Date _____ Per. _____

First, take a set of sedimentary rocks. Place them in order, 1 –12, on your desk as you read this paper. If your set is incomplete, or if you have extras, tell your teacher.

Sedimentary rocks are classified into three groups on the basis of their origin. That is, how they formed. These three groups are clastic (fragmental), organic, and chemical precipitates.

Most sedimentary rocks are composed of the weathered remains of other rocks that have been compressed and cemented in layers. Other sedimentary rocks are left behind when salt water evaporates, or when organic remains accumulate and change to solid rock. Some sedimentary rocks contain the fossil remains of prehistoric life.

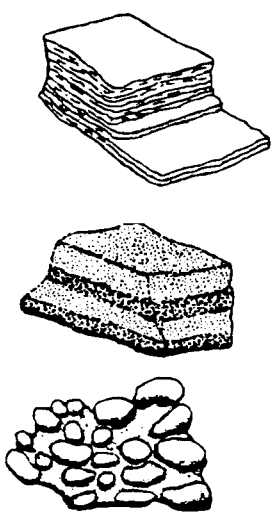
CLASTIC (fragmental) rocks, are the most common sedimentary rocks. They are made from sediments that have been weathered, eroded, deposited, compressed, and cemented to form new rock. Unlike sediments, sedimentary rock is hard because it has been compressed and cemented. Compression is caused by the weight of sediments deposited on top of the rock layers. Silica (quartz), calcite (limestone) and clay are three common rock forming cements. These cements are usually deposited by water percolating through the sediments. Clastic rocks are classified on the basis of the size of the grains of sediment.

Shale is composed of clay particles so small that they cannot be seen without magnification. Shale feels smooth and breaks into thin layers.

Siltstone is made of larger particles, but it sometimes breaks into thin layers.

Sandstone contains sand particles large enough to feel gritty. Although sandstone may or may not show layering, it usually breaks into irregular fragments.

Conglomerate may looks like a cement containing pebbles. It is composed of large, rounded particles of sediment held together by a natural cement.



Clastic (fragmental) Sedimentary Rocks are classified by the Size of the Grains:

Shale:	< 0.004 mm
Siltstone:	0.004 -0.06 mm
Sandstone:	0.06-2 mm
Conglomerate:	> 2 mm

---

1. How are sedimentary rocks classified into the three groups? _____
2. What two changes are required to change sediments into sedimentary rock? _____ & _____
3. Three natural cements are _____, _____, & _____
4. On what basis are the clastic rocks classified? _____
5. Shale is made of grains of sediment so small the rock feels _____
6. A rock composed of pebbles cemented together would be called _____

Most **CHEMICAL** sedimentary rocks are made of material that settle out of solution in sea water as the water evaporates. This group of rocks is sometimes known as the evaporites. Unlike the other sedimentary rocks, evaporites are composed of relatively soft, intergrown crystals. You should note that most rocks composed of intergrown crystals are *not* sedimentary rocks.

As ocean water evaporates, a variety of salts are left behind. **Rock salt** is the first and most abundant chemical to precipitate. Sodium chloride (table salt) is the mineral halite, which forms the sedimentary rock, rock salt. Rock salt is followed in precipitation by other salts. **Gypsum** (hydrous calcium sulfate) is one of the materials deposited later if evaporation continues. This kind of precipitation is now occurring in the Persian Gulf of Asia, and in the Great Salt Lake in Utah. Underground beds of rock salt in Western New York show that our part of North America was covered by a tropical inland sea millions of years ago.

Dolostone forms by a chemical reaction with sea water as magnesium is added to calcite (limestone).

The **ORGANIC** sedimentary rocks are made from the remains of plant and animals. They are called organic because the rocks are made from material that was once alive, and because they all contain carbon.

Coal is composed of the remains of plants that lived in tropical swamps millions of years ago. The plant material fell into water where it could not decay as quickly as it accumulated. Compression by burial turned these remains into peat, then lignite and then into bituminous coal, which are relative low in density. Deeper burial may produce anthracite, commonly called hard coal, because it is harder and more dense.

Coquina is a variety of limestone composed entirely of sea shells cemented by a calcite matrix.

Natural **chalk** is also composed of the remains of very tiny marine animal, too small to be readily visible.

