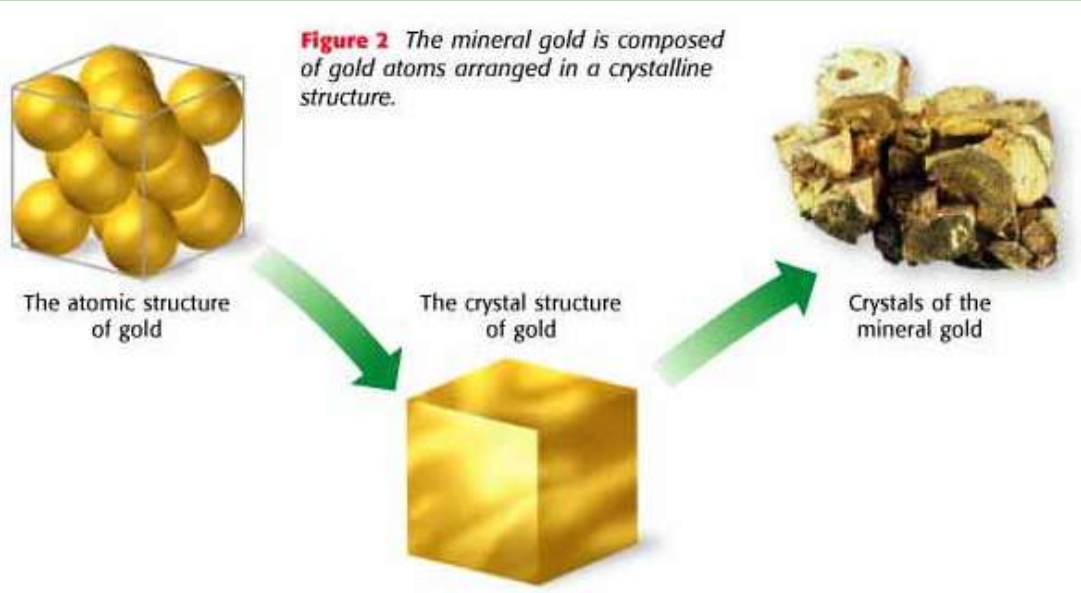
What do all minerals have in common?

- **For a substance to be a mineral it must have these 5 characteristics:**

1. Formed by **natural** processes on or inside Earth- no help from humans
2. Is **inorganic-** was never alive. For example, although coal was formed naturally in earth's crust it came from plants and is therefore, not a mineral
3. Is a **solid**, with definite volume and shape. Liquids cannot be minerals!
4. Minerals always contains certain elements that give it a **unique chemical composition** (makeup). Some minerals are compounds which are made up of more than one element.

The Structure of Minerals

- 5. Have a **crystalline shape-** the particles of a mineral line up in a pattern that repeats forming a crystal.
- Crystal- solid with atoms arranged in an orderly, repeating pattern



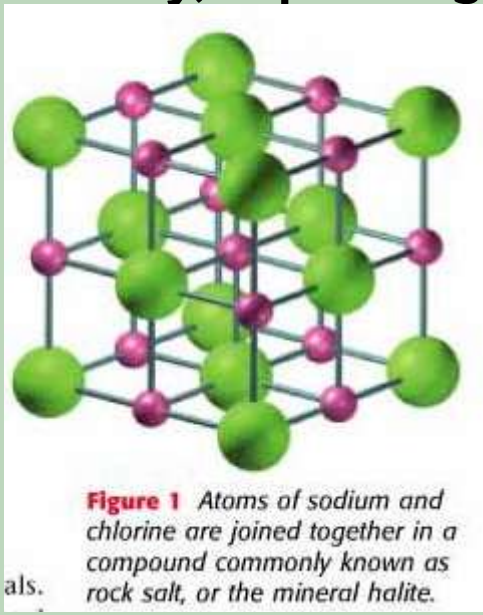


Figure 1 Atoms of sodium and chlorine are joined together in a compound commonly known as rock salt, or the mineral halite.

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How do minerals form?

There are 2 ways that crystals form:

- The cooling of hot, liquid rock called **magma** causes compounds to combine
  - Magma cools slowly= crystals are large
  - Magma cools quickly= crystals are small
- The evaporation of water that has minerals dissolved in it

How do we identify Minerals?

