

# Mineralogy

Kaustubh J. Sane

HJD Institute of Technical Education  
& Research, Kera

- A mineral is a naturally occurring homogeneous solid, inorganic form with a definite chemical composition and ordered atomic arrangement.
- There are over 2000 minerals identified.

- Physical properties of minerals
  - Color
  - Streak
  - Luster
  - Transparency
  - Form
  - Hardness
  - Fracture
  - Cleavage
  - Density

- Color
  - Depends on absorption of some and reflection of other colored rays or vibrations which composed ordinary white light.
- Streak
  - It is a color of powder of mineral produced on rubbing.
  - It is determined by rubbing a mineral on unglazed porcelain plate.



- Luster

- It is appearance given to a mineral by light reflected from its surface.

- Metallic-

- Metallic minerals e.g. pyrite, galena

- Vitreous-

- Luster of broken glass reflection. E.g. quartz

- Resinous

- Light reflection like of resins. Eg. Opal, amber

- Pearly

- Sheen of a pearl, eg. Talc.

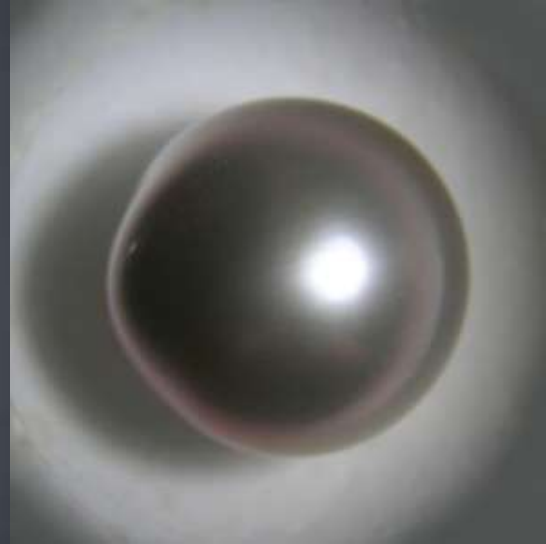
- Silky

- Luster of silk. Fibrous minerals like asbestoses and gypsum

- Adamantine

- Brilliant reflection like diamond

**Metallic Luster**  
(Molybdenite)



- Transparency

- A mineral is transparent when the outlines of the objects seen through it appear sharp and distinct.
- When an object looks indistinct then it is called as semitransparent.
- Minerals which are capable of transmitting light but can't see through it are called translucent.
- Minerals which do not transmit the light are called as opaque minerals.

**Metallic Luster**  
(Molybdenite)



Talc





- Forms

- Crystalline

- Mineral which show well developed crystals are termed as crystallized

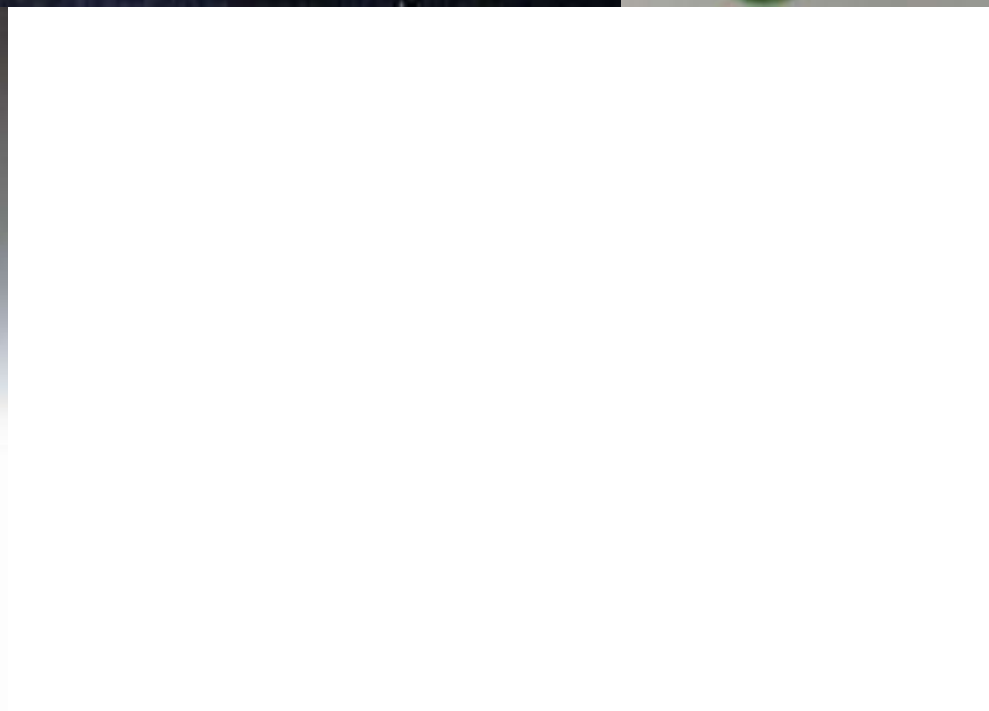
- Crystalline

- Crystal is developed but it is imperfectly formed grains

- Cryptocrystalline

- Mineral which show mere traces of crystalline structure.

