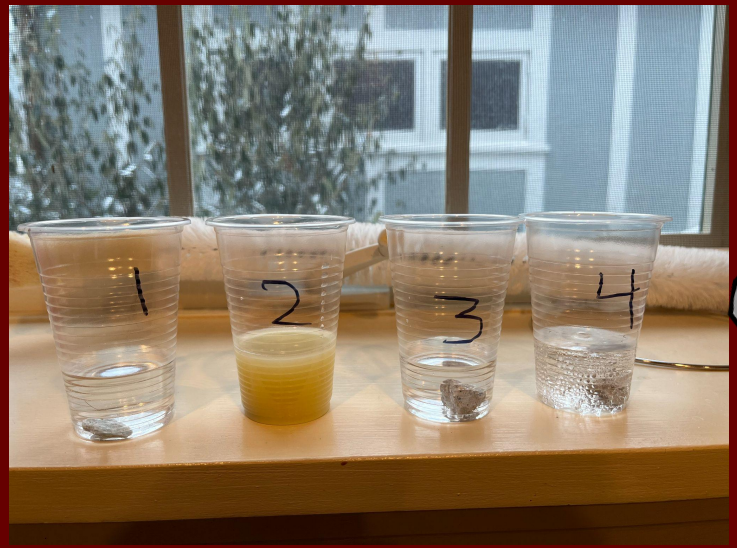
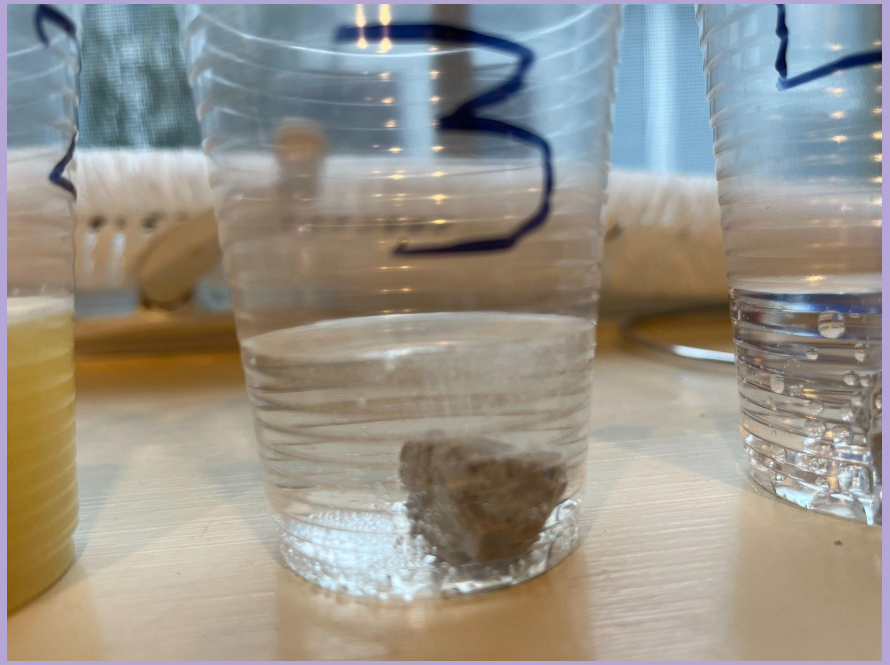
Rockin' Acid

2nd Grade Mrs. Ketzer



Testable Question:

How does acid affect rocks?



Prediction:

I don't think the rocks will be affected by the acid in a week.

Procedure:

1. Gather four similarly sized sedimentary rocks
2. Weigh each rock using a kitchen scale and record in logbook
3. Measure the volume of each rock using a graduated beaker to see how many milliliters the water moved when I put the rock in the water and record in logbook
4. Label four cups with numbers one through four
5. Place one rock in each cup
6. In cup number one pour 50mL of tap water, in cup two measure and pour 50mL of lemon juice, in cup three measure and pour 50mL of vinegar, and in cup four measure and pour 50mL of carbonated water.
7. Let each cup sit for 24 hours
8. Each day at the same time, take each rock out of the cup rinse it with water and dry on a towel.
9. Repeat steps 2-7 each day for a week.

