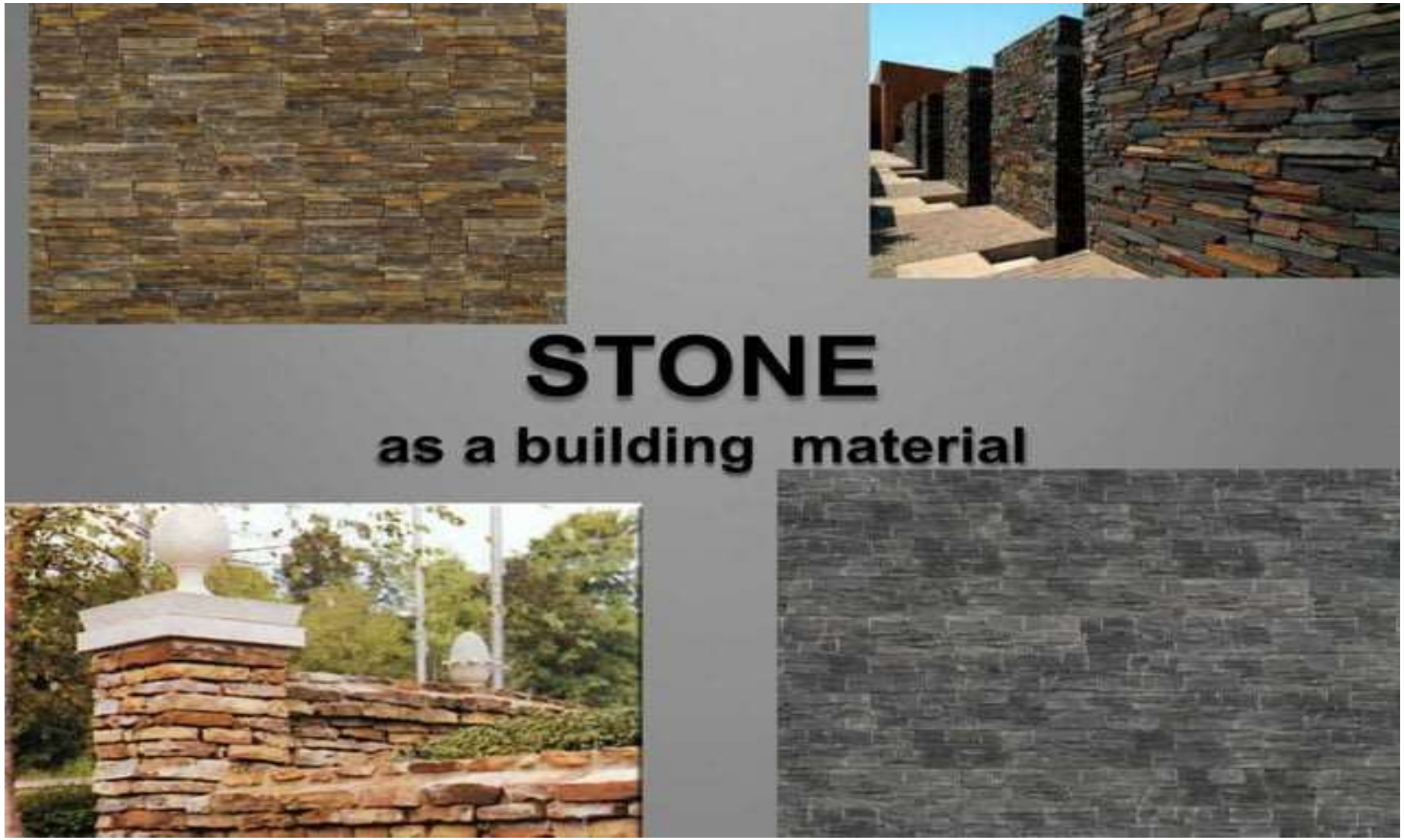

STONE
as a building material

WHAT IS STONE?

The hard, solid, non metallic mineral matter of which rock is made, a building material.

