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Section 2 and 3: Rocks and the Rock Cycle

- There are 3 different types of rocks:
- **Sedimentary**
- **Igneous**
- **Metamorphic**

They are all made of minerals

One rock can turn into a different type, during the rock cycle.

All rocks are formed during different processes

Rocks are Made of Minerals

Igneous:
melted
rock that
cools

Metamorphic:
form when existing
rocks are heated or
put under
pressure

Sedimentary:
Made of
compacted
sediments:
pieces of rocks,
minerals, shells

Igneous



Granite



Gabbro



Pumice



Basalt



Obsidian

Metamorphic



Marble



Chlorite Schist



Phyllite



Mica Schist



Slate



Quartzite

Sedimentary



Conglomerate



Shale



Limestone



Sandstone

Types of Rocks

- <https://www.youtube.com/watch?v=acqRoasmxzq>

3 Rocks Types Igneous rocks,
Sedimentary rocks, Metamorphic rocks
for kids

From Makemegenious

- The Rock Cycle - see handout

Read “**The Rock Cycle**” page 275

- **rock cycle** is a model to describe how different kinds of rock are related to one another and how rocks change from one type into another. It is a never ending process.
- The materials in the rocks are not destroyed, they are transformed into other materials and there are several processes involved in these transformations:

****The processes involved in the Rock Cycle:**

1. Weathering – rocks are broken down into sediments
2. Erosion - sediments are transported to other places by wind, water, ice, gravity
3. Melting – liquefy

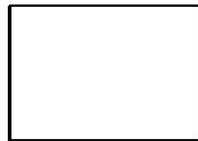
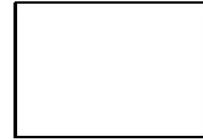
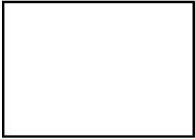
4.Heat and pressure

5.Cooling

6.Compaction – sediments are pressed

7.Cementation – minerals dissolve in the presence of water creating a “cement” that will glue the sediments together

The Rock Cycle



Igneous Rocks Classification

- According to where they form:

Intrusive or extrusive

- According to the composition:

Granitic or basaltic

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Igneous Rocks

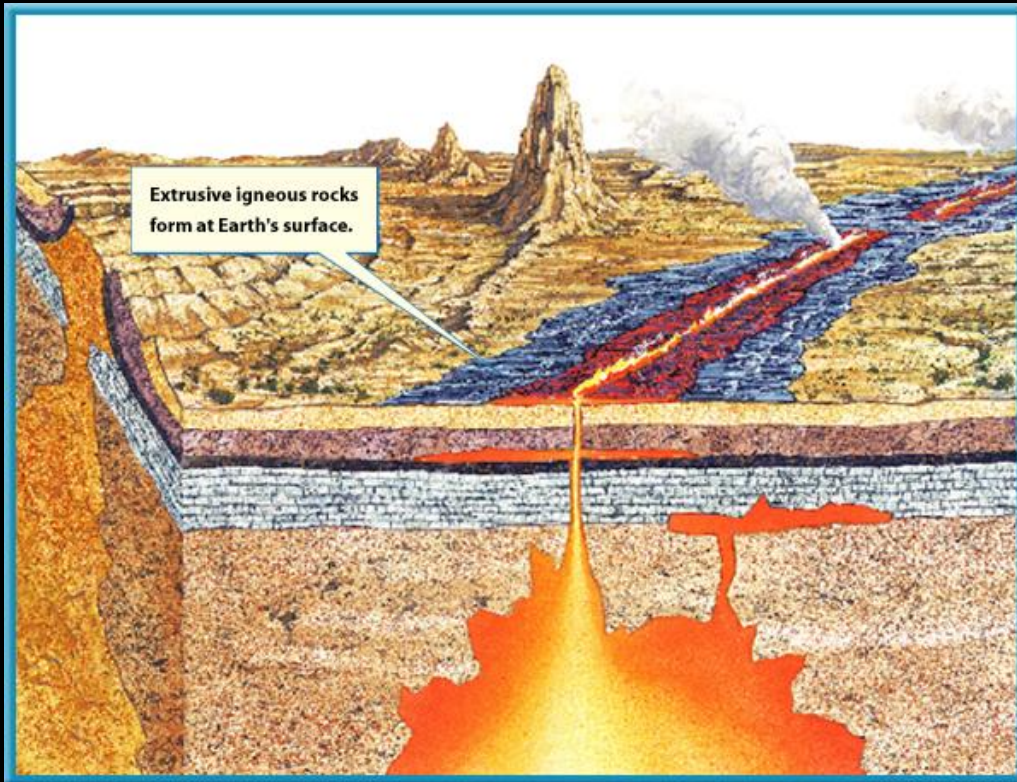
- **Igneous rocks** form when melted rock material (magma) from inside Earth cools.

