



Chapter 3, section 2

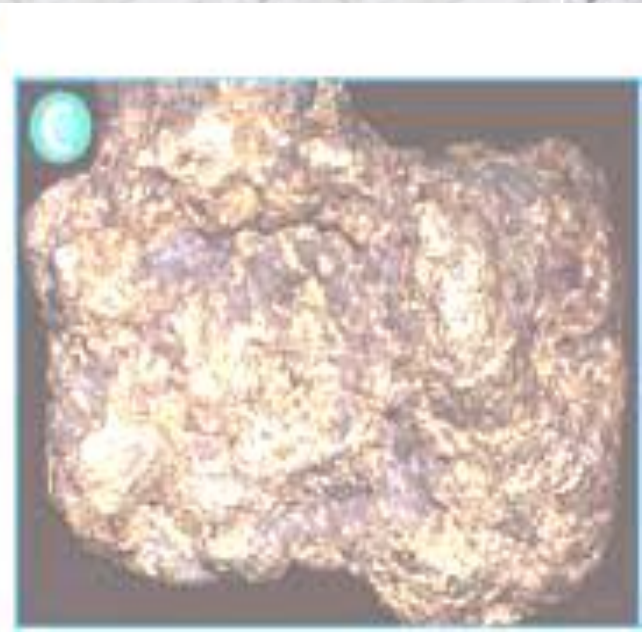
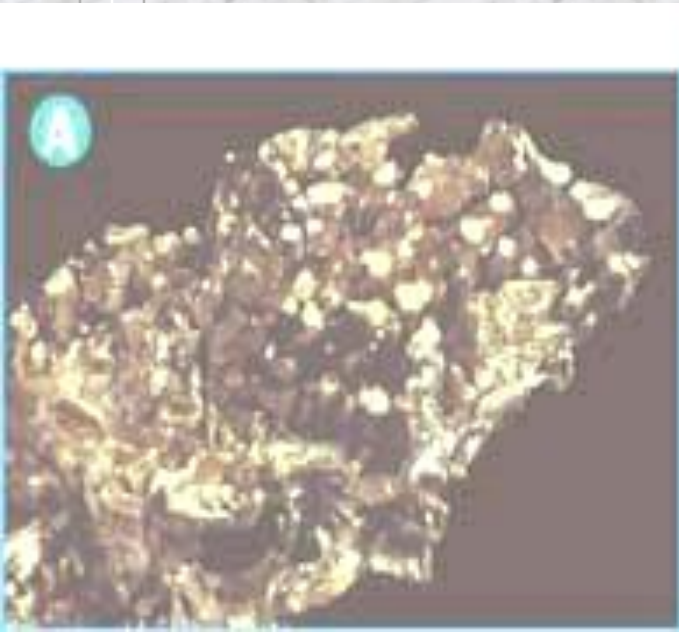
**How to identify a mineral...**





# Identifying Minerals

- These minerals are similar in color. How are they different?
- Look at the chemical formulas for: gold (Au), pyrite (FeS<sub>2</sub>), and chalcopyrite (CuFeS<sub>2</sub>)



# 8 ways to test the identify of a mineral

- 1--hardness
- 2--color
- 3--streak color
- 4--luster
- 5--density
- 6--crystal structure
- 7--cleavage/fracture
- 8--special properties

# 1. Hardness

How easy is it to **scratch** the mineral?

The Moh's scale rates the hardness of minerals on a scale from 1 to 10. It was created in 1812 by Friedrich Mohs

1 is the softest. Talc is a 1

10 is the hardest. Diamond is a 10

Common substances:

If you can scratch it with a:

- **fingernail=2.5**
- **penny=3-3.5**
- **glass=5.5-6**
- **steel=5-5.5**
- **streak plate=**

A mineral's number indicates its relative hardness. The scale ranges from 1, which is the softest, to 10, which is the hardest. A mineral of a given hardness will scratch any mineral that is softer than it is.