- We look at Physical Properties
- These include:
  - Color/Appearance
  - Luster
  - Streak
  - Hardness
  - Cleavage/Fracture

Physical Properties of Minerals
(can be used to identify the mineral)

Color

- Can be **misleading**
- Many minerals will have a similar appearance, but will have different impurities
- Color and appearance are not enough to distinguish minerals

Physical Properties of Minerals
(can be used to identify the mineral)

Luster

- Luster refers to the way a mineral reflects light from its surface
- Metallic = shiny like metal
- Non-metallic = dull, non-shiny surface, can include pearly, silky, and glassy
- We can also use toher terms such as waxy, pearly, glassy, dull, and silky

Pyrite has a metallic luster

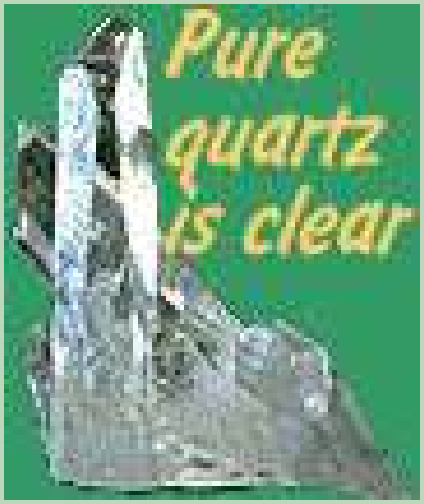
Calcite has a non-metallic luster

Physical Properties of Minerals
(can be used to identify the mineral)

Streak

- The **color** of the powdered form of the mineral
- We find a minerals streak by rubbing it on a white ceramic plate
- The color of the streak can be different than the mineral
- Minerals must be **softer** than the streak plate

Streak…can help identify quartz



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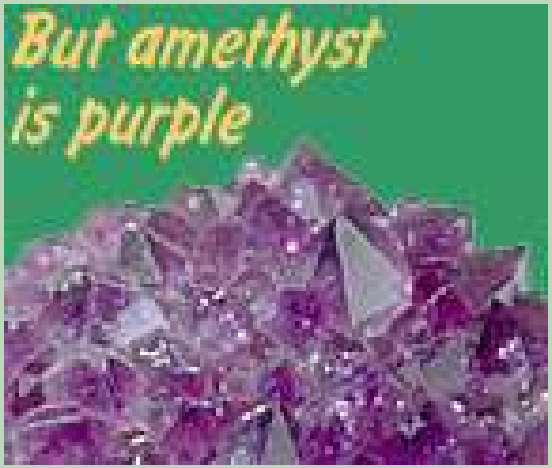


http://www.childrensmuseum.org/geomysteries/cube/b3.html

Physical Properties of Minerals
(can be used to identify the mineral)

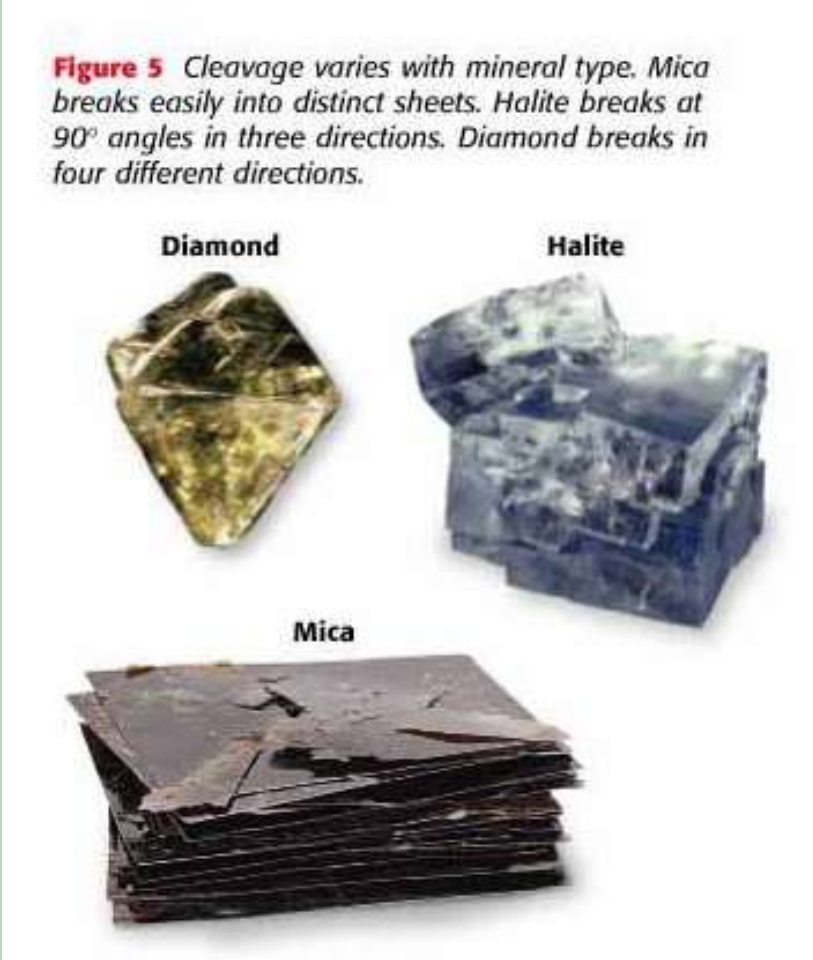
Hardness

- How easily a mineral **scratches** materials
- **Mohs Hardness Scale**
  - Scale from 1 (**softest**) to 10 (**hardest**)
  - Test by seeing if the mineral can scratch different objects (like human fingernail, copper, penny, glass, steel file)

Physical Properties of Minerals
(can be used to identify the mineral)

Cleavage & Fracture

- The way the mineral **breaks**
- ***Cleavage***—minerals break along **smooth**, flat surfaces and every fragment has the same general shape
- ***Fracture***—minerals that break at **random** with rough or jagged edges



Cleavage or Fracture?

