# Physical Geology-Practical

## Minerals

**Lab1**
**1st year class**


**Abdullah Talaat Othman**

**MSc. In Structural Geology and Geomorphology**

1

abdullah.talat@su.edu.krd.com


**2022-2023**

# Outline of Lab

-Mineral definition
-Physical properties of minerals
-Example of how to describe the minerals

# Minerals

**Mineral:** Is a naturally occurring homogeneous solid, inorganically formed, with a definite chemical composition and an ordered atomic arrangement (crystalline arrangement)" (Mason, et al, 1968).

1. **Naturally occurring:** Minerals form by natural, geologic processes. It cannot be a manufactured or manmade item.
2. **Solid:** Only solid crystalline substances are considered minerals.
3. **Generally inorganic:** Excluding the organic materials that make up plant and animal bodies (e.g. though natural but not mineral).
4. **Represented by a chemical formula:** Most minerals are chemical compounds having compositions that can be expressed by a chemical formula. For example, Quartz ($SiO_2$).
5. **Orderly crystalline structure:** Minerals are crystalline substances, which means their atoms are arranged in an orderly, repetitive manner.

# Physical Properties of Minerals

1. **Color:** Its mineral appearance, resulting from the way the mineral interacts with light. Such as Yellow, Green, Brown, Colorless, White, Yellowish green, and …etc.

Hematite

Quartz

**2. Streak:** The color of the mineral in powdered form. A mineral's streak is obtained by rubbing it across a **streak plate** (a piece of unglazed porcelain) and observing the color of the mark it leaves. Streak described as White, Black, Gray, Red, and … etc.

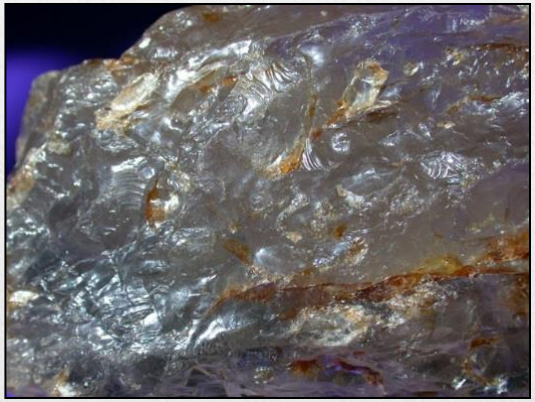
**3. Transparency:** The amount of light passed through a mineral determines its transparency.

**Transparent minerals:** most light passed through it.

**Translucent minerals:** partially let light passed through it.

**Opaque minerals:** does not let any light passed through it.

**Transparent**



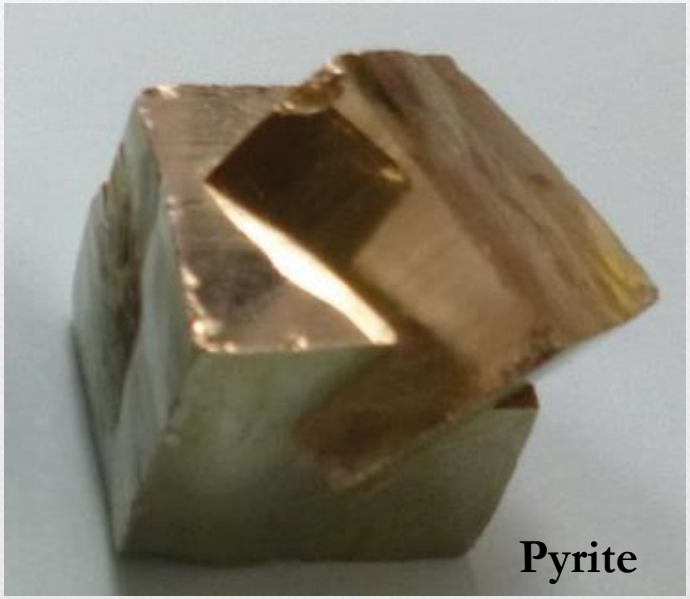
**Translucent**

**Opaque**

**4. Luster:** Refers to the appearance of the reflection of light from a mineral's surface. It is generally divided into two main types:

**a) Metallic:** Minerals with a metallic luster have the color of a metal, like silver, gold and copper, which are often shiny, but not all shiny minerals are metallic. Usually opaque and gives black or dark colored streak.

Galena



Pyrite

**b) Non-Metallic:** Minerals with non-metallic luster do not appear like metals. Most minerals have a nonmetallic luster and are described using various adjectives such as:

- ***Vitreous***: looks glassy, examples: Quartz, Tourmaline

- ***Resinous:*** like resin or amber from a tree, examples: Sulfur.

