

**Geology Sildes
For Petroluem & Civil Eng.**



Rocks and Minerals





MINERALS and their PROPERTIES

Minerals and their properties



- Our planet composed largely of rocks. Rocks are the most common material on Earth.
- Rocks are consolidated (or aggregates) of minerals or single mineral.
- The term "aggregate" implies that the minerals are joined in such a way that the properties of each mineral are retained. Few rocks are composed almost entirely of single mineral.
- So, WHAT ARE THE BUILDING BLOCKS OF ROCKS THAT WE ARE TALKING ABOUT? WHAT IS THE SCIENCE THAT IS INVLOVED IN STUDYING THEM? WHO STUDY THEM?

Minerals and their properties

Rock (granite)



Orthoclase feldspar



Plagioclase feldspar



Biotite



Quartz

Constituent minerals

STUDYING THEM? WHO STUDY THEM?

Minerals and their properties

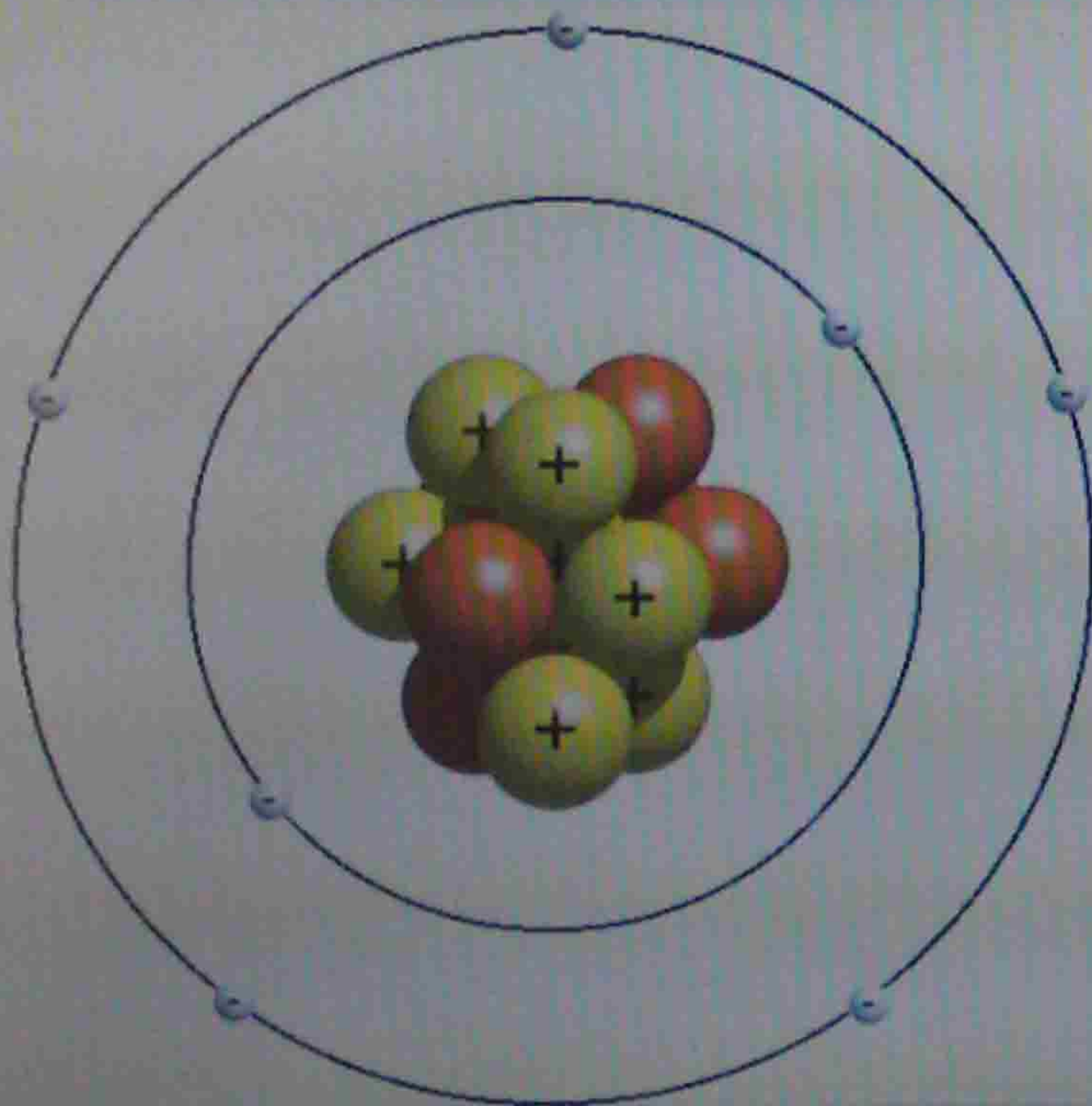
- **Minerals:** any natural occurring inorganic solids that possess an orderly internal structure and a definite chemical composition. Thus, in order to be a mineral, the following criteria should be fulfilled:
 1. It must occur naturally.
 2. It must be inorganic.
 3. It must be solid.
 4. It must possess an orderly internal structure: that is, its atoms must be arranged in a definite pattern.
 5. It must have a definite chemical composition that may vary within specific limits.