1

Talc



2

Gypsum



3

Calcite



4

Fluorite



5

Apatite



6

Orthoclase



7

Quartz



8

Topaz



9

Corundum



10

Diamond



# 2. Color (not reliable because some minerals come in many colors, and many minerals are the same color)

Colors of QUARTZ:



# 3. Streak (color)

- Streak Color--*practice*
  - more reliable than regular color
  - color of its powder
  - use streak plate (unglazed tile)
  - examples:
    - pyrite=black
    - gold=golden, yellow





## 4. Luster

### ■ Luster

- how a mineral reflects light from its surface
- 1. **metallic** (shiny)
- 2. **nonmetallic**:  
glassy, dull,  
earthy, waxy,  
pearly

## 5. Density

### ■ Density

- mass/volume
- remains the same (no matter the specimen size)
- also called “heft”
- may use “specific gravity” (same as density, but no units)



# Types of luster

## Metallic

bright, reflective



## Submetallic

dull, reflective



## Nonmetallic

**Vitreous**  
glassy,  
brilliant



**Silky**  
fibrous



**Resinous**  
plastic



**Waxy**  
greasy,  
oily



**Pearly**  
creamy



**Earthy**  
rough,  
dull

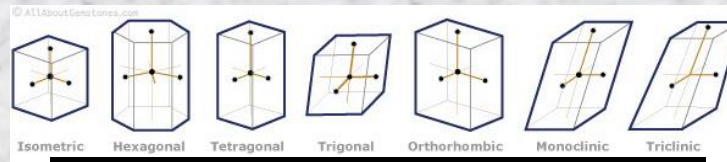


# 6. Crystalline structure

## Crystal System

Example: cubic-

Example:  
hexagonal





# 7. Cleavage

- Cleavage/Fracture (*paper towel demo*)
  - how a mineral **BREAKS**
  - 1. **Cleavage**=smooth break
  - 2. **Fracture**=irregular break—rough, jagged, or curved (most minerals have fracture)
    - quartz=curved, shell-like surface
    - copper and iron=hacky fracture (forms jagged points)

# Special Properties

- Fluorescence (glow under UV light)--scheelite
- **magnetic--magnetite**
- radioactive--uraninite
- **fizzes (gives off CO<sub>2</sub>) in acid– calcite (demo)**
- Very malleable (easy to shape)--gold
- earthy odor--clay
- soapy feeling--talc
- feels greasy--graphite
- **double refraction--optical calcite**



# Special Properties:



## Fluorescence

Calcite and fluorite glow under ultraviolet light. The same fluorite sample is shown in ultraviolet light (top) and in white light (bottom).



## Chemical Reaction

Calcite will become bubbly, or "fizz," when a drop of weak acid is placed on it.



## Optical Properties

A thin, clear piece of calcite placed over an image will cause a double image.



## Magnetism

Both magnetite and pyrrhotite are natural magnets that attract iron.



## Taste

Halite has a salty taste.



## Radioactivity

Minerals that contain radium or uranium can be detected by a Geiger counter.

## GROUP 1

### Metallic Luster, Mostly Dark-Colored

Mineral/ Formula	Hardness	Density (g/cm <sup>3</sup> )	Luster	Streak	Color	Other Properties/Remarks
<b>Pyrite</b> FeS <sub>2</sub>	6–6.5	5.0	Metallic	Greenish, brownish black	Light yellow	Harder than chalcopyrite and pyrrhotite; called “fool’s gold,” but harder than gold and very brittle
<b>Magnetite</b> Fe <sub>3</sub> O <sub>4</sub>	6	5.2	Metallic	Black	Iron black	Very magnetic; important iron ore; some varieties known as “lodestone”
<b>Hematite</b> Fe <sub>2</sub> O <sub>3</sub>	5.5–6.5	4.9–5.3	Metallic or earthy	Red or red brown	Reddish brown to black; also steel gray crystals	Most important ore of iron; known as “red ocher”; often used as red pigment in paint.