Sedimentary and Metamorphic Rock Activity
Environmental Science

Name: _____ Period: _____ Date: _____
Essential Question: How do I identify sedimentary and metamorphic rocks?

I. Observing Sedimentary Rock

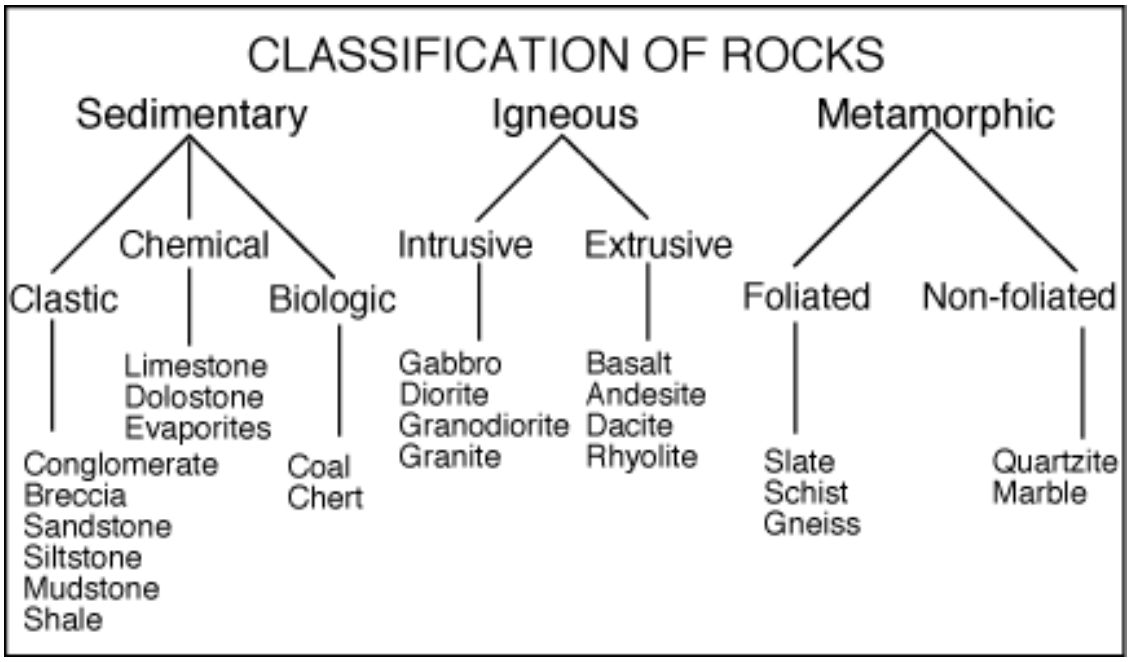
11 Arkose 12 Gypsum 13 Sandstone 14 Shale 15 Limestone 16 Conglomerate

# of the Rock	**Name of Rock** Check the number on the rock and compare it with the key above.	**Color** Is it black, white, grey etc.?	**Grain Size** Is it coarse, mixed, or fine	Is it **layered or not layered?**	Is it **clastic**, **chemical**, or **biologic?**	**Texture** Is it smooth or rough?	Describe the Rock

II. Observing Metamorphic Rock

21 Amphibolite 22 marble 23 Schist 24 Slate 25 Gneiss 26 Anthracite

# of the Rock	**Name of Rock** Check the number on the rock and compare it with the key above.	**Color** Is it shiny, dull, black, white, grey etc.?	**Grain Size** Is it coarse, mixed, or fine	Is it **foliated or non foliated?**	**Texture** Is it smooth or rough?	Describe the Rock



Clarifying Questions:

1. What are the three types of **sedimentary rocks**?

_____
_____

2. What are the two types of **igneous rocks**?

_____
_____

3. What are the two types of **metamorphic rocks**?

_____
_____

4. How are **layered** sedimentary rocks different from **foliated** metamorphic rocks? Answer this by comparing a layered metamorphic rock like **sandstone** with a foliated metamorphic rocks like **gneiss**.

_____
_____
_____

5. Classify the following rocks. Put a **check mark** on the appropriate column.

Rock	Sedimentary rock	Metamorphic rock	Igneous rock	Clastic	Chemical	biological	intrusive	extrusive	foliated	Non foliated
sandstone										
granite										
schist										
basalt										
marble										
shale										
slate										

Rock Classification Chart

Rocks on earth are classified according to the way they were formed. Igneous rocks come from magma or lava. Sedimentary rocks are made from sediments. Metamorphic rocks are the result of great heat and pressure that have changed existing rocks into new rocks.