2 types:

- **Extrusive**
- **Intrusive**

Igneous Rocks

- **Extrusive** igneous rocks form when melted rock material cools on Earth's surface.

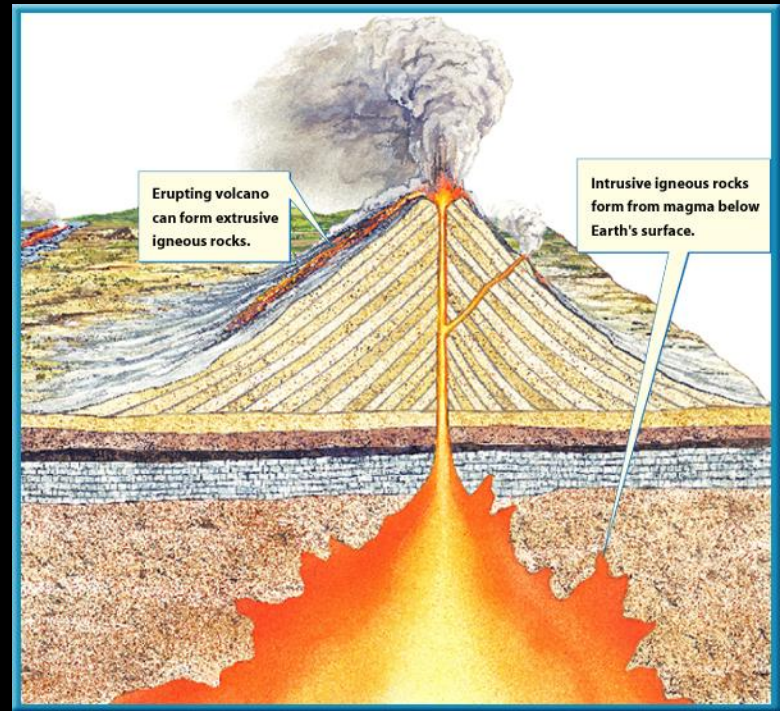
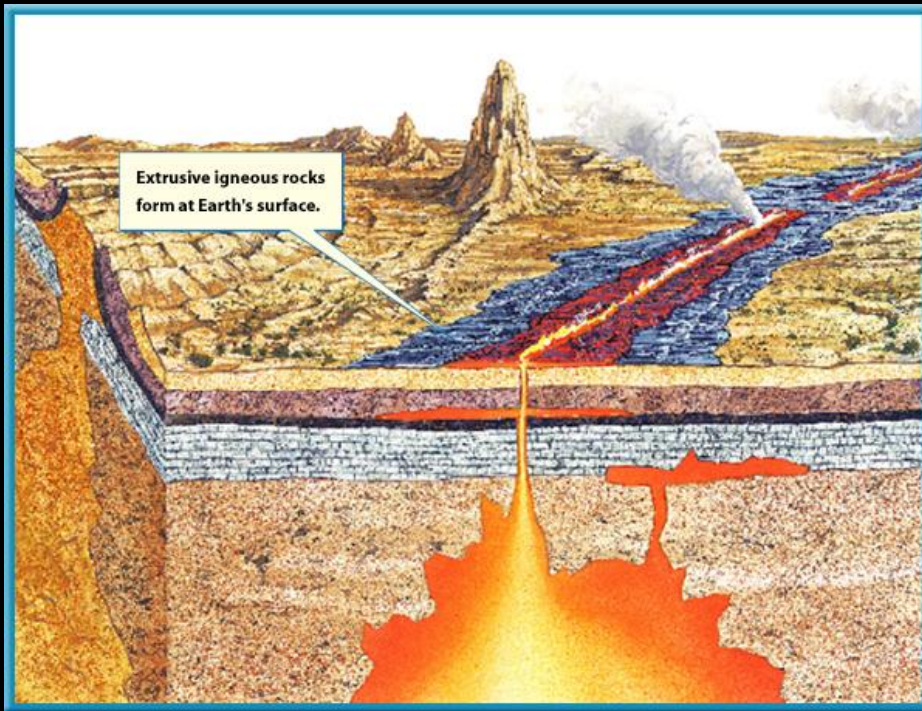


