# Title Information

Ishika Patel

Weathering and Sedimentary Rock Identification Lab

July 9, 2020

N/A

Table of Contents

[Title Information 1](#_Toc45213477)

[Data and Observations / Calculations 2](#_Toc45213478)

[Exercise 1: Identification of Sedimentary Rocks 2](#_Toc45213479)

[Data Table 1: Sedimentary Rocks 2](#_Toc45213480)

[Exercise 2: Effects of Weathering 3](#_Toc45213481)

[Data Table 2: Effects of Weathering on Mass 3](#_Toc45213482)

[Change in Mass Sample Calculations 3](#_Toc45213483)

[Data Table 3: Effects of Weathering on Appearance 4](#_Toc45213484)

[Photo Requirements 5](#_Toc45213485)

[Photo Requirement: Exercise 2, Step 4 (Rocks Initially) 5](#_Toc45213486)

[Photo Requirement: Exercise 2, Step 11 (Cups Initially) 5](#_Toc45213487)

[Photo Requirement: Exercise 2, Step 15 (Cups After 24 Hours) 6](#_Toc45213488)

[Photo Requirement: Exercise 2, Step 18 (Rocks after 24 Hours) 6](#_Toc45213489)

[Lab Question Answers 7](#_Toc45213490)

[Exercise 1 Questions 7](#_Toc45213491)

[Data Table 4: Hypothesis of Weathering 7](#_Toc45213492)

[Exercise 2 Questions 8](#_Toc45213493)

[Conclusions 9](#_Toc45213494)

[References 9](#_Toc45213495)

# 

# Data and Observations / Calculations

## Exercise 1: Identification of Sedimentary Rocks

### Data Table 1: Sedimentary Rocks

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sample #** | **Texture & Grain Size** | **Reaction to Acid (+/-)** | **Other Characteristics** | **Composition** | **M**  **Rock ID** |
| **29** | Gravel = 2-4mm, angular, poorly sorted | - | Very rigid, compact of different types of rocks | Rocks or Minerals | Breccia |
| **31** | Sand = 0.06-2mm, angular, moderately sorted | - | Dull, dark grey to black color, brown porous rocks with visible fragments | Plant fragments and or charcoal | peat |
| **32** | Sand = 0.06-2mm, well rounded, well sorted | - | Beige color, a bit sparkly, grainy | Quartz gains & minor accessory minerals | Quartz Sandstone |
| **34** | Silt = 0.004-0.06 | - | Rusty, well compacted, very fine grain | Quarts and accessory clay mineral (rust quality) | siltstone |
| **35** | Crystalline, angular | + | Pink to red outside, white clearer inside, cubic crystals, translucent | Halite mineral crystals | rock salt |
| **36** | Microcrystalline, well sorted | - | Very sparkly, white with pink/red accents, easily broken, crystals inside | Mineral crystals | Gypsum |
| **37** | Silt = 0.004 – 0,06mm, well rounded, well sorted | + | Uniform color, light grey, dull | Shells and coral fragment or calcareous phytoplankton | Limestone - chalk |
| **39** | Microcrystalline? Possible gravel | + | Really interesting texture, empty divots in the rocks, light grey color, fossil type fragment | Shells and coral fragment or calcareous phytoplankton | Limestone - fossiliferous |
| **41** | Sand = 0.06-2mm | - | Rough texture, red and brown color | 25% feldspar, some granite rocks | arkose Sandstone |
| **42** | Clay, angular | - | Glassy texture, all coal black rock, square shape | Plant fragments and or charcoal | bituminous coal |

## Exercise 2: Effects of Weathering

### Data Table 2: Effects of Weathering on Mass

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample** | **Treatment** | **Initial Mass (g)** | **Final Mass (g)** | **Change in Mass (g)** |
| **Granite #1** | **Distilled Water** | 9.1 | 9.1 | 0 |
| **Granite #2** | **Vinegar** | 6.8 | 6.9 | +0.1 |
| **Quartz Sandstone #3** | **Distilled Water** | 4.7 | 4.8 | +0.1 |
| **Quartz Sandstone #4** | **Vinegar** | 4.8 | 4.9 | +0.1 |
| **Calcareous Shale #5** | **Distilled Water** | 7.5 | 7.6 | +0.1 |
| **Calcareous Shale #6** | **Vinegar** | 3.0 | 3.1 | +0.1 |
| **Limestone #7** | **Distilled Water** | 10.2 | 10.3 | +0.1 |
| **Limestone #8** | **Vinegar** | 5.6 | 4.4 | -1.2 |

