INTRODUCTION TO ROCKS AND MINERALS

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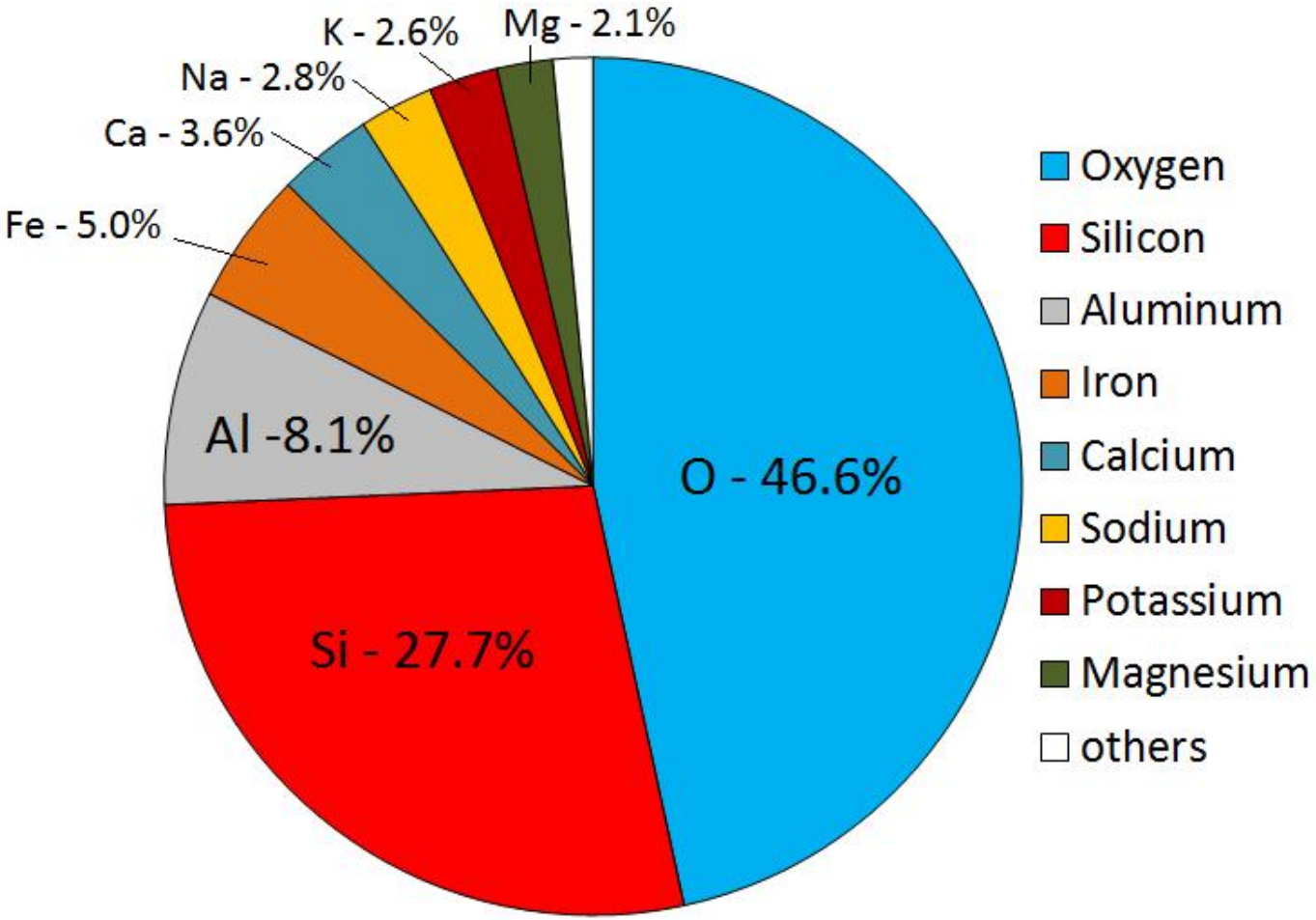
The earth is composed of various kinds of elements.

About 98% of the total crust is made up of eight elements as oxygen, silicon, aluminium, iron, calcium, sodium, potassium, and magnesium.