When the melted rock reaches Earth's surface, it is called **lava.**

Extrusive Rocks form from lava

Rocks from Lava

- Magma can reach the Earth's surface due to fissures or volcanic eruptions (openings) on the Earth's surface.



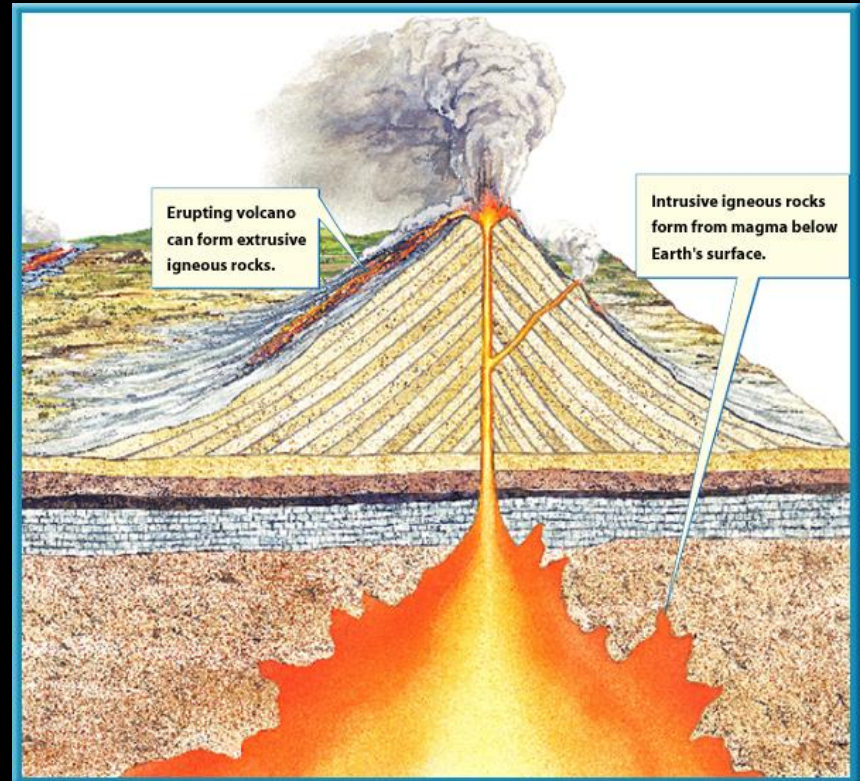
Rocks from Lava

- Lava cools quickly before large mineral crystals have time to form, so these rocks are composed of minerals with small crystals

Igneous and Sedimentary Rocks

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- **Intrusive** igneous rocks are produced when magma cools below the surface of Earth. (it is not lava)



Rocks from Magma

- Intrusive igneous rocks generally have mineral with large crystals that are easy to see – they have time to cool because they form inside the Earth.

Igneous rocks Chemical Composition and color

- The chemicals in the melted rock material determine the color of the rock.