### Change in Mass Sample Calculations

Granite #1:

9.1 - 9.1 = 0

Granite #2:

6.9 – 6.8 = 0.1

Sandstone #1:

4.8 - 4.7 = 0.1

### Data Table 3: Effects of Weathering on Appearance

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample** | **Treatment** | **Initial Appearance** | **Visible Chemical Activity** | **Final Appearance** |
| **Granite #1** | **Distilled Water** | One long curved side, 3 flat sides, bumpy, coarse, shiny, felsic color | Very small grains floating around in water, no other activity | Zero residue, clear water cup |
| **Granite #2** | **Vinegar** | Felsic color, one protruding edge, smaller grains | Bubbling, small grains floating up | Barely murky, clear vinegar cup |
| **Quartz Sandstone #3** | **Distilled Water** | Flat, darker red | Rock looks more orange than red | Zero residue, clear water cup |
| **Quartz Sandstone #4** | **Vinegar** | Rougher texture than #3, beige color (not as red), also flat | Bigger bubbles coming out from the bottom of the rock | Small specks at the bottom of cup, otherwise very clear |
| **Calcareous Shale #5** | **Distilled Water** | Flat, dark brown, burnt orange, beige, light brown, streaks one side; light brown/orange bottom | Bubbles coming out from rock | Clear water cup, no residue |
| **Calcareous Shale #6** | **Vinegar** | Light brown and dark brown alternating sides, very light, fragile | Smaller bubble coming form rock, darker color | Couple (approx. 4) specks at bottom of cup, nothing drastic otherwise clear |
| **Limestone #7** | **Distilled Water** | Smooth rock texture, some smaller “spikey” edges” long, light grey, finger like figure | No reaction initially/visibly | Clear water cup, still grey rock |
| **Limestone #8** | **Vinegar** | Round, light grey, sharper edges | Intense fizzing, grains coming off | Lots of residue at the bottom murky cup, very grainy |

## Photo Requirements

### Photo Requirement: Exercise 2, Step 4 (Rocks Initially)

A picture containing food, sign, grass

Description automatically generated

### Photo Requirement: Exercise 2, Step 11 (Cups Initially)

A picture containing indoor, table, sitting, filled

Description automatically generated

### Photo Requirement: Exercise 2, Step 15 (Cups After 24 Hours)

A picture containing indoor, sitting, table, filled

Description automatically generated

### Photo Requirement: Exercise 2, Step 18 (Rocks after 24 Hours)

A close up of a box

Description automatically generated

# Lab Question Answers

## Exercise 1 Questions

1. **How are rock salt and gypsum formed?**

Rock salt is a sedimentary rock that is formed by the evaporation of seawater and the composition of Halite (Clastic Sedimentary Rocks). Gypsum is also formed by the evaporation of solutions like seawater from the composition of gypsum mineral crystals (Clastic Sedimentary Rocks).

1. **What does grain size indicate about a specimen’s environment and the energy of transport?**

Grain size is indicative of the rock’s relative energy. Moving water and wind, methods of weathering, “carry larger grained clastic sedimentary rocks until they lose all energy”. (HOL Lab, 2020). Therefore, while a rock has energy it is moveable and weatherable. With regards to energy transport, “well-sorted deposits of gravel indicate a high energy environment such as a fast-moving stream or energetic shoreline. Well-sorted silt or clay-sized sediments indicate a calm environment including lakes, marshes, or lagoons” (HOL Lab, 2020). The larger the size of the rocks, the more energy it takes to transport this particle.

1. **What are two key minerals found in clastic sedimentary rocks? Based on our previous study of minerals, why do these two generally make up the majority of clastic sedimentary rocks?**

Two key minerals found in clastic sedimentary rocks, as seen by the HOL Lab table 1, include quartz or calcite. Another also referenced in Clastic sedimentary rock composition is Feldspar. These minerals generally make the majority of clastic sedimentary rocks because they are involved in the process of cementation where the “sediment is fused by tiny mineral crystals” (HOL Lab, 2020). By this chemical process, minerals are precipitated to form quartz – common form sedimentary rocks.

