MiSP Weathering and Erosion Worksheet #2 L3

Name ______________________________ Date_____________
L 1, 2, 3

WEATHERING BY A STREAM

Introduction: Running water wears down Earth' surface. Running water may break up sediments by both physical and chemical means. Rock fragments have their edges physically rounded as they are rolled and bounced along the stream channel. Running water may also dissolve soluble minerals in the rocks.

The model represented by this lab will demonstrate some factors that control the weathering of particles in running water.

<u>Problems</u>: What affects the rate that rocks are weathered in running water?

<u>Materials</u>:
Rock samples
Shaker container
Balance
Paper towels
Shale, bluestone, halite pieces (or other samples selected by your teacher)

Procedure:
Part A:
1. Weigh out 100 grams of presoaked shale which has been drained. The amount does not have to be exactly 100 grams but measure the amount to the nearest 0.1 gram and record on Data Chart A.
2. Place the chips in the plastic container. Add 200 ml of water.
3. Tightly cap the container. Shake for 3 minutes at a steady tempo.
4. Placing a screen over the opening, pour out the water. Remove the chips and dry with a paper towel.
5. Weigh ALL of the rock chips. Record this new mass at Time=3 minutes on Data Chart A.
6. Return the chips to the container and repeat the process 3 more times (shaking for 3 minutes, drying, reweighing and recording data). Stop after the chips have been shaken for a total of 12 minutes.
7. Use the equation: %Remaining = (New Mass/Mass at Time 0) X 100, calculate the percent of mass remaining after each 3 minute interval.
WORK SPACE:

After 3 minutes

After 6 minutes

After 9 minutes

After 12 minutes

Add the Percent Mass Remaining after each time interval to Data Chart A

Part B:

1. On Data Chart B, fill in the percent mass which remained for shale at the end of the first 3 minutes.
2. Weigh approximately 100 grams of halite. Determine, using the same methods as Part A, the percent mass remaining at the end of 3 minutes. Enter this on Chart B.
3. Weigh approximately 100 grams of bluestone. Determine, using the same methods as Part A, the percent mass remaining at the end of 3 minutes. Enter this on Chart B.

Part C:

1. Observe the weathered particles and samples of particles not weathered of each rock.
2. Compare the size and shape of the particles of each rock type used in this lab. Record your observations below:

Rock Type	Observations and Comparisons of Weathered Particles and Particles Not Weathered (Draw pictures):
	<u>Not weathered</u> <u>Weathered</u>
	<u>Not weathered</u> <u>Weathered</u>
	<u>Not weathered</u> <u>Weathered</u>

Data Chart A:

Weathering Time (minutes)	Mass Remaining (grams)
0	
3	
6	
9	
12	

Data Chart B:

Type of Rock	**Percent Remaining After 3 Minutes**

Graph the data from Chart A as a line graph on the next page on Graph 1 to show the relationship between time (minutes) and the mass of the shale

- Label the X axis
- Label the Y axis
- Connect the data points.

Graph the data from Chart B as a BAR GRAPH on Graph 2

- Label the X axis with the rock type
- Label the Y axis with percent remaining after 3 minutes

Graph 1 – Title:

Graph 2 - Title

Discussion L1-3

1a. Look at graph 1 (the line graph). Describe the steepness of the lines connecting the data points.

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1b. Where on the graph (what time interval(s)) does it show that the shale was

Weathered the most? __________________________________

Weathered the least? __________________________________

1c. Explain the reason for the change in the speed that the mass of the shale was lost (weathered away)?

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2. What effect does increased time of weathering have on the size of rock fragments?

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3. What effect does increased time of abrasion have on the shape of rock fragments?

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4a. How do the percentages of halite and bluestone remaining after three minutes compare with shale remaining after three minutes?

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4b. Why did halite lose more mass than shale and bluestone after three minutes?

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5. Use the graph to estimate the amount of shale that would remain after

4.5 minutes of shaking ___________________________________

15 minutes of shaking ____________________________________

Discussion L2-3

6. Look at graph 1. It is not a straight line. Compare two sections of the graph (0 to 3 minutes and 9 to 12 minutes) by calculating each section's unit rate of change (slope).

$$\text{Unit Rate of Change} = \frac{\Delta \text{ Mass (g)}}{\Delta \text{ Time (minutes)}} = \frac{\Delta y}{\Delta x} = \frac{(y_2 - y_1)}{(x_2 - x_1)}$$

Graphed data	Ordered Pair used for calculation (x_1, y_1) (x_2, y_2)	Δ Mass (g) Δ y	Δ Time (minutes) Δ x	Unit Rate of Change (slope) Δ y/Δ x
0 to 3 minutes				
9 to 12 minutes				

7a. Both unit rates of change (slopes) are negative numbers. What does that tell you about the relationship between time and the mass of the shale pieces?

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7b. Which section of the graph (0 to 3 or 9 to 12 minutes) had the greater slope? What does that tell you about the speed or rate of the weathering of the shale?

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7c. What do the unit rates of change have to do with your answers to 1a and 1b?

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Discussion L3

8. Determine the y-intercept for the line segment from 0 to 3 minutes. Use the equation for a line to calculate the y-intercept. Use the line you used in #6. The equation for a line is

$y = mx + b$
where m is the unit rate of change (slope) and
b is the y-intercept

Y Intercept
m =   Ordered pair (x, y) = (____ , ____) y = mx +b Solve for b:

9. Based on the unit rate of change that you calculated above and the y intercept, write an equation for the segment of the graph from 0 to 3 minutes. Remember that the equation for a line is **y = mx + b** and m is the unit rate of change (slope) and b is the y intercept.

Equation - 0-3 minutes

10. Using the equation above, calculate the mass of the shale at 2.25 minutes. Show work.
x = 2.25 minutes

y = ______________________________

11. In what two (2) ways would the equation for the line from 9 to 12 minutes be different than the equation you just wrote for the line from 0 to 3 minutes?

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