Granitic Igneous Rocks - High percentage of silica – rocks are light in color – **usually** intrusive – coarse grained



Igneous Rocks Chemical Composition and color

Basaltic Igneous Rocks – high percentage of iron, magnesium or calcium – darker – **usually** extrusive – Fine grained



***Andesitic Igneous Rocks

- Andesitic igneous rocks have mineral compositions between those of basaltic and granitic rocks.

Sedimentary Rocks

- Made of compacted sediments.
- **Sediments** - Pieces of broken rock, shells, mineral grains, and other materials
- **Sediments are compacted in layers** forming Sedimentary Rocks

***Sedimentary rocks form in 3 steps that happen after the **sediments** are dropped by wind, water, gravity.

1.**Accumulation** of sediments in layers

2.**Compaction**: As the sediment accumulates, the weight of the layers of sediment presses down and compacts the layers underneath.

3.**Cementation**: The sediments become cemented together, as layers, into a hard rock

Sedimentary Rocks

- Most sedimentary rocks take thousands to millions of years to form.
- There are 3 types:
 - Detrital
 - Chemical
 - Organic

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Detrital Rocks

- Detrital rocks are made of **grains of minerals** or **pieces of rocks** that have been compressed



2

Chemical Rocks

- Chemical sedimentary rock forms **when mineral-rich water from geysers, hot springs, sea or salty lakes evaporates.**
- As the water evaporates, layers of the minerals are left behind, forming a rock
- Ex: limestone and rock salt

Limestone – chemical sedimentary rock



Rock Salt – chemical sedimentary rock



2

Organic Rocks

- Form by:
Living matter
that dies, piles
up, and then is
compressed
into rock.

EX:

- **Chalk and coal**



2

Organic Rocks

- **Coal** is produced from **plants**
- **Chalk** is formed from the skeleton of **small marine animals** that deposit on the bottom of the sea

****Fossils, Sedimentary and Metamorphic Rocks**

Sedimentary rocks can contain fossils because unlike other rocks, they will form at temperatures and pressure that do not destroy the rests of the Organisms. Also, the sediments are deposited a little bit at the time, in layers, and protect the remains from water, wind, animals, etc.

It is very difficult to find fossils in metamorphic rocks, because the heat and pressure necessary to form a metamorphic rock would destroy the remains.

