Name: _____ Period: _____ Date: _____

Sedimentary Rock Lab

(Formation, Properties, and Ancient Depositional Environments)

BIG IDEA:

Earth's immense history is "recorded" in the rocks. Sedimentary rocks tell us about ancient environments and can hold fossils.

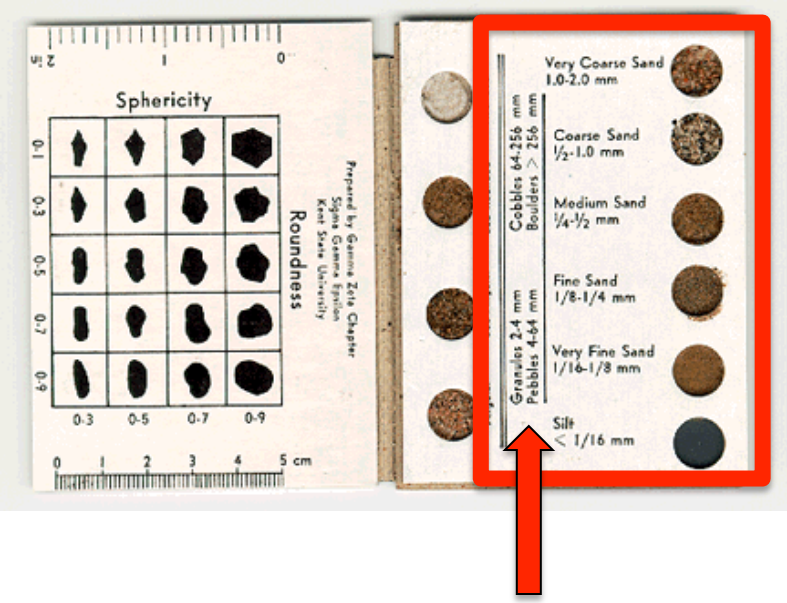
FOCUS QUESTIONS:

- ✓ How can you **use physical and chemical properties** of sedimentary rocks to **identify** them?
- ✓ How can you use these characteristics to **determine what the environment once was** where they were formed?

PROCEDURE:

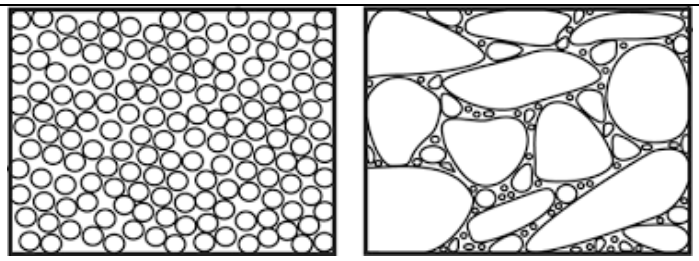
1. Pick a sample. Note which number you take.
2. Make sure you record the following data in the correct row.

3. Use the grain size chart and/or ruler to determine the sediment size(s) (quantitative) that compose rock.
   a. If the sediments are too small to measure with a ruler, you will need to use your finger to feel the textures on the right hand side of the booklet and compare.
   b. You may also want to use a hand lens or microscope to compare textures.
   c. Record the **sediment SIZE(S)** in the data table. (If the rock is not made of sediments, then record if it is crystals or something else.)
4. Use this information to determine the **NAME** (qualitative) **of the sediment(s)** in the data table. (Remember, sediments are classified by size. Each size is a different type of sediment.)
   a. If you notice the sediments are something else (such as shells) record this information as well.



Classification of Sediments by SIZE:	
Grain Size Range	**Name of Loose Sediment**
> 2 mm	**gravel**
1/16 to 2 mm	**sand**
	***note: sand can be different sizes – see grain size chart to the left**
1/256 to 1/16 mm	**silt**
< 1/246 mm	**clay**

5. Observe the sediment **SORTING**.
    a. Are the sediments **well sorted**, meaning they are all about the same size?
    b. Or are the sediments **poorly sorted**, meaning they are all different sizes?
    c. See picture below for clarification.



well sorted	**poorly sorted:**
✓ **all sediments are about the same size**	✓ **sediments are all different sizes**

6. Record your findings in the data table.
7. Use the **acid test** to determine if the mineral **calcite** is present.
    a. Use the dropper to add ONE drop of vinegar (an acid)to the rock sample.
    b. Observe closely for signs of a chemical reaction. This included bubbling that you can see and/or hear.
    c. If there is a reaction, then there is calcite in the rock.
8. Record observations in the data table.
9. RINSE AND DRY THE ROCK OFF AS BEST YOU CAN.
10. Use the glass plate to do a **scratch test** for mineral **hardness**.
    a. Quartz is a mineral with a Moh's hardness of 7. Glass is made of quartz sand and also has a Moh's hardness of 7.
    b. If something scratches glass, it is the **same hardness as glass or harder.**
    c. Calcite (also a mineral) has a hardness of 3.
11. Record other observations such as:
    a. the **shape** of sediments (rounded or angular)
    b. if there are shells, fossils, or other **organic parts**
    c. **color(s)** of sediments
    d. any other important details (**layers**, etc.)

