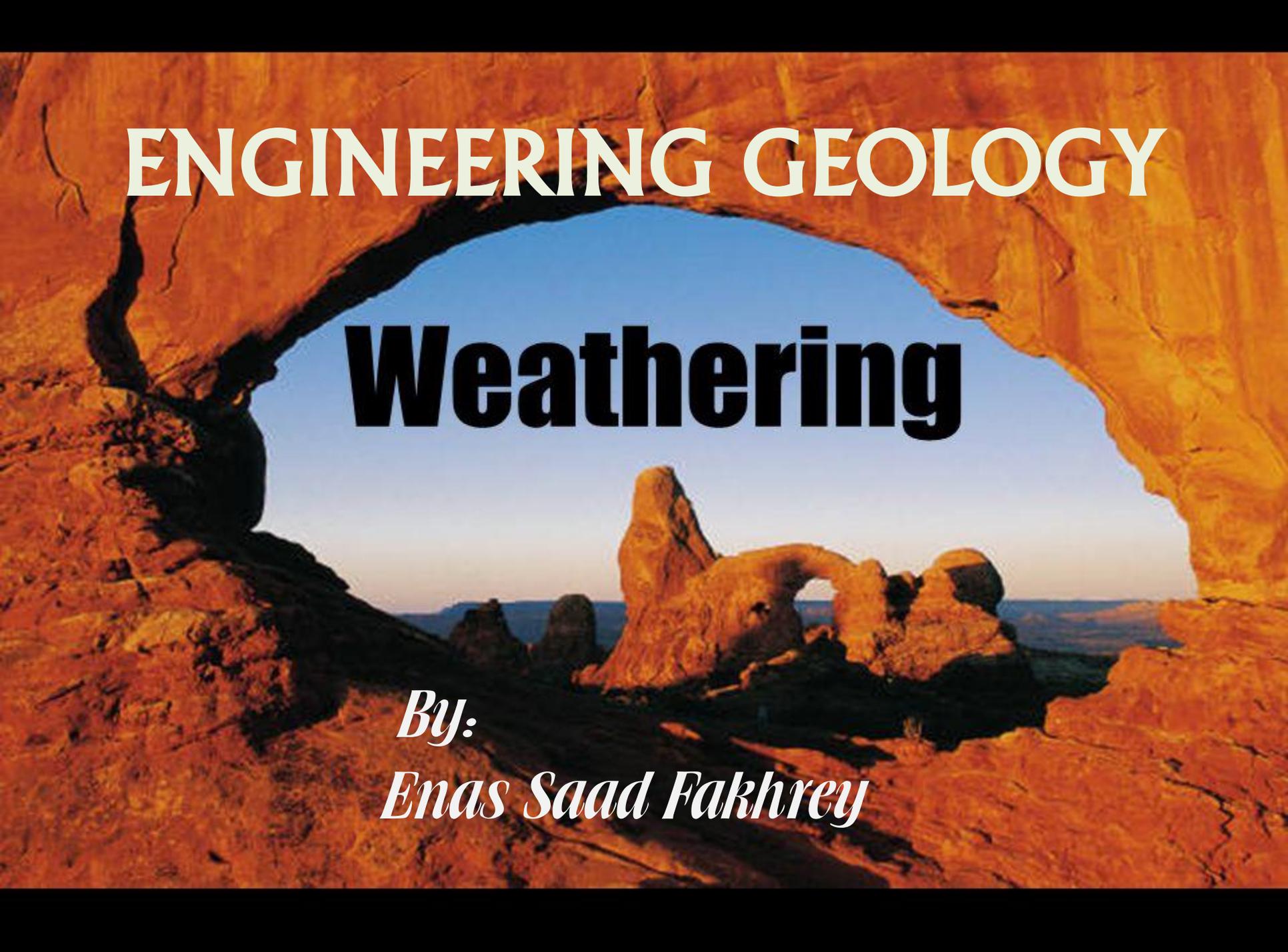


ENGINEERING GEOLOGY



Weathering

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Weathering

- The breaking down of rocks and other materials on the Earth's surface is called weathering. A slow, continuous process, it affects all substances exposed to the atmosphere.
- Weathering implies decay and **change in state** from an **original** condition to a **new** condition as a result of external processes.
- Weathering takes place in all environments but is most **intense** in **hot, wet** climates where weathering may be expected to extend to great depths.