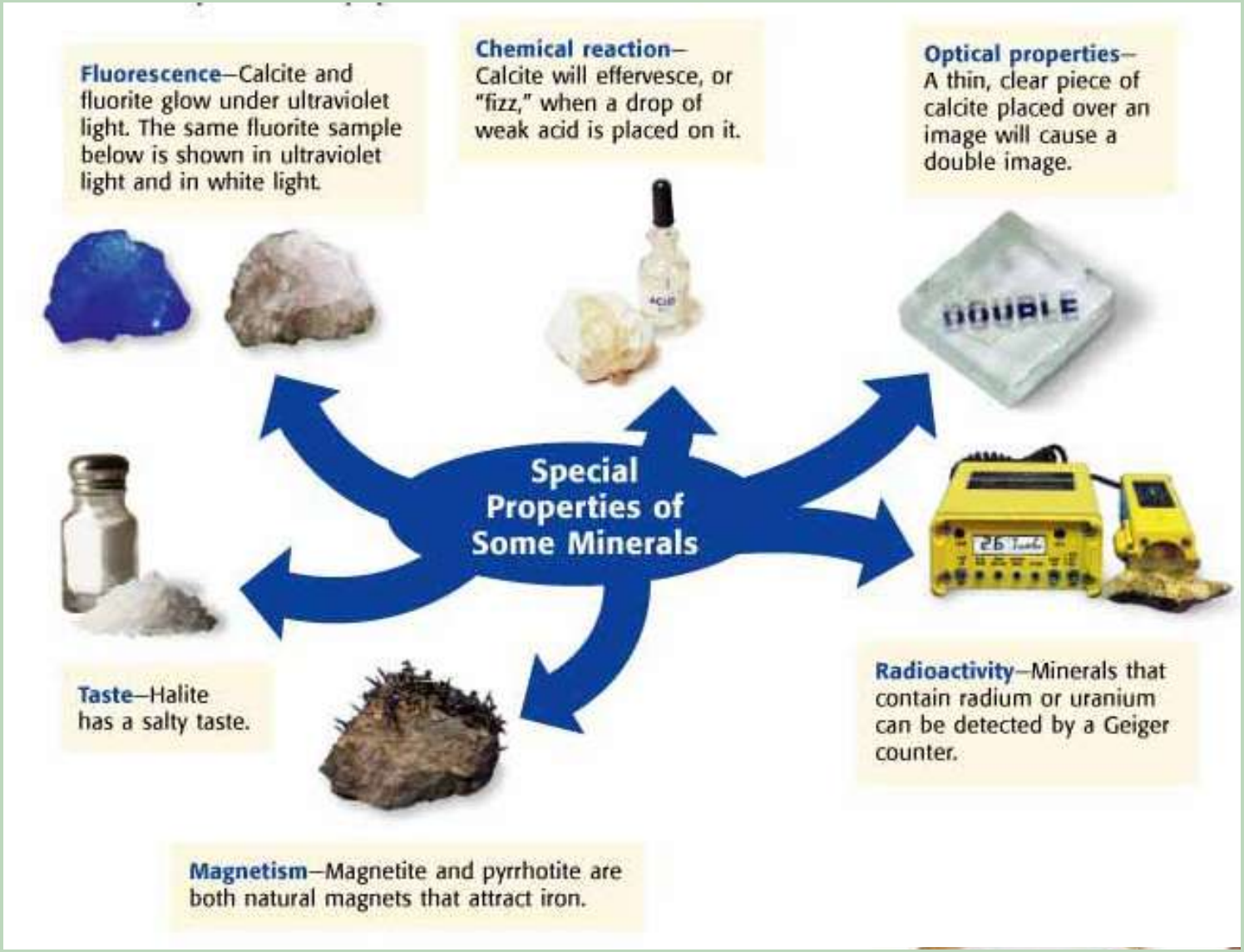
1. 

2. 

3. 

4. 

Physical Properties of Minerals
(can be used to identify the mineral)



Review

1. What is a Mineral?

   A naturally occurring solid with a crystal structure

2. Name 2 things that all minerals have in common?

   Inorganic, Crystalline Structure, Formed Naturally, Unique Chemical Composition

3. What are two special properties that some minerals may have?

   Fluorescent, magnetic, optical properties, chemical reactions, taste, radioactive

4. How are minerals identified?

   Color, Luster, Streak, Hardness, Cleavage, Fracture