Igneous **Igneous rocks form when molten rock (magma) originating from deep within the Earth solidifies. The chemical composition of the magma and its cooling rate determine the final igneous rock type.**	**Intrusive (plutonic)**	Intrusive igneous rocks are formed from magma that cools and solidifies deep beneath the Earth's surface. The insulating effect of the surrounding rock allows the magma to solidify very slowly. Slow cooling means the individual mineral grains have a long time to grow, so they grow to a relatively large size. Intrusive rocks have a characteristically coarse grain size.
	Extrusive (volcanic)	Extrusive igneous rocks are formed from magma that cools and solidifies at or near the Earth's surface. Exposure to the relatively cool temperature of the atmosphere or water makes the erupted magma solidify very quickly. Rapid cooling means the individual mineral grains have only a short time to grow, so their final size is very tiny, or fine-grained Sometimes the magma is quenched so rapidly that individual minerals have no time to grow. This is how volcanic glass forms.
Sedimentary **Sedimentary rocks are formed from pre-existing rocks or pieces of once-living organisms. They form from deposits that accumulate on the Earth's surface.**	**Clastic**	Clastic sedimentary rocks are made up of pieces (clasts) of pre-existing rocks. Pieces of rock are loosened by weathering, then transported to some basin or depression where sediment is trapped. If the sediment is buried deeply, it becomes compacted and cemented, forming sedimentary rock. Clastic sedimentary rocks may have particles ranging in size from microscopic clay to huge boulders. Their names are based on their grain size.
	Chemical	Chemical sedimentary rocks are formed by chemical precipitation. This process begins when water traveling through rock dissolves some of the minerals, carrying them away from their source. Eventually these minerals are redeposited when the water evaporates away or when the water becomes over- saturated.
	Biologic	Biologic sedimentary rocks form from once-living organisms. They may form from accumulated carbon-rich plant material or from deposits of animal shells.
Metamorphic **Metamorphic rocks are rocks that have been substantially changed from their original igneous, sedimentary, or earlier metamorphic form. Metamorphic rocks form when rocks are subjected to high heat, high pressure, hot, mineral-rich fluids or, more commonly, some combination of these factors.**	**Foliated**	Foliation forms when pressure squeezes the flat or elongate minerals within a rock so they become aligned. These rocks develop a platy or sheet-like structure that reflects the direction that pressure was applied.
	Non-foliated	Non-foliated metamorphic rocks do not have a platy or sheet-like structure. There are several ways that non-foliated rocks can be produced. Some rocks, such as limestone are made of minerals that are not flat or elongate. No matter how much pressure you apply, the grains will not align! Another type of metamorphism, contact metamorphism, occurs when hot igneous rock intrudes into some pre-existing rock. The pre-existing rock is essentially baked by the heat, changing the mineral structure of the rock without addition of pressure.

http://stone-network.com/petrology/sandstone.html

Sedimentary Rock Classification

How Do You tell One Sedimentary Rock from Another

Sedimentary rock is classified into two groups based on how they form. They are **clastic** and **chemical**.

Clastic sedimentary rock is formed as bits of weathered rock become cemented together. Because all kinds of rock are subject to weathering many different minerals can make up this group of rocks. **Clays** and **quartz** are the most common.

Classification of clastic sedimentary rocks is done according to the **size** of the sediments that make up the rock. The following table contains the major groups of clastic sedimentary rocks with their characteristics:

Clastic Sedimentary Rocks		
Name of Rock	Sediment Type	Texture

Conglomerate	gravel - rounded fragments	course over 2 mm
Breccia	gravel - angular fragments	course over 2 mm
Sandstone	sand	medium 1/16 to 2mm
Siltstone	mud	fine 1/256 to 1/16 mm
Shale	mud	very fine less than 1/256 mm

Chemical sedimentary rocks form from dissolved minerals that are **precipitated** or separated from water. This happens most frequently when water evaporates leaving the minerals behind.

You can see this process taking place in your own home. The white deposits that form around the faucets in your bathroom or kitchen are from minerals left behind as water evaporates.

Below is a list of chemical sedimentary rocks with some of their characteristics:

Chemical Sedimentary Rocks		
Name of Rock	Composition	Texture
Crystalline Limestone	Calcite - $CaCo_3$	corse to fine Crystalline
Fossiliferous Limestone	Calcite - $CaCo_3$	visible fragments of shells
Chalk	Calcite - $CaCo_3$	microscopic shells and clay
Chert	Quartz - SiO_2	very fine crystalline
Gypsum	Gypsum - $CaSO_4$-$2H_2O$	fine to course crystalline
Rock Salt	Halite - NaCl	fine to course crystalline
Bituinous Coal	Organic Matter	fine

http://www.rocksandminerals4u.com/sedimentary_rock.html