12. Analyze observations to determine the classification of how the rock **formed.** Conclude it the rock is clasitic, organic, or chemical. Record your conclusion in the data table.

13. Analyze observations and use the **identification charts** below to identify the **NAME** of the rock.
    a. If there is a property or word on the chart you do not know, use your resources to find out. Example: "conchoidal fracture" is not something we have covered.

14. SAVE THE LAST COLUMN ABOUT ANCIENT DEPOSITIONAL ENVIRONMENTS TO DO TOGETHER AS A CLASS.

DATA:

Sample Number	TEXTURE			Calcite Present	Scratch Test	Other Observatio-ns	Classify Rock Formation	Rock Name	Ancient Depositional Environment(s)
	Sediment Size(s) • SIZE of sedim-ent(s) • or if crystals present (step 3c)	**Sediment Name** • TYPE of sedime-nt(s) • draw an "x" if crystals (step 4)	**Sorting** • well sorted • poorly sorted • draw an "x" if crystals (step 5)	(fizzing /chem. react.) • yes • no (step 7)	• same or harder than glass (≥7+) • softer than glass (<7) (step 10)	• sediment shape (angular or rounded) • fossils present? • color • layers (step 11)	• clastic • organic • chemical (step 12)	• use observations and identification charts (step 13)	Infer based on observations, rock formation, and additional research. (step 14)
1									
2									
3									
4									
5									
6									
7									
8									

Conclusion Questions:

1. a. Which sample did you determine was CONGLOMERATE? _____ How did the sediments that make it up become rounded?

   b. Do you think that the sediments that make up conglomerate had to be transported (eroded) a long distance? Explain.

2. Which sample did you determine was FOSSILIFEROUS LIMESTONE? _____ How do fossils become part of sedimentary rocks?

3. Contrast how clastic sedimentary rocks and chemical sedimentary rocks look.

4. Could a sedimentary rock be both clastic and organic? Explain your reasoning. Give an example to prove your point.

5. Pick one rock you identified.
   a. Which environment did you infer it formed in?
   b. Explain your reasoning with evidence from the data table and the text.
   c. A claims, evidence and reasoning chart may be helpful in planning your answer.

6. What other questions do you have?

http://homepages.neiu.edu/~jmhemzac/121/rocks%20004ed.jpg
http://csmres.jmu.edu/geollab/Fichter/SedRx/Basickey.PDF

