



5TH LECTURE (ROCK & STONE)

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WHAT IS STONE

Stone is a ‘naturally available building material’ which has been used from the early age of civilization. It is available in the form of **rocks**, which is cut to **required size and shape** and used as building block.



Rock & Stone Comparative

Parameters of comparison	Rocks	Stones
Geological definition	Rocks are naturally occurring solid mineral materials that form a part of the earth crust and are found almost everywhere.	Stones are hard substances and are considered to be combinations of extracted minerals such as sandstone or limestone.
Size/Weight	Rocks are seen to be larger and heavier in comparison to stones.	Stones are smaller and lighter in comparison to rocks.
Uses	Rocks consist of minerals matter that is very useful in developing technologies such as cosmetics, cars, roads and other appliances.	Stones have a variety of uses such as in construction sites for buildings, walls, Concrete, asphalt and other building products.
Properties	The properties depend on the type of mineral material, and they usually have brightness, great size and weight, and texture.	Stones have either layered or un layered structure, different porosity and absorption, hardness, and different texture.
Relation	Rocks are broken down into smaller pieces so that they can be utilized, and these smaller pieces are called stones.	Stones are considered to be the hard substances that combine to help form the structure of large rocks.

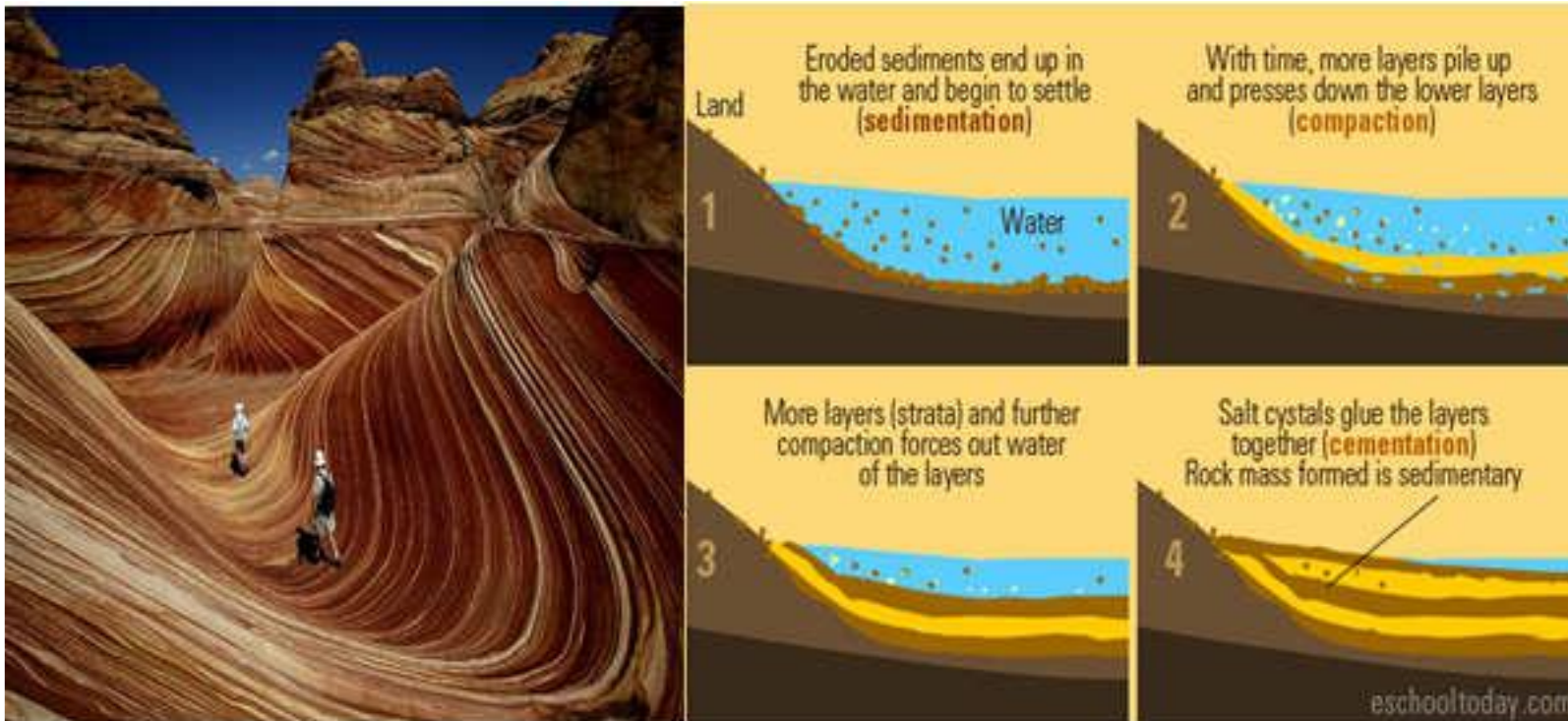
STONES CLASSIFICATION

Stones are derived from rocks which are classified as:-

1. **Geological origin: Sedimentary, Igneous and Metamorphic**
2. Chemical composition: Siliceous, Argillaceous and Calcareous
3. Physical form: stratified, un stratified and foliated (thin)

1. Sedimentary Rocks

They are formed as the sediments deposited over a period of time mostly at the bottom of sea and oceans. They include minerals and remains of plants and animals. E.g. Limestone, Sandstone

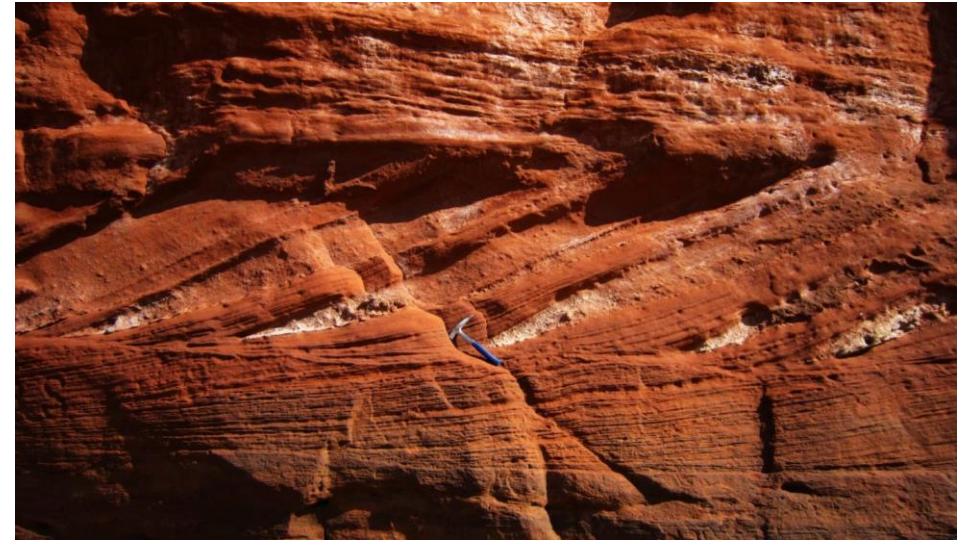


Sandstone (Limestone) :-

is a sedimentary rock (rock formed by ancient rivers that slowly deposited material on their beds, that built up layer by layer over millions of years). It has the following properties:

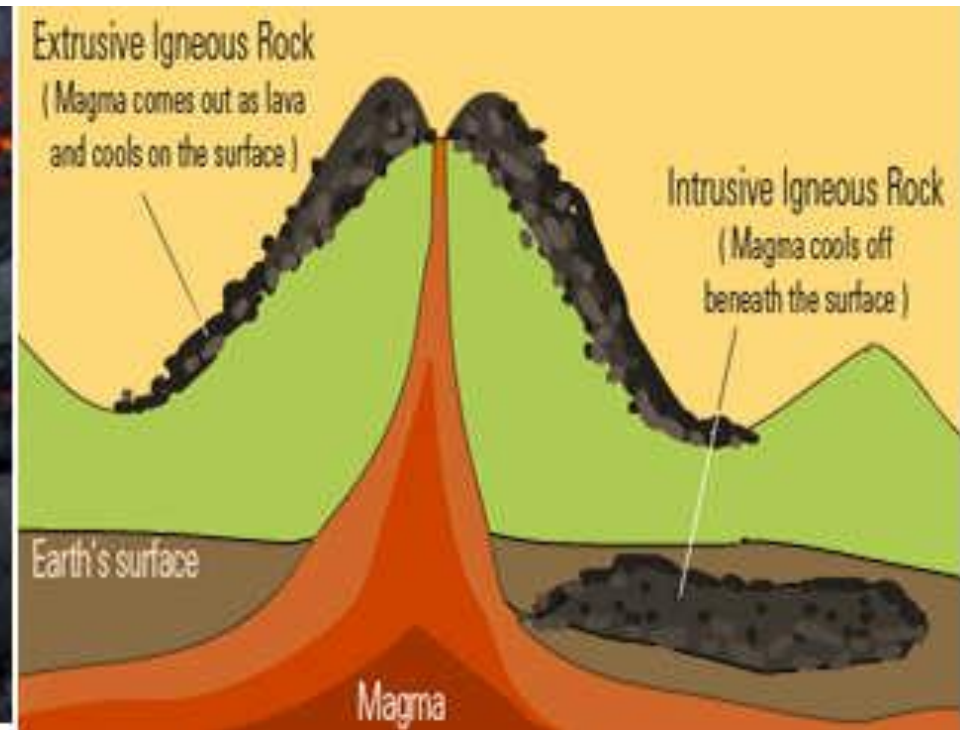
1. It is abrasion resistant, but not always strong, as it is **formed in layers**.
2. It is usually highly resistant to acids
3. It has a **rough finish, and cannot be mirror-polished, as it consists of grains**

These properties mean that it is good for decks and external areas because of its anti-slip properties.



2- Igneous Rocks

These stones are formed when the molten magma from the earth cools inside the earth or on the earth surface and solidifies. E.g. Granite



- ❑ Generally igneous rocks are **strong and durable**.
- ❑ Granite and basalt are the rocks belonging to this category,
- ❑ Granites are formed by slow cooling of the lava under thick cover on the top. Hence they have **crystalline surface**.
- ❑ The cooling of lava at the top surface of earth results into **non-crystalline and glassy texture**. Trap and basalt belong to this category.



Granite is a volcanic rock (it was originally lava, that cooled to form solid rock) that has the following properties:

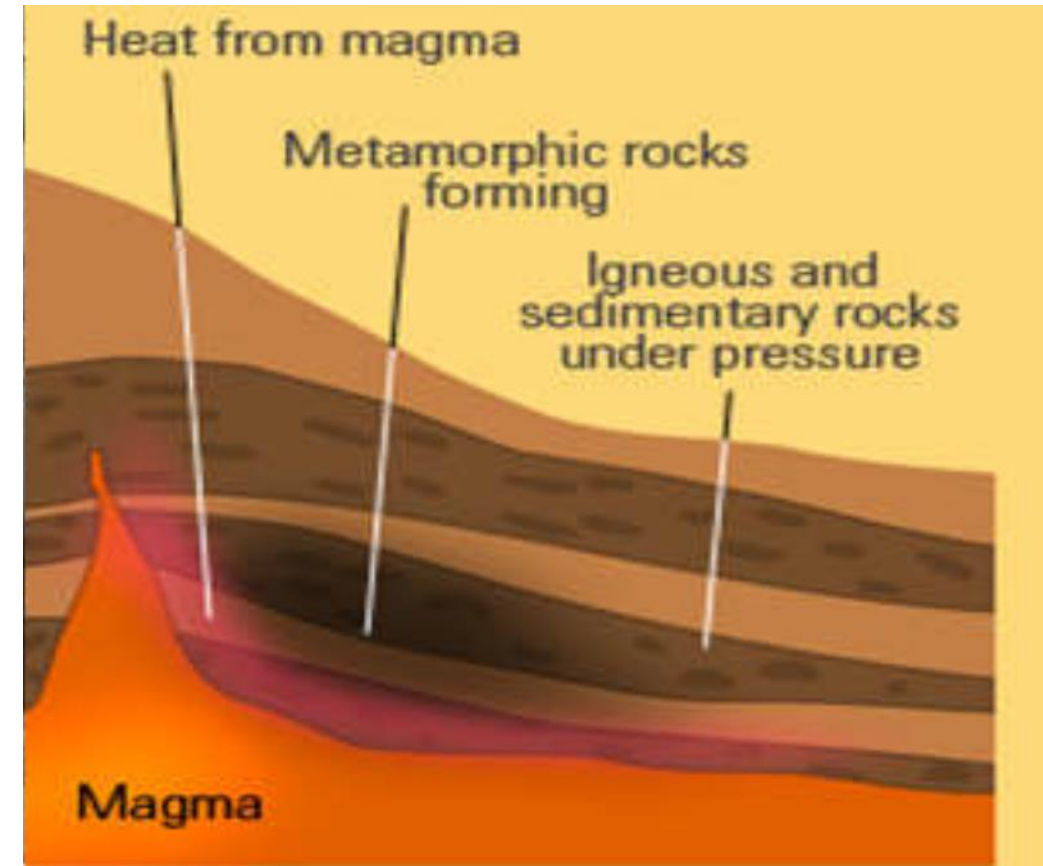
1. It is very hard, strong, and abrasion resistant
2. It is resistant to acids
3. It can be polished to a mirror-like smoothness