Minerals and their properties

- **Mineralogy:** The study of minerals.
- **Mineralogist:** The person who study minerals.
- Up to 4000 minerals were identified.
- Each is characterized by its unique chemical composition and internal structure.
- i.e., every sample of the same mineral consists of the same elements joined together in a consistent, repeating pattern.
- Accordingly, rocks composed of minerals, minerals composed of compounds, compounds composed of elements, elements composed of atoms.

Minerals and their properties

- In order to understand minerals, we have to review the basic building block of minerals, the elements, and then examine how elements bond together to form minerals.

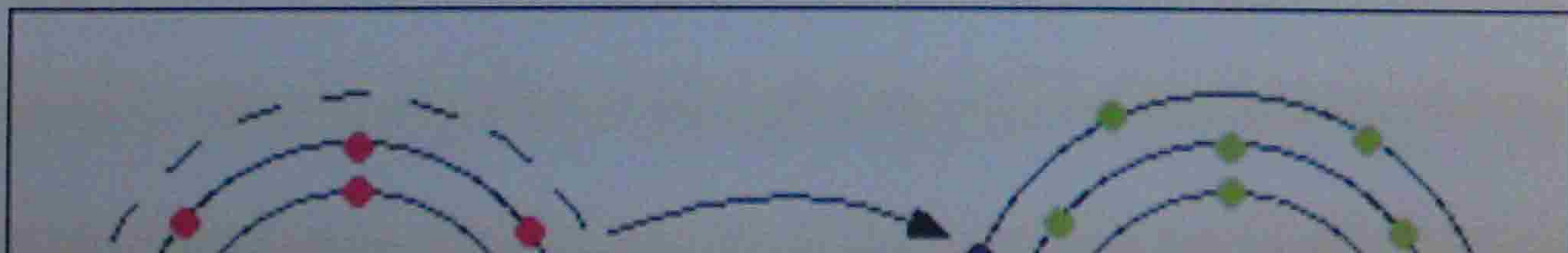


Atomic structure

1. **Nucleus:** neutrons and protons (positive electrical charges).
2. **Electrons:** negative electrical charges surrounding each nucleus. They are arranged in different zones called **energy levels**.

Minerals and their properties

- How do elements combine?
- **Chemical bonds:** The strong attractive force linking atoms together.
- The **"Octet Rule"**: atoms combine to form compounds and molecules in order to obtain stable electron configuration of the noble gases.



The Structure of Minerals

- A mineral is composed of an ordered array of atoms chemically bonded together to form a particular crystalline structure.
- This packing of atoms is reflected in the regularly shaped objects we call **CRYSTAL**.
- Some minerals having exactly the same chemical composition may form two minerals with totally different properties. Minerals of this type are said to be **POLYMORPHS** (*poly* = many, *morph* = form).
- Example: Calcite and Aragonite; Graphite and Diamond.



NEXT TIME WE MEET WE WILL DISCUSS:

1. Physical Properties of Minerals

2. Mineral Groups