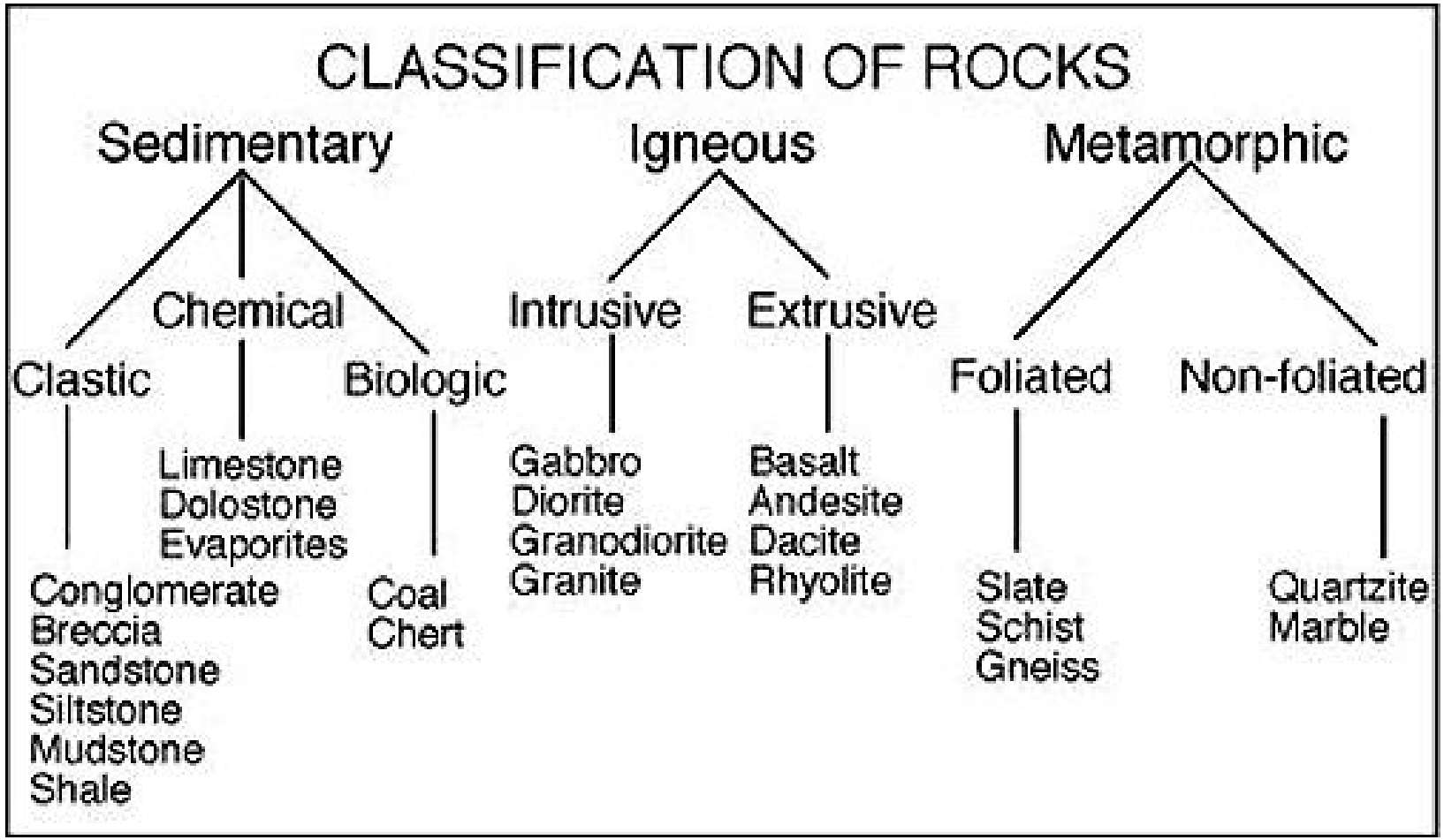


Earth's Crust	Entire Earth
Oxygen-47%	Iron-35%
Silicon-28%	Oxygen-30%
Aluminium-8%	Silicon-15%
Iron-5%	Magnesium-13%
Magnesium-4%	Nickel-2%
Calcium-2%	Sulphur-2%
Pottassium-2%	Calcium-1%
Sodium-2%	Aluminium-1%
Others-2%	Others-1%

The elements in the earth's crust are rarely found exclusive but are usually combined with other elements to make various substances, known as minerals.