Types of Weathering

Rocks on the Earth's surface are broken down by two types of weathering:

1. Mechanical and
2. Chemical.

a. Mechanical Weathering

- When the forces of weathering break rocks into smaller pieces but **do not change** the chemical makeup of the rocks, the process is called mechanical weathering.
- During mechanical weathering, rocks are broken into different shapes and smaller pieces.

Causes of Mechanical Weathering

There are several causes of mechanical weathering.

- Temperature
- Frost action
- Organic activity
- Gravity
- Abrasion

Temperature

- Rocks can be broken apart by changes in temperature. As rocks are heated up in the sun during the day, the outside of the rock expands. The inside of the rocks remain cool and do not expand. When the air temperature drops at night, the outside of the rock cools and contracts. This continuing cycle causes particles to break off. This is called **exfoliation**.

Frost Action

- Unlike most liquids, water expands when it freezes. The repeated freezing and melting of water, called **frost action**, is another cause of mechanical weathering. When water freezes in cracks in the rocks, it expands, making the crack larger. In time, this causes the rock to break into pieces.

Organic Activity

- Plants and animals can cause mechanical weathering. The roots of plants sometimes loosens rock material. A plant growing in a crack can make the crack larger as the root spread out. This is known as **root-pry**. It is organic since this activity is caused by living things.

Gravity

- Gravity is another agent of mechanical weathering. Sometimes gravity pulls loosened rocks down mountain cliffs in a landslide. A landslide is a large movement of loose rocks and soil. As the rocks fall, they collide with one another and break into smaller pieces. Falling rocks usually occur in areas where a road has been cut through, leaving cliffs on both sides.

Abrasion

- Abrasion is the wearing away of rocks by solid particles carried by **wind**, **water** or **other forces**.

In desert regions, the wind easily picks up and moves sand. The sharp edges of the sand particles scrape off pieces of exposed rocks. Running water also carries loose rocks which scrape against each other and break.



b. Chemical Weathering

- When the chemical makeup of the rocks is changed it is called chemical weathering. During chemical weathering, changes occur in the mineral composition of rocks. Minerals can be added, removed or broken down (decomposed). Many substances react chemically with rocks to break them down.

Types of Chemical Weathering

There are several causes of chemical weathering:

- Water
- Oxidation
- Carbonation
- Sulfuric acid
- Plant acids

Most chemical weathering is caused by water and carbon dioxide. Water can dissolve most of the mineral that hold rocks together.

Amount of Time of Exposure

- The amount of time that rock is exposed on the Earth's surface also affects its rate of weathering. A very old rock that has not been exposed to the forces of weathering can remain almost unchanged. If a newly formed rock is deposited on the Earth's surface it will begin to weather right away.

Soil

- The formation of soil is extremely important to most living organisms. Plants depend on soil as source of food. Soil supplies plants with minerals and water needed for growth. Animals depend indirectly on soil since they eat plants and other animals that eat plants.

Soil Composition:

- Soil is a mixture of four materials:
 1. Weathered rock particles (Main ingredient)
 2. Organic matter (5%)
 3. Water (20 to 30 % of soil)
 4. Air (20 to 30 % of soil)

- There are four world soil types:
 1. Tropical Soils (warm, rainy regions)
 2. Desert Soils (dry regions)
 3. Temperate Soils (moderate rainfall and temperatures regions)
 4. Arctic Soils (cold, dry regions)

Kind of soil depends on many factors

- The kind of rock in the area
- The area's climate or weather pattern
- The landforms in the area
- The plant cover in the area
- The animals and other organisms.
- Time (how long it has to form.)

Thanks