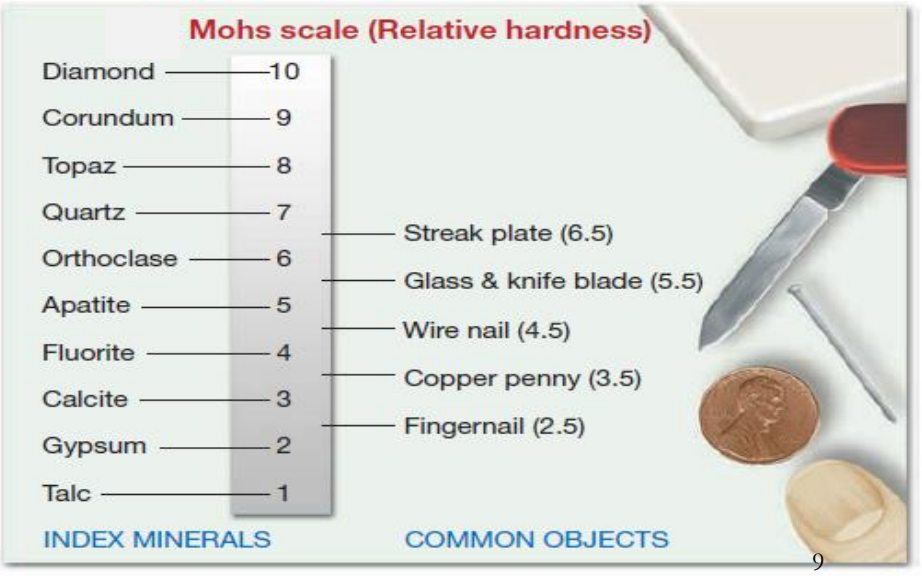
- **Pearly:** iridescent pearl like, example: **Opal**

- ***Greasy:*** appears to be covered with a thin layer of oil, example: **Talc**.

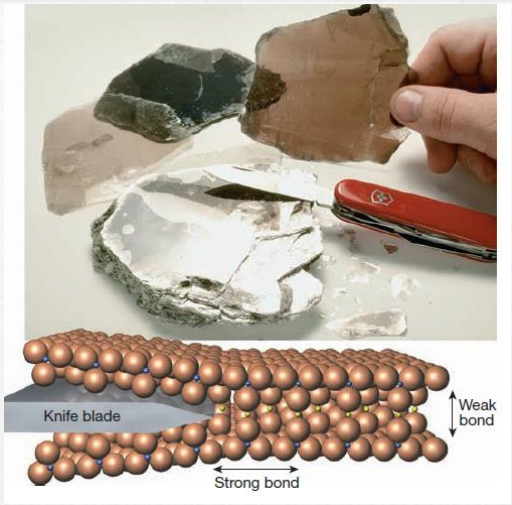
- ***Silky:*** looks fibrous, example: some **Gypsum**, **Asbestos**, **Malachite**

- ***Adamantine:*** brilliant luster like Diamond.

**5. Hardness:** Refers to the resistance of a mineral to being scratched by a different mineral or other material, ***Friedrich Mohs*** created a **Mohs'** scale to determine the hardness of a mineral ranging from 1 for the softest mineral to 10 for the hardest mineral.

**6. Cleavage:** Tendency of the mineral to break along a flat planar surface, mostly along crystal faces. Cleavage quality is described as a **Perfect, Imperfect, poor and none.**




**7. Fractures:** Tendency of a mineral to break along irregular surfaces other than cleavage planes. It may be described as **Conchoidal, Fibrous, Hackly, Uneven and Even.**

Hackly fracture/ Copper mineral

Conchoidal fracture/ Quartz mineral

**8. Specific gravity (density):** Mineral weight divided by weight of equal volume of water.

## -Example of how to describe physical properties minerals

| Name | Color | Streak | Transparency | Luster | Cleavage | Fracture | Hardness | Sps.Gr. |
|---|---|---|---|---|---|---|---|---|
| Quartz | Colorless | White | Transparent | Non-Metallic Vitreous | None | Conchoidal | 7 | Medium |

1. Talc
2. Gypsum
3. Calcite
4. Fluorite
5. Orthoclase
6. Hornblende
7. Quartz
8. Magnetite
9. Halite
10. Graphite
11. Sulfur
12. Olivine
13. Asbestose
14. Copper
15. Opal
16. Muscovite
17. Biotite
18. Pyrite
19. Galena