Background:

I chose this project because I am interested in geology, and taking care of the environment.

In my research I found out that:
-Statues can be destroyed by acid rain.
-Acids and bases are measured on a pH scale. Acids have a low pH and bases have a high pH.
-Water is neutral with a pH of 7-8.
-Lemon juice has a pH of 2-3
-Vinegar contains acetic acid and its pH is about 2-3.
-Carbonated water has a pH of 4.5
-Acid rain is rain that contains acid that is made from poisonous gases mixing with clouds. The poisonous gases come from burning fuel, making electricity, wildfires, and anything that releases smoke into the air.

This project is important because we need to save rocks. There are many important things made out of rocks that are being destroyed by acid rain. So it’s important for people to see the effects of acid rain on rocks so that they don’t pollute so much.

Constant Conditions:

Independent Variable:
-The type of acid/liquid

Dependent Variable:
-Mass
-Volume

Constant Conditions:
-The amount of acid/liquid (50mL)
-Approximate size of rocks
-Type of rock (sedimentary)
-Kept them on the same shelf
-Made observations at the same time each day
-Used the same instruments each time

Control:
Water trial since water is not an acid

Data and Trials: (see log for each day's results)

2/3/22 (day 0)

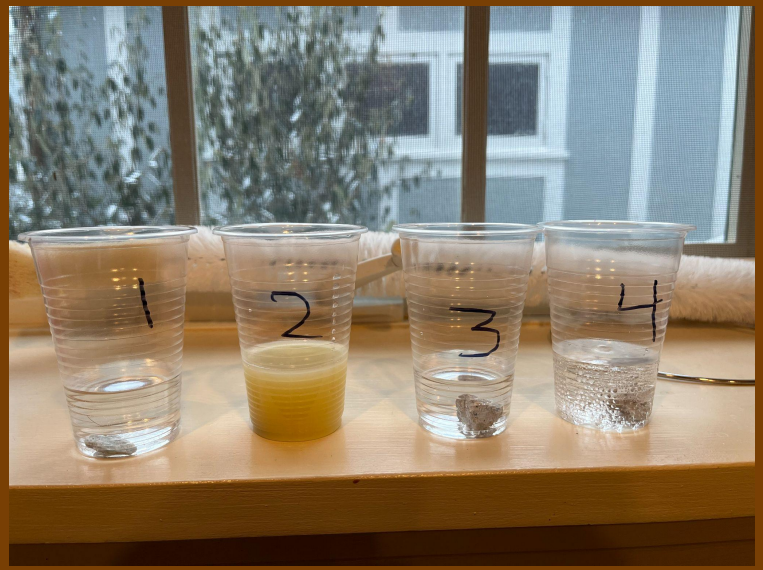
Liquid	Rock Number	Mass (g)	Volume (mL)
Water (control)	1	1	2
Lemon Juice	2	6	5
Vinegar	3	6	4
Carbonated Water	4	7	5

2/10/22 (day 7)

Liquid	Rock Number	Mass (g)	Volume (mL)
Water (control)	1	1	1
Lemon Juice	2	0 (gone)	0 (gone)
Vinegar	3	0 (gone)	0 (gone)
Carbonated Water	4	7	4

Rocks before the experiment:

Rocks in each type of acid:



The rock in vinegar completely broke down after six days

Conclusion and Reflection:

I found out that lemon juice and vinegar could destroy my rocks in a week.

I was surprised that it happened so quickly.

If I did this project again I would take a closer look at vinegar. Since I know that vinegar affected the rock, I would be interested to see if I add different amounts of water to the vinegar (changed its pH) if it would change how quickly the rock eroded. That way I could tell if small changes to pollution would be better than nothing. I would also use better equipment. The kitchen scale didn't recognize masses lower than 1g, and the graduated beaker didn't have enough marking on it so I needed to estimate the volume.

Sources:

Eyewitness Chemistry by Ann Newmark

Measure Up Math Volume by Chris Woodford

Stem Careers Geologist by Nikole Brooks Bethea

Erosion and Sediments by Steve Wilson

Dirty Air by Ellen Lawrence

What’s Climate Change? By Robert M. Hamilton