STONE -As A Building Material.

Stones have been considered as one of the popular building material from the olden days due to their availability in abundance from the natural rocks. Building stones should possess enough strength and durability.

The stones which are suitable for the construction of the structures such as retaining walls, abutments, dams, barrages, roads etc are known as building stones.

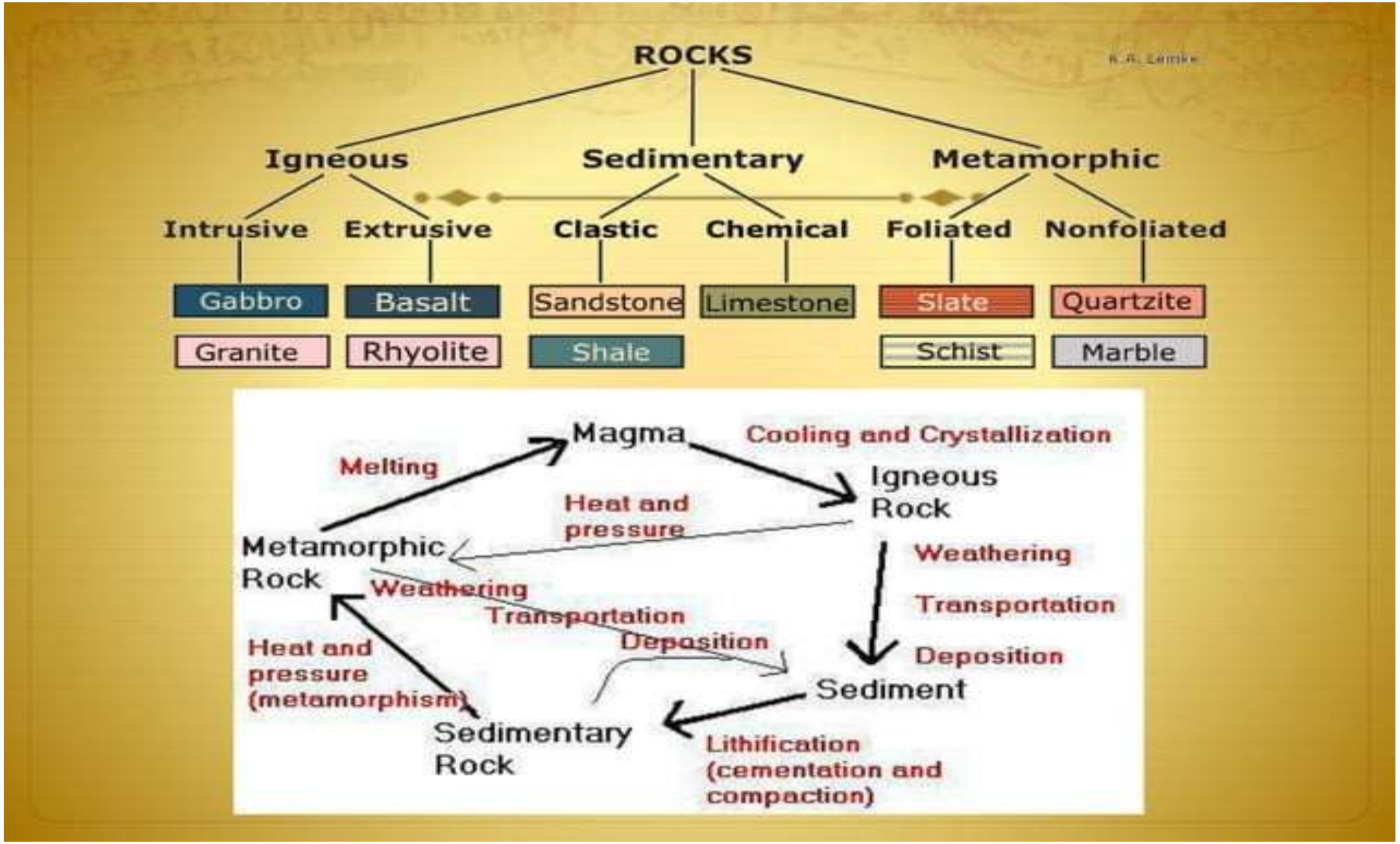
SOURCES OF STONE

Monomineralic rock-monomineralic Applied to rocks composed of one mineral type only. Examples would include the **igneous** rock **anorthosite** (composed entirely of **plagioclase feldspar**) and the **metamorphic** rock **marble** (composed entirely of **calcite**).

