Name _____ date _____

It's Just a Matter of Time

Landscapes change and have been changing for thousands of years. Although sometimes the changes go unnoticed during our lifetime, literature and pictures have proven that change is inevitable.

We know that all chemical weathering processes involve water, and this is why warm, wet, climates favor chemical weathering.

The question we want to ask today in lab is:

What effect does the temperature of water have on the rate at which chemical weathering occurs?

Materials: (working in pairs):

- 1 250ml beaker
- 1 thermometer
- 1 effervescent antacid tablet

Available to the class:

- ice water
- hot water

Data Table 1:

Beaker 1	Beaker 2	Beaker 3	Beaker 4	Beaker 5
0^0-10^0C	10^0-20^0C	20^0-30^0C	30^0-40^0C	40^0-50^0C

Procedure:

1. Each pair will be assigned a beaker number. (See **data table1** above)
2. Write your assigned beaker number in **data table 2**
3. Adjust your beaker to make sure that the water is within the correct temperature range. (using the ice or hot water)
4. Read the temperature of the water to the nearest half degree and record that value in **data table 2**.
5. Remove your thermometer from the beaker and set it aside in a **safe** place.
6. Have one person holding the stop watch.
7. The other person will drop the antacid tablet into the beaker, start the stop watch at the instant the tablet enters the water.
8. Stop the stop watch when the last piece of the tablet dissolves.
9. Record your time in **data table 2**

Data Table 2:

Beaker Number	**Temperature (^{0}C)**	**Time (seconds)**

10. Once you have your information dump the beaker of water down the sink and clean up your lab area.

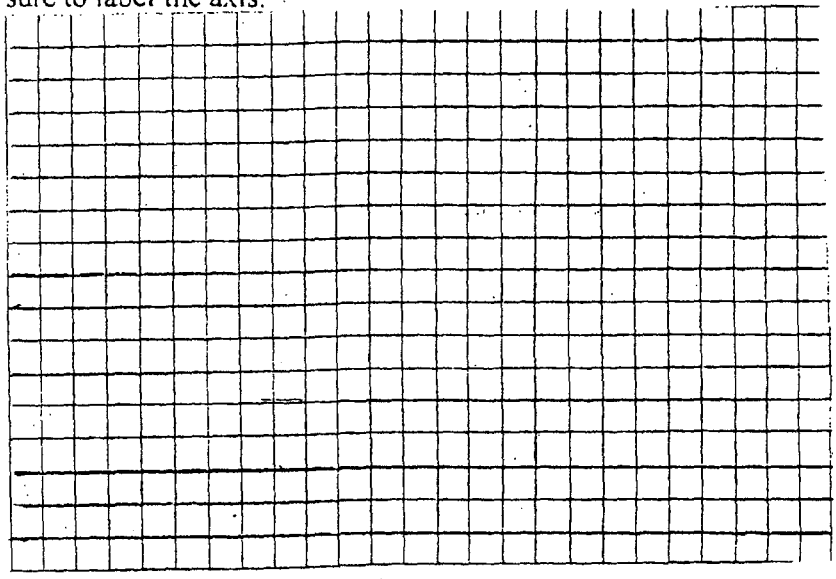
11. Fill in your data on the overhead under the appropriate beaker number, and fill in your data table 3 with all the class data.

Data Table 3:	**A**	**B**	**C**	**Average Time (sec)**
Beaker 1 0^0-10^0C				
Beaker 2 10^0-20^0C				
Beaker 3 20^0-30^0C				
Beaker 4 30^0-40^0C				
Beaker 5 40^0-50^0C				

12. Once all classmates have filled in their data find the average temperature of each beaker.

13. Plot those averages on the graph below making a bar graph starting with beaker 1 in **Data Table 4**. The X axis will be temperature intervals (^{0}C) and the Y axis will be time(sec). Make sure to label the axis.

Data Table 4:



Answer the following questions:

1. In which beaker did the reaction occur most slowly?_____

2. In which beaker did the reaction occur most rapidly?_____

3. What do you think is the relationship between the temperature and the rate of a reaction?_____

4. Examine the temperature ranges used for this experiment. Are all these temperatures likely to occur on the earth's surface?_____
   explain:_____

5. Utilizing the maps in the environmental science book(pg406-407 & 416-417) Locate Rio de Janeiro in South America and Seattle in North America. Both cities have climates with abundant moisture. Compare the weathering rate of the limestone in Rio to that in Seattle._____
Explain your answer_____

6. Locate Nome, Alaska pg. 416 Environmental Science books, why is a limestone in Nome likely to weather very slowly?_____

7. How would the rate of the reaction have been different if the tablets had been ground into a powder before they were dropped into the water? Explain._____
_____
_____

Weathering

Use the words to fill in the blanks of the paragraphs.

plants	pieces	moisture	ice wedging	acids	carbonic acid
freezing	chemical	oxidation	temperatures	minerals	
climate	desert	mechanical	cracks	reacting	

Weathering is the breaking of rocks into _____ . There are two main types of weathering. _____ weathering involves breaking rocks without changing their chemical composition. In _____ , water trapped in rocks freezes and expands, forcing the rocks apart. _____ can also cause mechanical weathering. As their roots grow and put pressure on rocks, _____ widen and rock fragments may fall off. _____ weathering involves water, air, and other substances' _____ with the minerals in the rocks. When metal is exposed to water and oxygen, _____ occurs and rust forms. _____ in plant roots and mosses can also react with the _____ in rocks. Water and carbon dioxide combine to form _____ , which reacts with minerals such as calcite in limestone. How rapidly weathering occurs in an area depends on the _____ . Chemical weathering happens more slowly in _____ areas due to a lack of _____ . Low _____ in polar regions keep chemical weathering to a minimum there. Whenever _____ and thawing alternate, mechanical weathering becomes an important form of weathering.