These properties make it a great choice as **a floor or countertop finish**. It can also be used to **clad walls**. However it is available mainly in dark colors: **black, red, grey**. This darkness in color does tend to limit its use in certain areas.



3. Metamorphic Rocks

- ❑ They are formed when the already existing rocks undergo changes due to intensive heat and pressure. E.g. Marble, Slate
- ❑ The term “metamorphic” itself is the combination of the Greek words meta, which means “**after,**” and morph, which means “**change.**” Intense temperatures and pressure beneath the earth cause physical and chemical change to igneous and sedimentary rocks, causing them to form metamorphic rocks.



Marble comes from limestone, while slate is formed from mudstone. These rocks are formed either by being subjected to great **pressure beneath the earth** (regional metamorphism) or by **magma coming into contact with the rocks**.



Marble

Marble is a metamorphic rock and has the following properties:

1. Most marbles are soft, and not very abrasion resistant
 2. They are not resistant to acids
 3. They can be polished to a mirror finish
 4. It is translucent - light can pass through it to the extent of a few millimeters
- Thus, marbles should not be used in high-traffic areas such as the entryways or staircases of public buildings - granite would be much better in those cases.



Igneous Rocks	Sedimentary Rocks	Metamorphic Rocks
Formed from cooled, solidified molten rock	Formed from sedimentation of dust, dirt, and other matter on lake beds and sea floors	Formed by intense heat and pressure beneath the earth
Source of mineral deposits (e.g. tin, uranium)	Used in construction work (roads, tunnels, bridges)	Used in geological research
Basalt, granite	Limestone, shale, sandstone	Marble, quartzite, slate

IGNEOUS ROCKS ARE FORMED FROM MELTED ROCK DEEP INSIDE THE EARTH.



SEDIMENTARY ROCKS ARE FORMED FROM LAYERS OF SAND, SILT, DEAD PLANTS, AND ANIMAL SKELETONS.



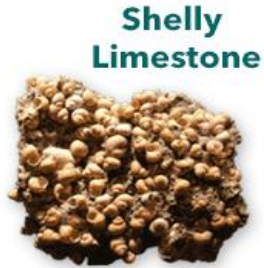
**Glacial
Conglomerate**



**Banded
Iron**



Sandstone



**Shelly
Limestone**



Chalk



Anthracite



Shale

METAMORPHIC ROCKS FORMED FROM OTHER ROCKS THAT ARE CHANGED BY HEAT AND PRESSURE UNDERGROUND.



Slate



Schist



Garnet Amphibolite



Marble



Eclogite



Jadeite



**Deformed
Conglomerate**



Gneiss



Sphalerite Ore Rock

THE FOLLOWING PROPERTIES OF THE STONES SHOULD BE LOOKED INTO BEFORE SELECTING THEM FOR ENGINEERING WORKS

.1- Structure

2-Texture

3-Density.

4- Appearance

5-Strength

6- Hardness

7-Porosity and Absorption

8-Weathering

9- Resistance to Fire

Home work [The class have to be divided into 4 groups each group are responsible to bring samples for one class stone

- 1. Group One: Sedimentary stone**
- 2. Group Two: Igneous stones**
- 3. Group three Metamorphic stone**
- 4. Group four :Man made stones**



NEXT LECTURE
STONE MASONRY WORK