Polymineralic rock-or "polymineralic," i.e., mixtures of two or more minerals. An example of a polymineralic rock is granite, which is typically composed of quartz, feldspar, and mica.

Rock forming minerals: (Found in igneous rocks)

1.Augite
2.Chlorite.
3.Felspar.
4.Hornblende.
5.Mica
6.Olivine.
7.Plagioclase.
8.Quartz.
9.Serpantine.
10.Calcite


ROCKS
Igneous
Sedimentary
Metamorphic
Intrusive
Extrusive
Clastic
Chemical
Foliated
Nonfoliated
Gabbro
Basalt
Sandstone
Limestone
Slate
Quartzite
Granite
Rhyolite
Shale
Schist
Marble
Magma
Cooling and Crystallization
Melting
Igneous Rock
Heat and pressure
Metamorphic Rock
Weathering
Transportation
Deposition
Weathering
Transportation
Deposition
Heat and pressure (metamorphism)
Sediment
Sedimentary Rock
Lithification (cementation and compaction)

STONE

As a building material.

Classification-

1.Geological Classification-

A)Igneous Rocks.-These are primary rocks which are formed from molten magma. They represent different structural features depending upon the condition of solidification and composition. Generally igneous rocks are strong and durable.

These are also called un stratified or eruptive rocks. The examples of igneous rocks are granite, basalt, trap, etc.

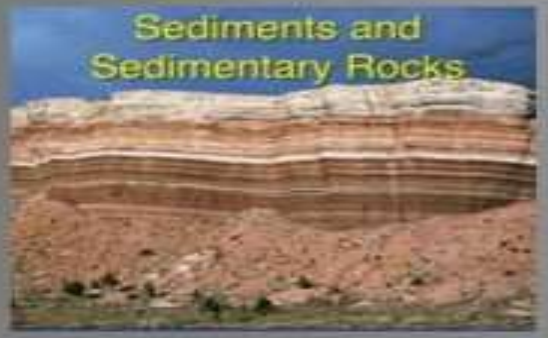
b)Sedimentary rocks-These are secondary rocks and are formed by the denudation and deposition of previously existing rocks due to weathering actions. Water (rain) is the most powerful and principal weathering agent. The other destructive agents are frost, winds and chemical actions. The destructive agents break up the surface of earth which gets further broken up when carried down by rains and rivers. When the velocity of water in the rivers those broken particles are deposited in the river bed and thus sedimentary rocks are formed.

These are also called aqueous and stratified rocks.

(OR)

The rocks which are formed by gradual deposition are called Sedimentary Rocks.

Examples: Lime stone, sand stone, etc.



Sedimentary Rocks

Sandstones are made up of sand sized grains

Limestones are the principal me of carbonate rocks the limeston is a light whitish-gray

c) Metamorphic rocks-Rocks which are formed due to metamorphic action of pressure or internal heat or by both (or) alteration of original structure due to heat and excessive pressure) are called Metamorphic Rocks.
Examples: Marble etc. New minerals are produced by this metamorphism. Shales (mudstones) may be recrystallized into mica-rich rocks called schist. As such rocks are heated to temperatures below but not far from those that would melt the rocks, they become soft, recrystallize further, and can be deformed into crenulated light and dark units that resemble layers, forming rocks called gneisses. Examples of slate, schist and gneiss are:



2.Physical Classification

a)Stratified rocks-Stratified rocks show a layered structure in their natural environment. They possess planes of stratification or cleavage and can be easily split up along those planes. Sedimentary rocks are distinctly stratified rocks, eg; sandstone, limestone, slate, etc.