SEDIMENTARY ROCK IDENTIFICATION KEY

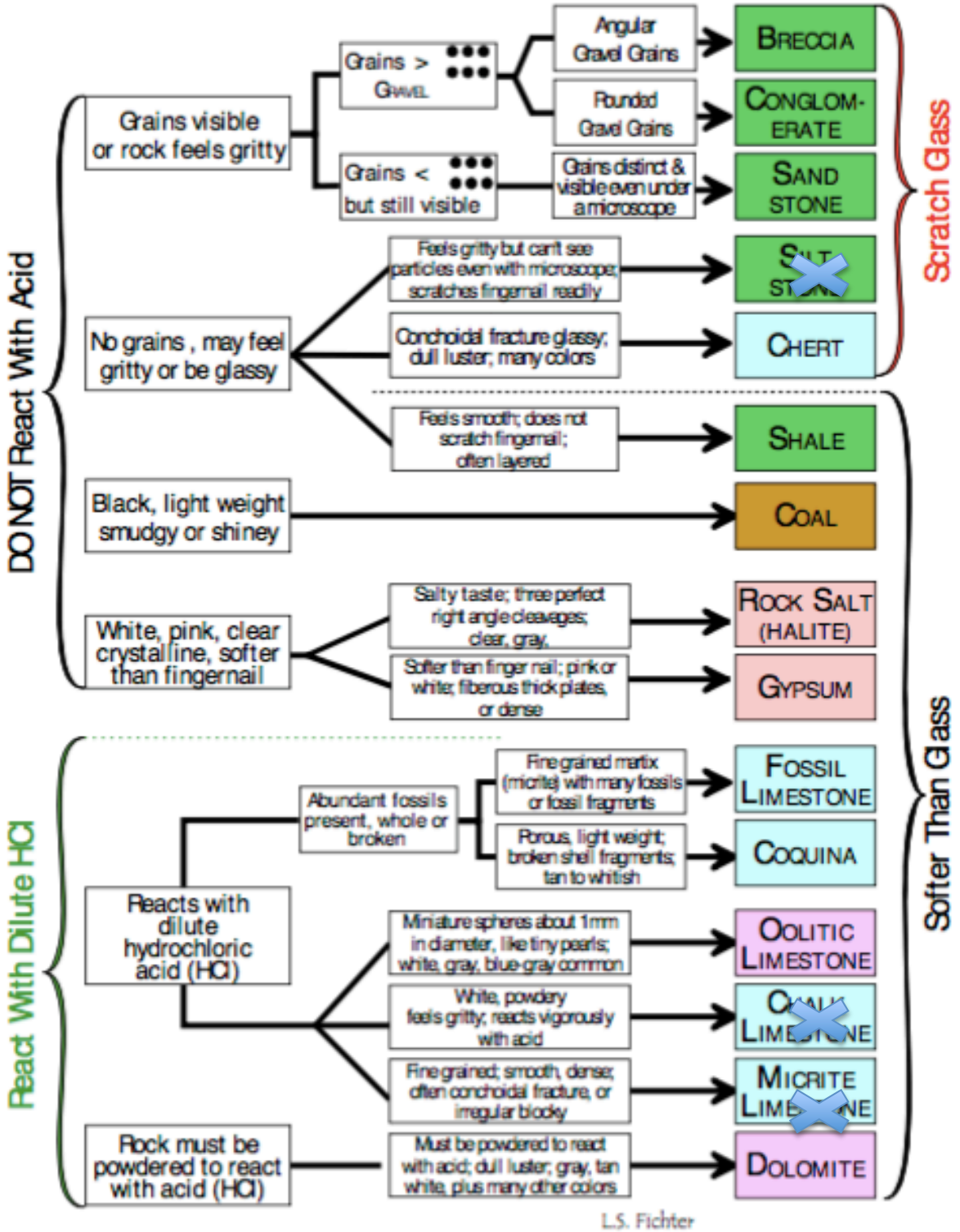
Detrital Sedimentary Rocks

Clastic Texture (particle size)	Distinctive Properties	Rock Name	
Gravel Coarse (over 2 mm)	Rounded rock or mineral fragments, typically poorly sorted	**Conglomerate**	
	Angular rock or mineral fragments, typically poorly sorted	**Breccia**	
Sand Medium (1/16 to 2 mm)	Quartz grains, typically rounded, well sorted	**Sandstone**	Sandstone
	At least 25% feldspar, typically poorly sorted, angular fragments		
	Mixture of sand and mud, typically poorly sorted		
Silt/mud Fine (1/16 to 1/256 mm)	Mostly silt-size quartz and clay, blocky, gritty	**Siltstone**	Mudstone
Clay/mud Very fine (less than 1/256 mm)	Mostly clay, splits into layers, may contain fossils	**Shale**	
	Mostly clay, crumbles easily		

Chemical Sedimentary Rocks

Composition	Distinctive Properties	Rock Name	
Calcite, $CaCO_3$ (effervesces in HCl)	Fine to coarse crystalline	**Crystalline Limestone**	Limestone
	No visible grains, may exhibit conchoidal fracture		
	Visible shells and shell fragments loosely cemented	**Coquina**	
	Various size shells and shell fragments, well cemented	**Fossiliferous Limestone**	
	Microscopic shells and clay, soft		
	Faint layering, may contain cavities or pores	**Travertine**	
Quartz, SiO_2	Microcrystalline, may exhibit conchoidal fracture, will scratch glass	**Chert (light colored)**	
		Flint (dark colored)	
		(banded)	
Gypsum $CaSO_4 \cdot 2H_2O$	Fine to coarse crystalline, soft	**Rock Gypsum**	
Halite, NaCl	Fine to coarse crystalline, tastes salty	**Rock Salt**	
Altered plant fragments	Black brittle organic rock, may be layered	**Bituminous Coal**	

Key to the Identification of Basic Sedimentary Rocks



L.S. Fichter
August, 2000
http://geollab.jmu.edu/Fichter/SedRx/index.html