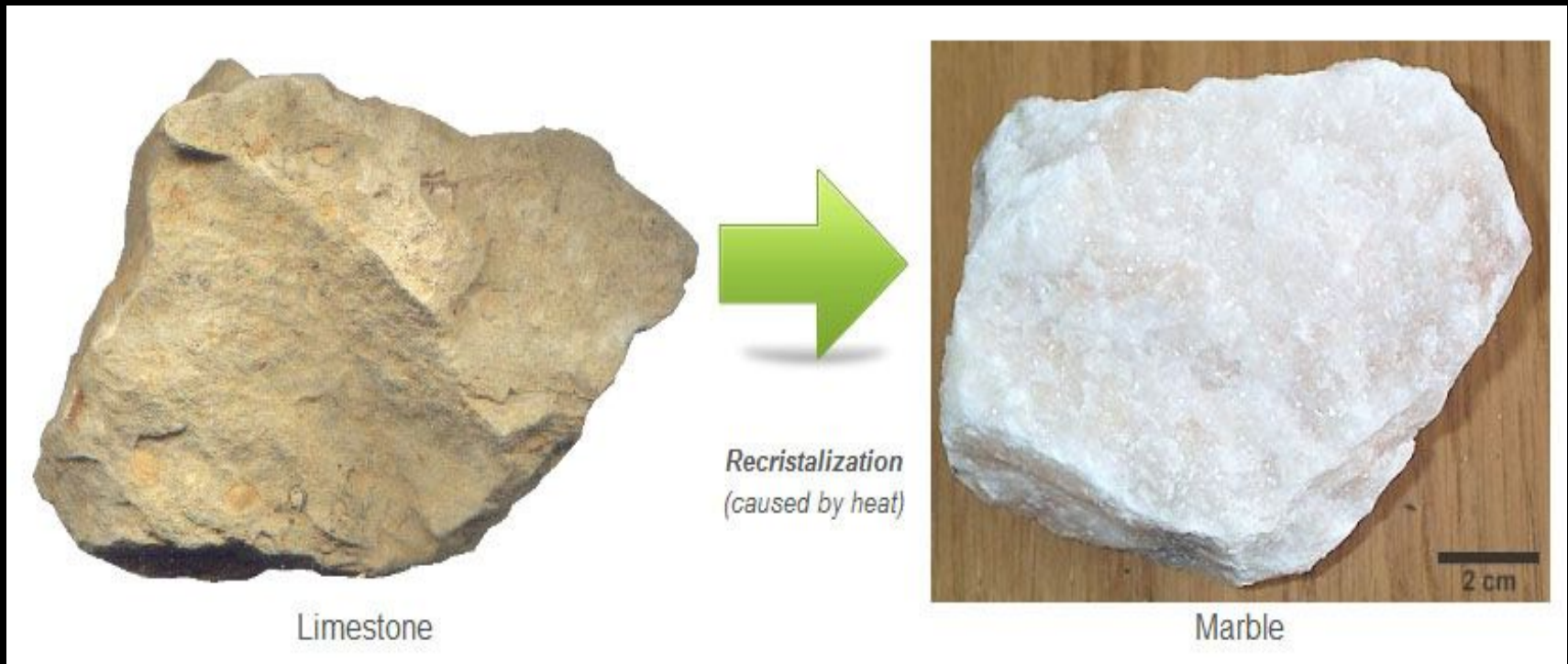
Metamorphic Rocks

- Metamorphic means “change of form”
- Metamorphic rocks form when existing rocks are heated or put under pressure .
- It is a process that takes millions of years to be completed.

Metamorphic Rocks and the Rock Cycle

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- Limestone (sedimentary) can change into marble.



3

Types of Metamorphic Rocks

- They are classified according to their TEXTURE.
- There are 2 types:
 - **Foliated**
 - **Non foliated**

Metamorphic Rocks and the Rock Cycle

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- **Foliated** rocks have visible layers
- Gneiss pg 273



Foliated Metamorphic Rocks



Gneiss



Slate

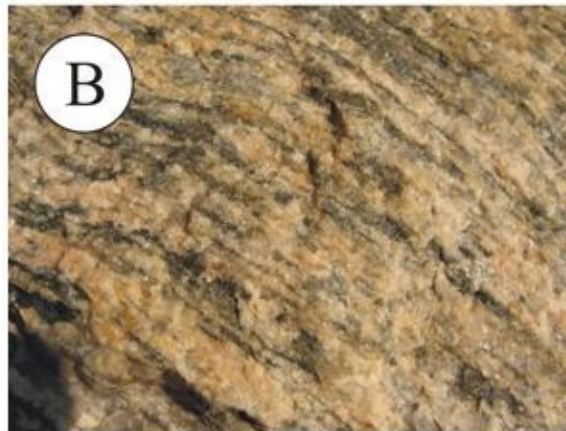
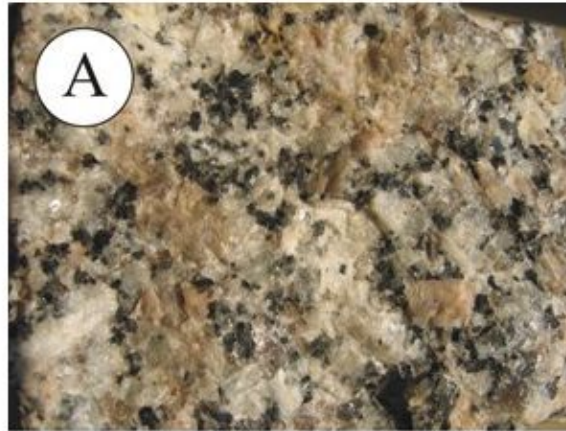


Schist



Phyllite

Nonfoliated vs. Foliated Rocks



Metamorphic Rocks and the Rock Cycle

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- **Nonfoliated** rocks do not have distinct layers or bands.