b)Non stratified rocks-The rocks which do not show any sign of strata and cannot be easily split into thin layers are called unstratified rocks. Their structure may be crystalline or granular. Granite, trap and marble are the common examples of unstratified rocks.

c)Foliated rocks-There are two basic types of **metamorphic** rocks: 1) foliated **metamorphic** rocks such as **gneiss**, **phyllite**, **schist** and slate which have a layered or banded appearance that is produced by exposure to heat and directed pressure; and, 2) non-foliated **metamorphic** rocks such as **marble** and **quartzite** which do not have a layered ...

3.Chemical classification-

a)Siliceous rocks-The stones which contain (Silica SiO_2) as principal constituent are called silicious rocks. These stones are durable stones.

The examples of silicious rocks are granite, Quartzite and Sand stone etc.

b)Argillaceous rocks-Argillaceous or clay stones are those stones which contain (alumina Al_2O_3) (clay) as principal constituent. These stones are less durable stones. All clay stones belong to this group.

The examples of argillaceous rocks are Slate, Laterite, etc.

c)Calcareous rocks-The stones which contain calcareous material ($CaCO_3$) as principal constituent are called calcareous rocks. They also contain some proportion of siliceous and clay matter.

The examples of calcareous rocks are marble stone and lime stone, etc.

Siliceous rocks

Argillaceous

Calcareous

Characteristics of Stones while considering them for construction

There are several characteristics of stones which are used for building construction.....these are.....

1)Hardness :denotes several qualities of stones such as resistance to cutting and resistance to abrasion (rub with each other)

2) Durability: is the power of stone to resist atmospheric and other external effects.

It depends upon:

Chemical composition, Physical structure, Resistance to weathering effects, Place where it is used

(3) Decomposition: Gases and acids in rain water dissolve

(4) Porosity and Absorption: Stone can hold water in two ways Either through porosity or absorption.For building purposes, the better stones some constituents of stone and cause the stone decay.

(5) Disintegration: In cold countries water freezes and expands and thus disintegrates the stones.

(6)Reliability:When exposed to fire stone should be reliable (good in quality).

(7)Weight:This is an important characteristic of stone. It depends upon the type of structure of stone in which we shall use. E.g. we shall use heavy stones in the construction of the dams, bridges, etc.

(8)Strength:It is power of stone to sustain pressure or resistance to crushing force.

Average crushing strength of stone is 3 tons per square inch.

(8)Appearance and color:Highly colorful stones are preferred for architectural purpose but those are soft and thus less durable. Therefore, lighter stones are preferred than to darker ones.

(9) Physical Strength:Crystalline structures are more durable than non-crystalline structure stone.

(10)Seasoning Qualities:A good building stone should have good seasoning qualities. All the stones contain some moisture which is known as quarry sap stones. The period 3-6 months are enough for seasoning

(11)Fire resistance:A good building stone should be fire resistant. Some stones such as basalt

Uses Of Stone in Construction

Common Uses Of Builiding Stones:

1.Millions of tones of crushed rock are needed annually for road base, paving, 2.ready-mixed concrete and asphalt.

3.Sandstone which is not so hard-wearing or beautifully patterned is used for 4.garden walls and paths in landscaping.

5.Basalt: It is quarried and crushed as "Blue Metal" which is used as a road-base, and in reinforced concrete as aggregate.

6.Although wood, straw and mud is used for houses in some parts of the world, most buildings are preferred to be built of stones.

7.Building wells.

8.Material for foundation and walling of buildings, dams, bridges, etc.

9.Aggregate.

10.Stone walls.

11.Roof tile in the form of slates.

12.Murram for covering and flooring of road surface.

13.Limestone for burning lime and for the manufacture of Portland cement.

14.Shale is a component of bricks and may also be used in manufacturing of cement.

15.Nite, another stone type is used for architectural construction, ornamental stones and monuments.

16.Marble is widely used in construction industry, for aesthetic purposes, beautification and strength.