

Mineralogy

TIIAME

- 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.

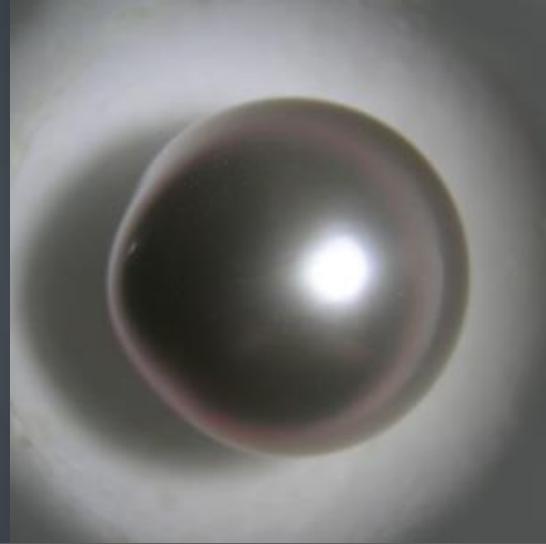
- Silky

- 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 transmits 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- The quality or condition of being dense.

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.