Rock: aggregate or a physical mixture of one or more minerals

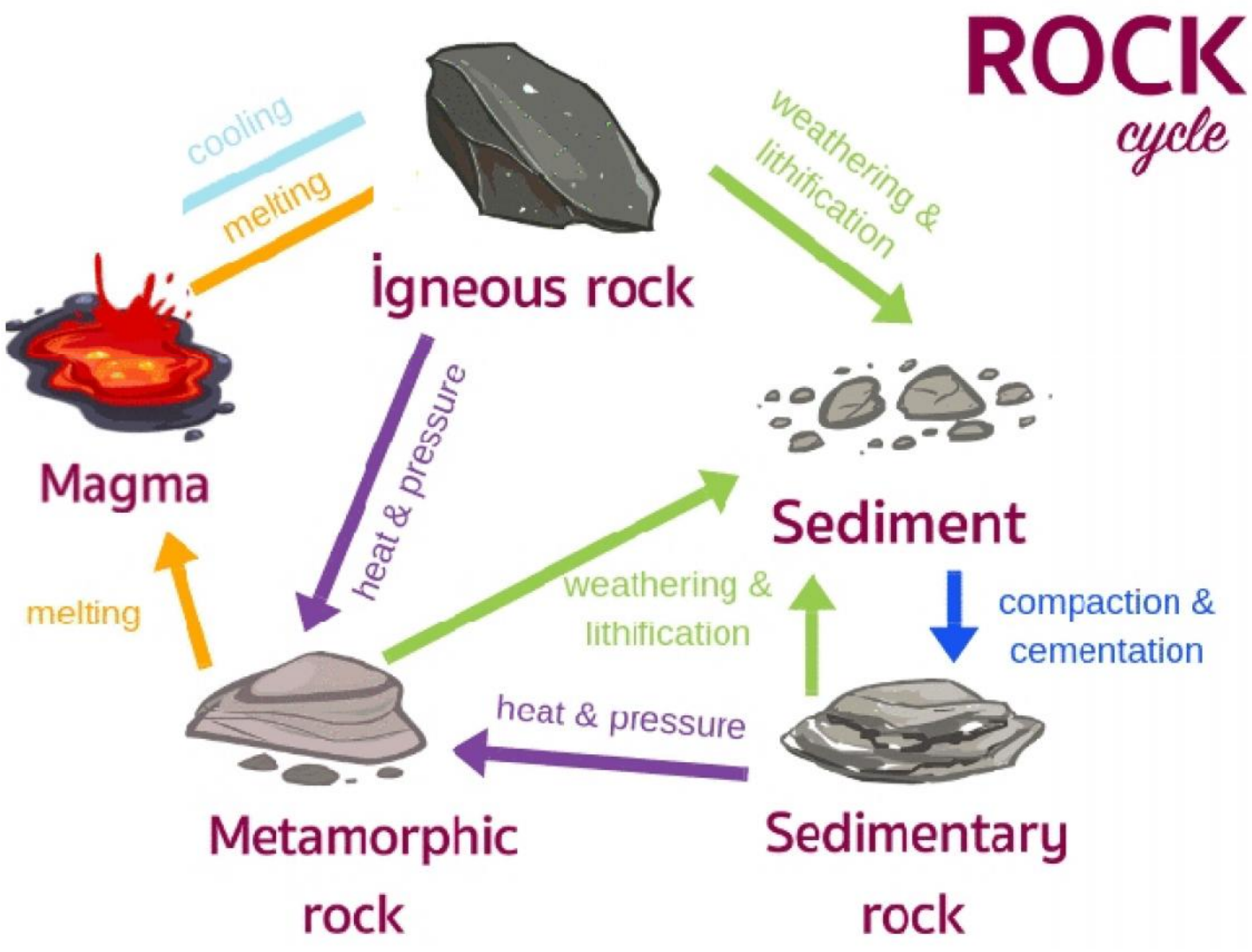
Rocks are of three types: Igneous, Metamorphic and Sedimentary



The science dealing with the study of rocks is called as Petrology.

Rocks do not remain in their original form for a long time but may undergo transformations.

The rock cycle is a continuous process through which old rocks are transformed into new ones as shown in the diagram below.