## Data Table 4: Hypothesis of Weathering

|  |  |
| --- | --- |
| **Rock Type** | **Hypothesis** |
| **Granite** | If the Granite is left in distilled water or vinegar for 24 hours, then the rock will not see much evidence of weathering because Granite is a material often used in homes and known to withstand many conditions. Also, granite did not show any initial visual reactions in either substance. |
| **Quartz Sandstone** | If the quartz sandstone is left in distilled water or vinegar for 24 hours, then the sandstone will see a discrete change in distilled water and a greater mass change in vinegar because the sandstone in vinegar saw bubbles emerging initially. The sandstone is porous and will allow vinegar to erode it. |
| **Calcareous Shale** | If the shale is left in distilled water or vinegar for 24 hours, then the shale will see a negative mass change in both substances because the shale had a physical reaction of bubbles in both substances. The shale is porous and is hypothesized to erode it. |
| **Limestone** | If the limestone is left in distilled water or vinegar for 24 hours, then limestone will see a discrete change in distilled water and a greater negative mass change in vinegar because right as the vinegar was poured the limestone began breaking apart. |

## Exercise 2 Questions

1. **Did the results support your hypotheses? Explain your answer.**

Most of the rocks did not support my hypothesis of some erosion. In fact, the granite, sandstone and shale gained mass due to the water or vinegar trapped in the rock. The limestone however did have supporting evidence for the hypothesis because there was a substantial loss in mass in the vinegar sample.

1. **Which rock samples (if any) lost or gained mass? Explain how this occurred.**

The Limestone in the vinegar lost mass. This is because of the chemical weathering simulated in the experiment. The acidity of the vinegar broke the limestone apart. Otherwise, the other rocks saw either zero (granite in water) or approximately 0.1 increate in mass. This is attested to the porosity of the rock as it absorbs some of the solvent.

1. **Was chemical weathering simulated with any of these rock samples? Explain your answer.**

Chemical weathering was simulated in the limestone in the vinegar in particular. The acidity of the vinegar dissolved the rock, and this process was noticeable throughout the experiment. Seen in the cup, there was murky solvent and continuous bubbles rising from the limestone. These are tell-tale signs of a chemical reaction occurring.

1. **Rank the rocks in order of resistance to weathering from 1 to 4, with 1 being the most resistant and 4 being the least resistant to weather.**

In order from most to least resistant to weathering: granite (1), shale (2), sandstone (3), limestone (4).

1. **Of the four rock types examined in this exercise, which would be the best option to use in the construction of a building, and why?**

Of these rock types examine, the best option to use in the construction of a building would be granite. Granite saw the least deviation in both distilled water and vinegar left in 24 hours. As seen in data table 2, granite did not change mass when left in distilled water. This material's great resistance makes it the superior option to use in construction.

# Conclusions

This lab went very much in depth with regards to identifying sedimentary rocks as well as the weathering process for these rocks. Beginning with Exercise 1, sedimentary rock identification looks into the granularity of the rock and its colors and textures. There are three different type of sedimentary rocks: clastic, biochemical and chemical. The two latter options are most reactive to HCl due to the use of calcite in sedimentary rock. In identifying sedimentary rock there is also a crystalline and microcrystalline texture which make some rocks shiny.

In Exercise 2, this lab went into more detail about the types of weathering. In particular with clastic rocks we looked into chemical weathering. The procedure called for the scientist to leave four different types of rocks in distilled water and vinegar and to see the mass change over 24 hours of soaking. This lab taught me, in specific, the importance of using weather resistant rocks in homes and construction. Granite prove to be the most reliable rock in this experiment. Limestone suffered the effect of chemical weathering in this experiment when it was put in vinegar. Weathering is a crucial part in the process of creating and identifying sedimentary rocks.

This lab provided a great basis of using the scientific process and deductive reasoning to apply academic knowledge!

# References

Clastic Sedimentary Rocks. (n.d.). Retrieved July 08, 2020, from <http://itc.gsw.edu/faculty/tweiland/sedrx2.htm>

Physical Science Department. (2020, Summer). GEY111 HOL lab manual.  Colorado: CCCOnline.  Retrieved from class website at:

<https://ccco.desire2learn.com/d2l/le/content/2768021/viewContent/29148202/View>

Physical Science Department. (2020, Summer). GEY111 Lab Report Assistant.  Colorado: CCCOnline.  Retrieved from class website at:

<https://ccco.desire2learn.com/d2l/le/content/2768021/viewContent/29148203/View>