- Acicular – fine needle like structure; natrolite
- Bladed – shape of knife blade; kyanite
- Botryoidal- spheroidal forms resembling to bunch of grapes. Botryoidal hematite
- Columnar- resembles to columns; hornblende
- Fibrous- fine thread like strands; asbestos
- Granular- grain shape like lump of sugar.
- Radiated- needle like crystal radiating from a centre; pyrite concentration



# • Hardness

- It is measured by scratching a mineral surface.
- Moh's scale of hardness
  1. Talc
  2. Gypsum
  3. Calcite
  4. Fluorite

5. Apatite
6. Orthoclase
7. Quartz
8. Topaz
9. Corundum
10. Diamond



- Fracture

- Mineral when breaks from cleavage plane it forms a fracture.
- These are not linear nor parallel
  1. Even fracture
  2. Uneven fracture
  3. Splintery- observed in fibrous minerals look like woodstick
  4. Conchoidal-minerals break in curved shaped. Shown by natural glass
  5. Hackly- surface elevations of minerals.

- Cleavage-
  - The property of mineral to split under the influence of force, more or less parallel to crystal face.
  - It may cleave in one, two, three or more directions.
- Density-

# Silicate group

- Silicates include large number of minerals.
- They constitute 95% of silicate minerals.  
Which are considered common minerals of earth's crust.

# Quartz group (silica group)

- Quartz appears in hexagonal dipyramid form.
- color- colourless
- Streak- color less
- Cleavage- absent
- Fracture- uneven
- Sp. gravity - 2.8
- Luster- vitreous
- O. prop.- piezoelectric
- Identified from- hardness, cleavage and crystal form
- Other types-



- Rock crystal- colorless
- Amethyst- violet
- Rose quartz- rose color
- Milky quartz- milkyness is due to presence of air cavity.
- Smoky quartz- black color
- Agate
- Jasper- red to brown color, due to presence of iron oxide particles.
- Flint
- Occurrence- it is common mineral in crustal layer of earth. It is essential mineral in sandstone.
- Uses- in electrical appliances.

# Feldspar group

- These are available in igneous rocks.
- There are two groups,
  - Albite; calcium
  - Anorthosite; potassium
- Orthoclase ( potassium aluminum silicate)
  - Color- white
  - Luster- vitreous
  - Streak- white
  - Cleavage- 2 set
  - Fracture- uneven
  - Hardness- 6
  - Occurrence- in acid igneous rocks

- Plagioclase ( group of Ca and Na)
  - Color- colorless
  - Streak- white
  - Luster- subvitreous
  - Cleavage- perfect
  - Fracture- uneven
  - Hardness- 6
  - Occurrence- in all igneous rocks. These are also common in low grade metamorphic rocks.

# Pyroxene group

- Pyroxenes are silicates of iron, magnesium and calcium. They crystallize in orthorhombic and monoclinic system.
- Two groups
  - Orthorhombic system-
    - Astatine
    - Hypersthene
  - Monoclinic system-
    - Augite
    - Diopside

- Hypersthene-
  - Color- brownish yellow
  - Streak- colorless
  - Hardness- 5-6
  - Luster- sub metallic
  - Fracture- uneven
  - Occurrence- found in igneous rocks like gabbros
  - Composition- iron magnesium silicate

- Diopside
  - Color- white
  - Luster- vitreous
  - Hardness- 6
  - Cleavage- parallel
  - Fracture- uneven
  - Occurrence- metamorphosed dolomite limestone.

# Amphibole group

- It is double chain structure.
- They crystallize in monoclinic system
- Hornblende-
  - Color- light green
  - Luster- resinous
  - Cleavage- 2 set
  - Hardness- 5
  - Fracture- uneven
- Olivine-
  - Color- green
  - Luster- dull
  - Streak- light green
  - Cleavage- imperfect
  - Hardness-7
  - Form- granular

# Mica group

- They are characterized by cleavage in one direction.
- Muscovite-
  - Color- colorless
  - Luster- vitreous
  - Streak- colorless
  - Hardness- 3
  - Cleavage- present
  - Fracture- uneven
  - Occurrence- in acid igneous rocks. Also in sandstone and schist.