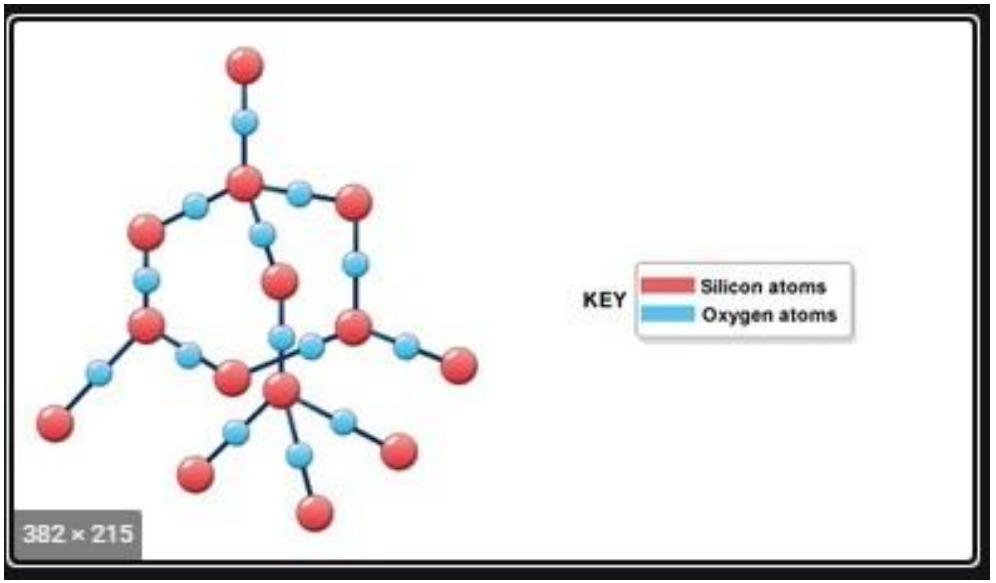
All the rocks are composed of minerals.

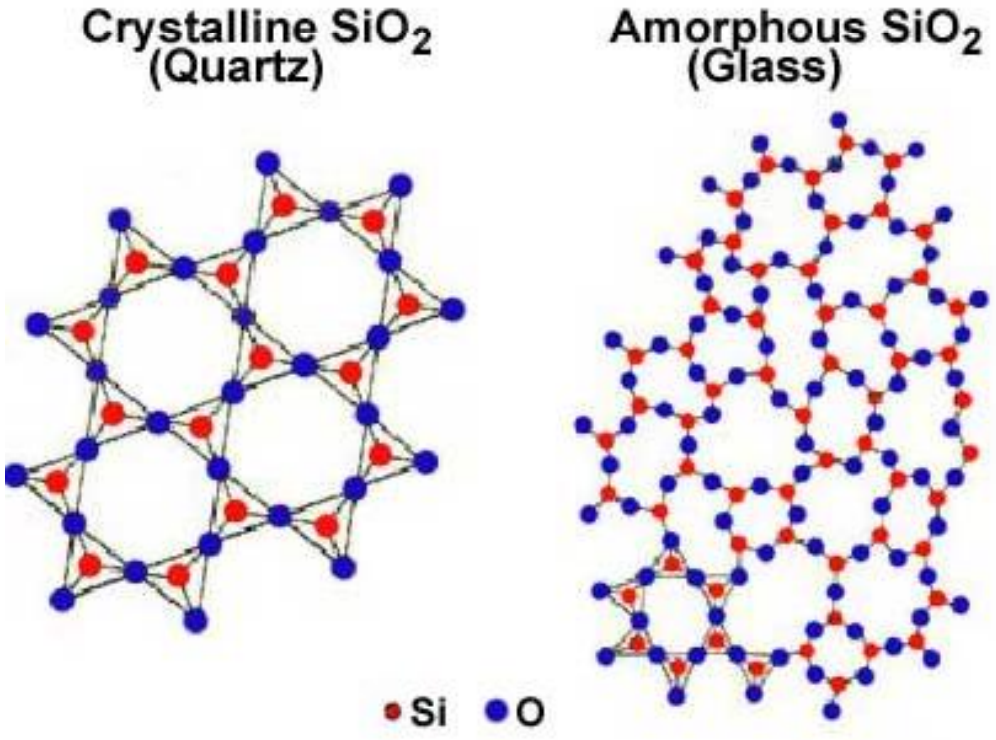
A mineral is a naturally occurring inorganic homogenous substance, having an ordered atomic structure, a definite chemical composition and physical properties.

For Example:

Quartz is a hard, crystalline mineral composed of silicon and oxygen atoms. The atoms are linked in a continuous framework of SiO_4 silicon-oxygen tetrahedra, with each oxygen being shared between two tetrahedra, giving an overall chemical formula of SiO_2.

