



SNS COLLEGE OF TECHNOLOGY
(AN AUTONOMOUS INSTITUTION)
COIMBATORE-35

II YEAR / III SEMESTER
19CET201-ENGINEERING GEOLOGY



UNIT 2-MINEROLOGY

Physical properties of minerals – Quartz group, Feldspar group, Iron ore minerals – Hematite and Magnetite – Clay Minerals – Mica – muscovite and biotite, Calcite



PHYSICAL PROPERTIES OF MINERALS:

Most minerals can be characterized and classified by their unique physical properties: **hardness, luster, color, streak, specific gravity, cleavage, fracture, and tenacity.**



QUARTZ

- ❖ The most abundant mineral in Earth's crust
- ❖ Extremely resistant to weathering
- ❖ Highly resistant to physical and chemical weathering
- ❖ Used to make time pieces because it vibrates at a precise frequency





WHAT IS QUARTZ?

Quartz is a chemical compound consisting of one part silicon and two parts oxygen. It is silicon dioxide (SiO_2). It is the most abundant **mineral** found at Earth's surface, and its unique properties make it one of the most useful natural substances



WHERE IS QUARTZ FOUND?

Quartz is the most abundant and widely distributed mineral found at Earth's surface. It is present and plentiful in all parts of the world. It forms at all temperatures. It is abundant in **igneous**, **metamorphic**, and **sedimentary rocks**. It is highly resistant to both mechanical and chemical weathering. This durability makes it the dominant mineral of mountaintops and the primary constituent of beach, river, and desert sand. Quartz is ubiquitous, plentiful and durable. Movable deposits are found throughout the world



PHYSICAL PROPERTIES OF QUARTZ

Chemical Classification-Silicate

Color-Quartz occurs in virtually every color. Common colors are clear, white, gray, purple, yellow, brown, black, pink, green, red.

Streak-Colorless (harder than the streak plate)

Luster-Vitreous

Diaphaneity-Transparent to translucent

Cleavage-None - typically breaks with a conchoidal fracture

Mohs Hardness- 7

Specific Gravity-2.6 to 2.7

Diagnostic Properties-Conchoidal fracture, glassy luster, hardness

Chemical Composition-SiO₂

Crystal System-Hexagonal

Uses-Glass making, abrasive, foundry sand, hydraulic fracturing proppant, gemstones



FELDSPAR

Feldspar is the name of a large organization of rock-forming silicate minerals that make up over 50% of Earth's crust. They are discovered in igneous, metamorphic, and sedimentary rocks in all components of the sector. Feldspar minerals have very comparable structures, chemical compositions, and bodily properties. Common feldspars consist of orthoclase (KAlSi_3O_8), albite ($\text{NaAlSi}_3\text{O}_8$), and anorthite ($\text{CaAl}_2\text{Si}_2\text{O}_8$)





COMPOSITIONS OF FELDSPAR GROUP MINERALS

This group of minerals includes tectosilicates. Compositions of foremost elements in commonplace feldspars may be expressed in terms of 3 endmembers: potassium feldspar (K-spar) endmember KAlSi_3O_8 , albite endmember $\text{NaAlSi}_3\text{O}_8$, anorthite endmember $\text{CaAl}_2\text{Si}_2\text{O}_8$. Solid solutions between K-feldspar and albite are referred to as “alkali feldspar”. Solid solutions among albite and anorthite are called “plagioclase”, or greater nicely “plagioclase feldspar”. Only constrained solid solution happens between K-feldspar and anorthite, and inside the two different stable solutions, immiscibility occurs at temperatures commonplace in the crust of the Earth. Albite is taken into consideration both a plagioclase and alkali feldspar.



PHYSICAL PROPERTIES OF FELDSPAR MINERALS

Chemical Classification-Silicate

Color-Usually white, pink, gray or brown. Also colorless, yellow, orange, red, black, blue, green.

Streak-White

Luster-Vitreous. Pearly on some cleavage faces.

Diaphaneity-Usually translucent to opaque. Rarely transparent.

Cleavage-Perfect in two directions. Cleavage planes usually intersect at or close to a 90 degree angle.

Mohs Hardness-6 to 6.5

Specific Gravity-2.5 to 2.8

Diagnostic Properties-Perfect cleavage, with cleavage faces usually intersecting at or close to 90 degrees. Consistent hardness, specific gravity and pearly luster on cleavage faces.



PHYSICAL PROPERTIES OF FELDSPAR MINERALS

Chemical Composition-A generalized chemical composition of $X(\text{Al},\text{Si})_4\text{O}_8$, where X is usually potassium, sodium, or calcium, but rarely can be barium, rubidium, or strontium.

Crystal System-Triclinic, monoclinic

Uses-Crushed and powdered feldspar are important raw materials for the manufacture of plate glass, container glass, ceramic products, paints, plastics and many other products. Varieties of orthoclase, labradorite, oligoclase, microcline and other feldspar minerals have been cut and used as faceted and cabochon gems.





THANK YOU...