Ex: marble

- Page 273 fig 21 B

Non foliated Metamorphic Rocks

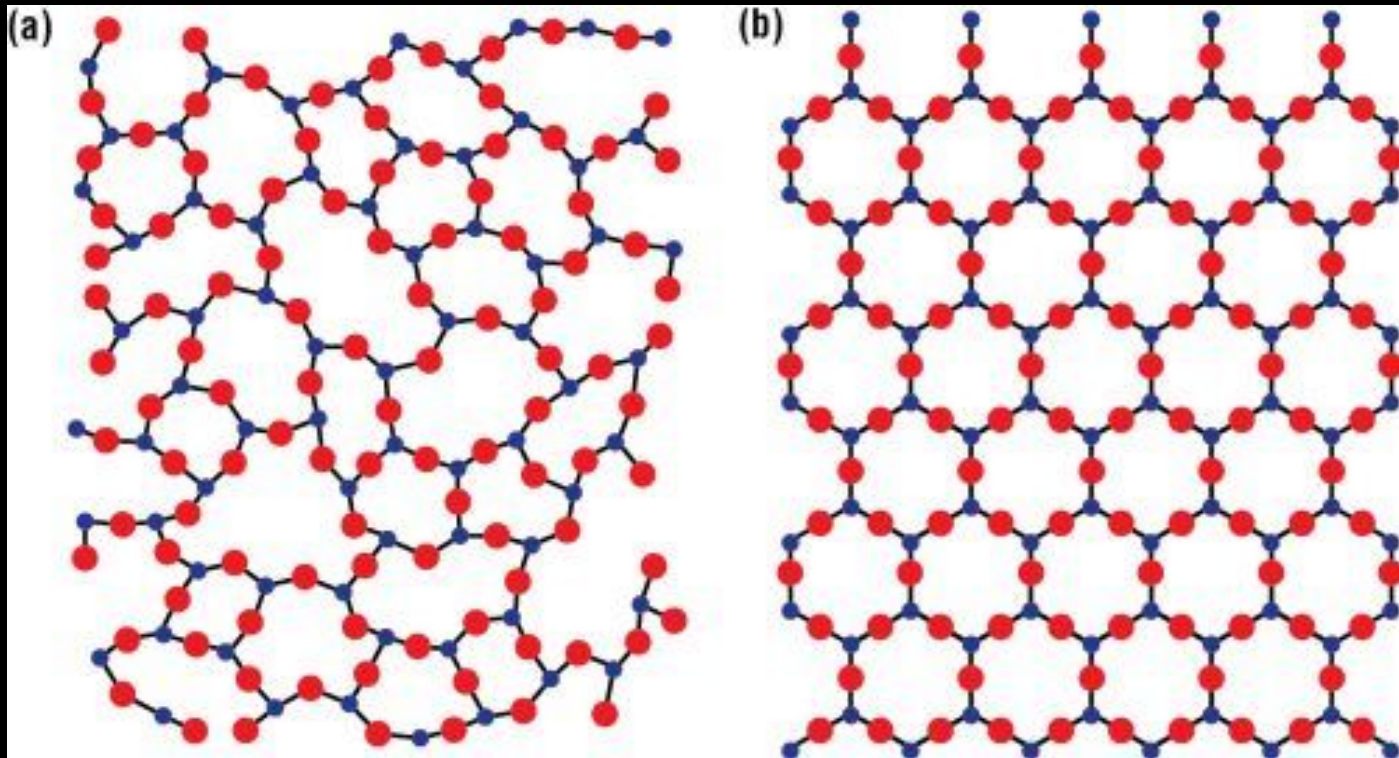
Quartzite
(from arkose)



Marble



Solids: can be crystalline solids or amorphous solids
The picture below compares an amorphous(a) and a crystalline (b) structure



Atoms are in a
random arrangement

Atoms are organized in a
repeating pattern

Glass is made by melting together sand and several minerals at very high temperatures. Glass is an amorphous solid (cools very fast and there is no time to make crystals)
EX of a glass found in nature: obsidian or volcanic glass