QUARTZ


KEY
Silicon atoms
Oxygen atoms
382 × 215


Crystalline SiO_2 (Quartz)
Amorphous SiO_2 (Glass)
Si
O

FELDSPAR

Microcline ($KAlSi_3O_8$)

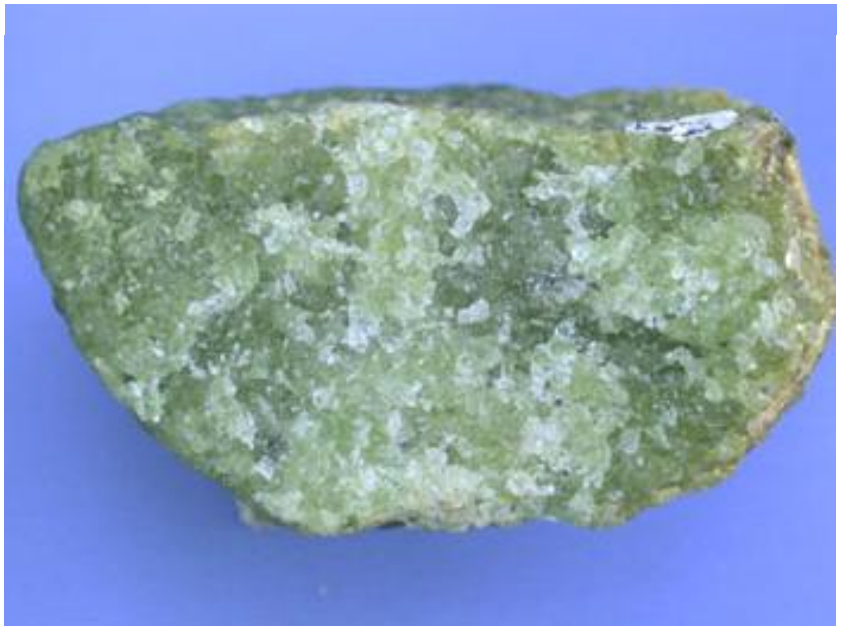
Plagioclase ($NaAlSi_3O_8$)

CALCITE

MUSCOVITE

AMPHIBOLE

PYROXENE



OLIVINE

• About 20 minerals make up more than 95% of all the rocks in the Earth's crust.

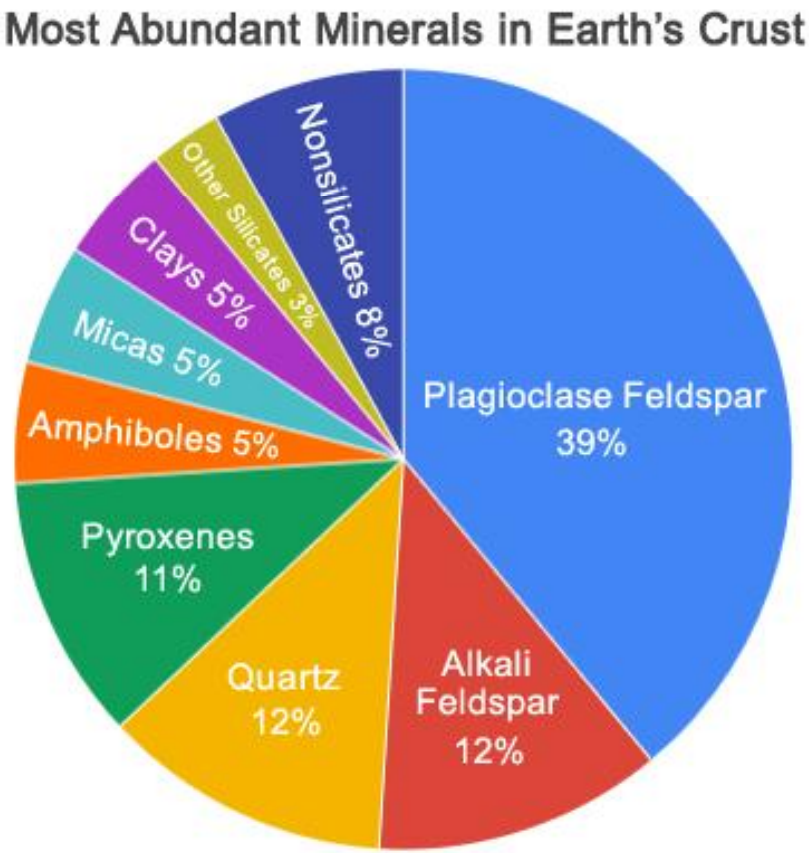
• A mineral is composed of two or more elements. But, sometimes single element minerals like sulphur, copper, silver, gold, graphite, etc are also found.