Limestone is a sedimentary rock composed of the mineral calcite. In places like the Bahamas, calcite is precipitating from sea water to form chemical limestone. Organic coquina limestone is composed mostly of sea shells. If the shells have been abraded into a calcite sand, fragmental limestone is the result. Thus, limestone is a sedimentary rock that can be classified into any of the three sedimentary groups.

7. The chemical precipitate rocks are left behind when sea water _____
8. The solution material in sea water is mostly _____
9. Sedimentary rocks composed of material that was once alive are the _____ rocks.
10. What is an "evaporite"? _____
11. List the three groups of sedimentary rocks and give two examples of each.

    Group 1: _____. _____ & _____

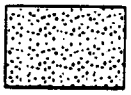
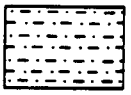
    Group 2: _____. _____ & _____

    Group 3: _____. _____ & _____

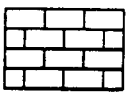
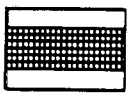
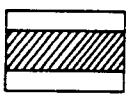
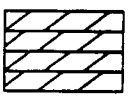
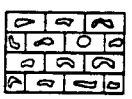
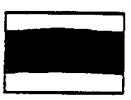
The chart below is from the Earth Science Reference Tables. Use this chart to answer the following questions .

Sedimentary Rocks

INORGANIC LAND-DERIVED SEDIMENTARY ROCKS

TEXTURE	GRAIN SIZE	COMPOSITION	COMMENTS	ROCK NAME	MAP SYMBOL
CLASTIC (fragmental)	Sand, pebbles, cobbles, boulders	Mostly quartz, feldspar, clay minerals	Particles rounded and cemented by fine particles	Conglomerate	
	Sand		Can be fine to coarse	Sandstone	
	Silt		Can be compact or easily split	Siltstone	
	Clay			Shale	

CHEMICALLY AND ORGANICALLY FORMED SEDIMENTARY ROCKS

TEXTURE	GRAIN SIZE	COMPOSITION	COMMENTS	ROCK NAME	MAP SYMBOL
NON-CLASTIC (Chemical)	Coarse to fine	Calcite	Crystals from chemical precipitates (Incudes the evaporites)	Chemical Limestone	
	All sizes	Mostly halite		Rock Salt	
	All sizes	Gypsum		Rock Gypsum	
	All sizes	Dolomite	Changed from limestone by replacement	Dolostone	
ORGANIC (Biological)	Microscopic to coarse (larger than 0.2 cm)	Calcite	Cemented shells, shell fragments, and skeletal remains	Fossil Limestone	
	All sizes	Carbon from plant remains	Black and nonporous	Coal	

12. What name is given to a fragmental rock composed of pebbles or cobbles cemented together?

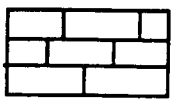
13. What is coal made from?

_____

14. What clastic rock has the smallest grains of sediment?

15. What nonclastic rock started as limestone and was made by a chemical replacement?

_____

16. What rock is represented by this pattern? 

_____

17. What group of sedimentary rocks is classified by the size of the grains of sediment?

_____

18. What rock is made of clay?

_____

19. What common sedimentary rock is composed mostly of the mineral calcite? _____

20. The most common minerals in the clastic rocks are... _____

21. What is the most abundant mineral in natural rock salt? _____

We can usually identify a rock as sedimentary because it has one or more of the following characteristics:

1. It is composed of rounded fragments compressed and cemented together.
2. It is layered, although the layers may be too thick to show in a small sample.
3. It contains fossils.
   (Fossils are not found in all sedimentary rocks, however, non-sedimentary rocks almost never contain fossils.)

Lab Procedure:

A. *Gently* place the 12 rock specimens on the desk in front of you. If your set is not complete, or samples have been badly damaged, please tell the teacher so the problem can be fixed.

B. Use this paper to identify each of the twelve specimens and tell what characteristics helped you to identify each.

Rock Name (There are repeats)	Distinguishing Characteristics
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
1.	
12.	

Next, *circle* the names of all of the above rocks that are monomineralic (composed of just one mineral).

Please be sure that you are returning a *complete* set of rocks, ready for the next group. If your set is not complete, please tell your teacher.