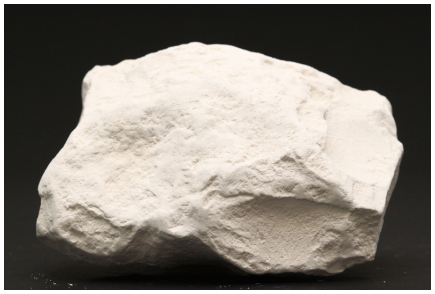
Name _____ Date _____ # _____

Vinegar, Rocks, and Chalk Lab



Question:
What effect does water and vinegar have on limestone? What effect does water and vinegar have on chalk?

We're going to investigate what water and vinegar does to limestone and chalk. Each group will be responsible for making one or two mixtures of vinegar/water. For this lab, you will need the following items:

- One or two containers with lids
- Measuring cup
- Labels
- One piece of chalk or two pieces of limestone rock
- Spoon

Your group will be responsible for making one of the following:

- 250 mL of water container and 250 mL of vinegar container (CHALK) **TWO CONTAINERS IN TOTAL**

- 250 mL of water container and 250 mL of vinegar container (LIMESTONE) **TWO CONTAINERS IN TOTAL**

- 50 mL of water, 150 mL of vinegar container (CHALK)

- 50 mL of water, 150 mL of vinegar container (LIMESTONE)

- 125 mL cups of water, 125 mL cups of vinegar container (CHALK)

- 125 mL of water, 125 mL of vinegar container (LIMESTONE)

Name _____ Date _____ # _____

Part **A**

- To make your mixture, take the container and measuring cup.
- Designate one group member to ***always*** hold the container until the end of Part A.
- Add your cups of water.
- Then add your cups of vinegar to the container. **Be sure to use the right amount of each liquid and BE CAREFUL NOT TO SPILL THE CONTAINER and DO NOT LET VINEGAR OR WATER SPILL WHEN YOU POUR.** Spilling will not create the right mixture and lead to misleading results.

After you pour the vinegar and water into the container, stir the mixture with a spoon. From here, raise your hand and wait for your teacher to come with your labels and sign your page.

☐ Checkpoint A

Part **B**

The label on our container(s) is/are:

_____

_____

Name _____ Date _____ # _____

- At this point, the designated container holder can stop holding the container.
- Next, you will need to weigh your chalk or limestone. Use the mass scale and record the mass of your chalk/limestone.
- Record the mass and circle the material you are measuring below.

Mass of our chalk/limestone: _____ g

☐ Checkpoint B

Part C

- At this point, put your chalk/limestone **ON TOP OF YOUR CONTAINER'S LID**. Do **NOT** put your chalk/limestone in the container yet.
- Record the mass of your chalk/limestone on your data sheet.
- Wait for further instructions.

In this lab, we will observe how vinegar and water affect the mass of limestone and chalk over several days. *Mass* is a measure of matter. It is different than weight because weight can change based on what planet you are on. The bigger the planet, the more you will weigh because greater the planet's gravitational pull. The mass of an object will be the same, no matter if it's on Mars, Mercury, or Earth.

Name _____ Date _____ # _____

Hypothesis (Over time, what do you think will happen to the chalk and limestone):

_____

_____

_____

_____

_____

Checkpoint C ☐

Name _____ Date _____ # _____

DAY _____

Limestone

Container Label				
First Day's Mass				
Yesterday's Mass				
Today's Mass				
Percentage Change from First Day				
Percentage Change from the Previous Day				

Name _____ Date _____ # _____

DAY _____

Chalk

Container Label				
First Day's Mass				
Yesterday's Mass				
Today's Mass				
Percentage Change from First Day				
Percentage Change from the Previous Day				

Name _____ Date _____ # _____

Teacher Instructions

This is a lab that explores chemical weathering on a rock. It requires quite a few materials, so be warned!

Items needed:

- Small pieces of limestone
    - You can find limestone at a Home Depot or other hardware stores that sell landscape rock. Most of the landscape rocks out there are made of limestone. Be sure to test your limestone by putting them in vinegar over night. If it bubbles, it is a good chance that it is limestone.
- Dust free/dustless chalk
    - Be sure it is dust free/dustless chalk because non-dust free chalk is made of plaster of pairs, not limestone.
- Spoons
- 8 Containers
- Water
- Vinegar
- 8 Measuring cups
- Mass scale
- Labels

Explanation:

The reason this works is because chalk is a type of limestone that is made exclusively out of calcium carbonate. Calcium carbonate is very reactive to acids and vinegar is an acid. Your typical limestone is made out of about 30% calcium carbonate and is one of the most easily chemically weathered rocks. Over time, you'll find that the solutions that have higher concentrations of vinegar will chemically weather away faster than the lower concentrations.

Occasionally you might find that some of the rocks gain mass rather than lose mass. This is probably because water has gotten into the rock or chalk and hasn't evaporated yet. You can try to blow dry your rock and chalk before hand or use a paper towel to dry them off. This might not make it completely dry, but it will lower the mass of the

rock or chalk. Eventually, the limestone and chalk will eventually chemically weather slower as all the acid is being used up.

You will need to make several copies of the data sheet to do this over several days. You could also use soda rather than vinegar or use both because soda is also an acid.

A potential extension of this project is to have student calculate the percentage change. If you are doing this with 4th graders, you could probably only do this with your higher achieving students or students identified as gifted. Otherwise, you will probably have to do this yourself.

Good luck!