• Some rocks are monomineralic (composed of only one mineral).
•Ex: Dunite (composed of olivine only)
•Quartzite (composed of quartz only)

•Polymineralic rock (composed of different minerals)
•Ex: Granite (typically composed of quartz, Feldspar and mica may be with some accessory mineral like garnet)

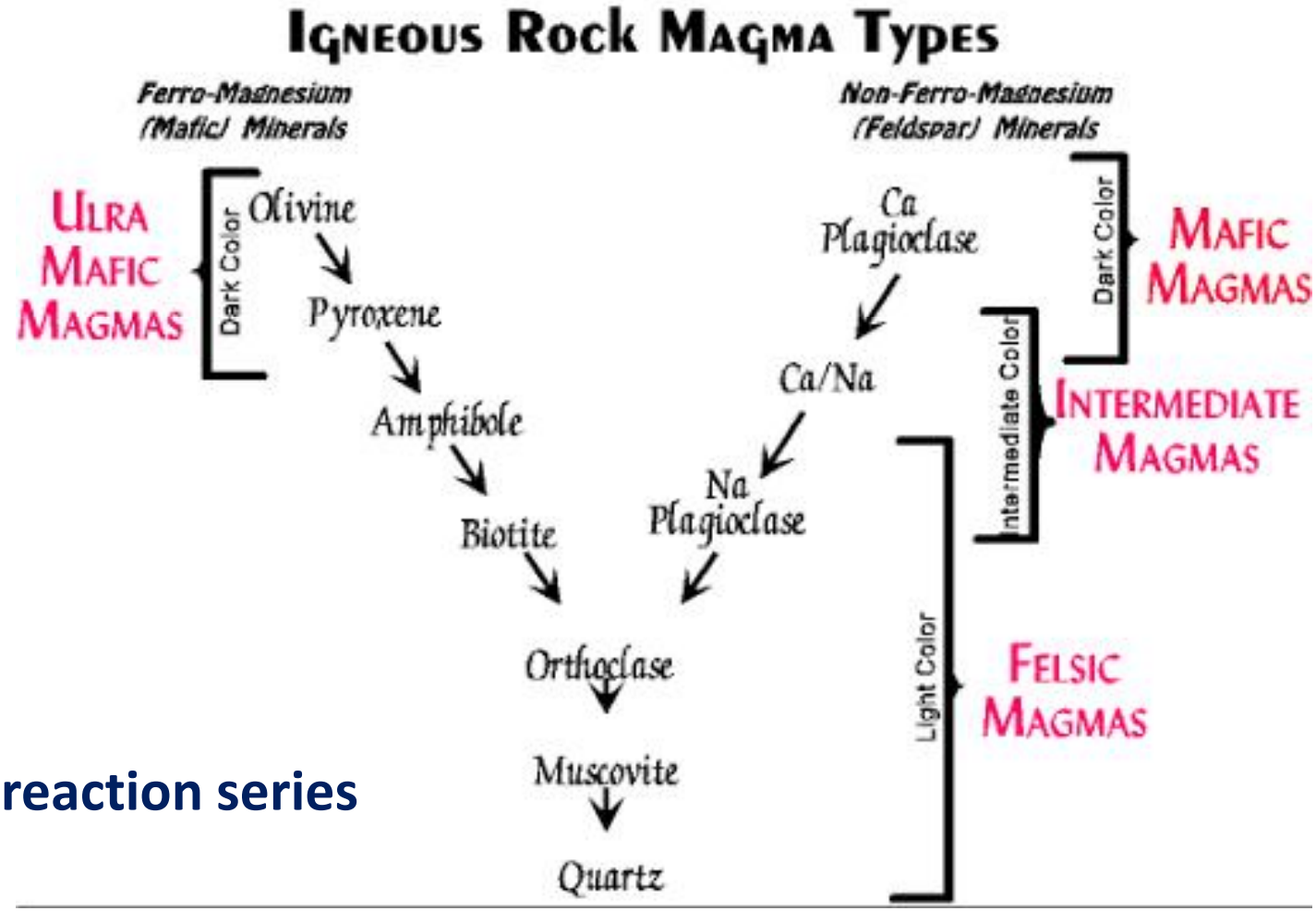
• The minerals which contain metals are called as metallic minerals (eg: Haematite) and the metallic minerals which are profitably mined are called as the ores.

• The crust of the earth is made up of more than 2000 minerals, but out of these, only six are the most abundant and contribute the maximum: feldspar, quartz, pyroxenes, amphiboles, mica and olivine.



The basic source of all minerals is the hot magma in the interior of the earth.

When magma cools, crystals of the minerals appear and a systematic series of minerals are formed in sequence to solidify so as to form rocks.



Bowen's reaction series

Thank you…