# Title Information

Ishika Patel

Minerology and Identification Lab

June 30, 2020

N/A

Table of Contents

[Title Information 1](#_Toc44440162)

[Data and Observations / Calculations 2](#_Toc44440163)

[Exercise 1: Specific Gravity 2](#_Toc44440164)

[Data Table 1: Density and Specific Gravity of Mineral Samples 2](#_Toc44440165)

[Exercise 2: Mineral Identification 4](#_Toc44440166)

[Data Table 2: Mineral Identification Characteristics 4](#_Toc44440167)

[Data Table 3: Identification of Mineral Samples 6](#_Toc44440168)

[Photo Requirements 6](#_Toc44440169)

[Lab Question Answers 7](#_Toc44440170)

[Exercise 1 Questions 7](#_Toc44440171)

[Exercise 2 Questions 7](#_Toc44440172)

[Conclusions 8](#_Toc44440173)

[References 9](#_Toc44440174)

# 

# Data and Observations / Calculations

## Exercise 1: Specific Gravity

### Data Table 1: Density and Specific Gravity of Mineral Samples

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample #** | **Mass of Mineral Sample (g)** | **Volume of Mineral Sample (cm3)** | **Density of Mineral Sample (g/cm3)** | **Specific Gravity of Mineral Sample** | **Documented Specific Gravity** | **Name of Mineral** |  |
| **1** | 20.5 | 7.5 | 2.73333333 | 2.73333333 | 2.6-2.8 | Plagioclase Feldspar |  |
| **2** | 11.2 | 4.8 | 2.333 | 2.3333 | 2.3 | Gypsum |  |
| **3** | 17.4 | 6.6 | 2.63636364 | 2.63636364 | 2.7 | Calcite |  |
| **4** | 20.7 | 7.3 | 2.83561644 | 2.83561644 | 2.7-2.8 | Talc |  |
| **5** | 15.2 | 4.7 | 3.23404255 | 3.23404255 | 2.7 | Calcite |  |
| **6** | 12.1 | 4.8 | 2.52083333 | 2.52083333 | 2.6 | Potassium Feldspar |  |
| **7** | 18.7 | 6.9 | 2.71014493 | 2.71014493 | 2.7-2.8 | Talc |  |
| **8** | 13.4 | 4.8 | 2.79166667 | 2.79166667 | 2.8-3.4 | Biotite |  |
| **9** | 11.6 | 4.5 | 2.57777778 | 2.57777778 | 2.6-2.8 | Plagioclase Feldspar |  |
| **10** | 3.2 | 1.1 | 2.90909091 | 2.90909091 | 2.8-3.4 | Biotite |  |
| **11** | 24.9 | 11.9 | 2.09243697 | 2.09243697 | 2.1-2.6 | Halite |  |
| **12** | 21.4 | 6.6 | 3.24242424 | 3.24242424 | 3.1-3.2 | Apatite |  |
| **13** | 24.7 | 8.5 | 2.90588235 | 2.90588235 | 2.9-3.6 | Amphibole |  |
| **14** | 17 | 6.1 | 2.78688525 | 2.78688525 | 2.6-2.7 | Quartz |  |
| **15** | 10.7 | 5.5 | 1.94545455 | 1.94545455 | 2.1 | Sulfur |  |
| **16** | 13.9 | 7.1 | 1.95774648 | 1.95774648 | 1.9-2.3 | Graphite |  |
| **17** | 13.9 | 5.1 | 2.7254902 | 2.7254902 | 2.8 -3.4 | Biotite |  |
| **18** | 14.5 | 3.3 | 4.39393939 | 4.39393939 | 4.9-5.2 | Magnetite |  |

#### Density Calculations

Density of Mineral (g/) = Mass of Mineral (g) / Volume of Mineral ()

Sample 1:

Sample 2:

Sample 3:

#### Specific Gravity Calculations

Specific Gravity = Density of Mineral (g/) / Density of Water (1 g/)

Sample 1:

Sample 2:

Sample 3:

## Exercise 2: Mineral Identification

### Data Table 2: Mineral Identification Characteristics

**VERBIAGE SOURCE FOR ENTIRE TABLE: GEY111 Lab Report Assistant, 2020**

**\*EXPERIMENT WAS CONDUCTED, VERBAGE USED IN TABLE IS REFLECTIVE OF THE LAB ASSISTANT\***

| **Sample #** | **Color** | **Luster** | **Streak** | **Hardness** | **Crystal Form** | **Cleavage/Fracture** | **Reaction to Acid (+/-)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | Black, Dark Brown | Non-metallic | White | 6 | Rarely have crystals but can be flat and bladed or prismatic | **Cleavage:** 1 perfect, 1 good meeting at 90°  **Fracture:** uneven or conchoidal | - |
| **2** | Reddish, white | Non-metallic | White | 2 | Tabular, prismatic, or bladed | **Cleavage:** 1 direction, basal  **Fracture:** uneven | + |
| **3** | Almost transparent | Non-metallic | White | 5 | Rhombohedrons, scalenohedrons, tabular, or prismatic | **Cleavage:** 3 directions not at 90°, Rhombohedral  **Fracture:** conchoidal and smooth | + |
| **4** | Aqua Green, Cloudy White | Non-metallic: greasy, waxy, pearly | White | 1 | Foliated sheets and plates | **Cleavage:** 1 direction – basal  **Fracture:** uneven | - |
| **5** | Grey, Hints of Brown/ Warm Tone | Non-metallic | White | 5 | Rhombohedrons, scalenohedrons, tabular, or prismatic | **Cleavage:** 3 directions not at 90°, Rhombohedral  **Fracture:** conchoidal and smooth | + |
| **6** | White and Peachy | Non-metallic | White | 6 | Well-shaped prismatic and tabular; monoclinic prismatic | **Cleavage:** 1 perfect, 1 good meeting at 90°  **Fracture:** uneven or conchoidal | - |
| **7** | Light Beige | Non-metallic | White | 1 | Foliated sheets and plates | **Cleavage:** 1 direction – basal  **Fracture:** uneven | - |
| **8** | Black, Beige | Metallic | Gray brown to white | 2.5 – 3 | Thick flakes, tabular, foliated, flaky or scaly | **Cleavage:** 1 direction, basal  **Fracture:** uneven | - |
| **9** | Cloudy White with Black Line | Non-metallic | White | 6 | Rarely have crystals but can be flat and bladed or prismatic | **Cleavage:** 1 perfect, 1 good meeting at 90°  **Fracture:** uneven or conchoidal | - |
| **10** | Black | Non-metallic | Gray brown to white | 2.5 – 3 | Thick flakes, tabular, foliated, flaky or scaly | **Cleavage:** 1 direction, basal  **Fracture:** uneven | - |
| **11** | Transparent | Non-Metallic, glassy | White | 2.5 | Cubic | **Cleavage:** 3 directions, cubic  **Fracture:** conchoidal | - |
| **12** | Black | Non-Metallic | White | 5 | Hexagonal; may be prismatic or dipyramidal | **Cleavage:** indiscernible  **Fracture**: conchoidal | - |
| **13** | Muted Grey | Non-Metallic, sparkly | White to gray | 5.5 – 6 | Tetrahedron | **Cleavage:** 2 directions not at 90° - prismatic  **Fracture:** uneven | - |
| **14** | Milky White | Non-Metallic | White | 7 | Hexagonal, prismatic, and pyramidal | **Cleavage:** none  **Fracture:** conchoidal or uneven | - |
| **15** | Bright Yellow | Non-Metallic: Vitreous | Yellow | 1.5 – 2.5 | Dipyramidal and tabular | **Cleavage:** 3, 2 direction  **Fracture:** conchoidal | - |
| **16** | Black | Metallic | Dark gray to black | 1 – 2 | Hexagonal plates | **Cleavage:** 1 direction, basal  **Fracture:** conchoidal | - |
| **17** | Grey, Brown, White | Metallic | Gray brown to white | 2.5 – 3 | Thick flakes, tabular, foliated, flaky or scaly | **Cleavage:** 1 direction, basal  **Fracture:** uneven | - |
| **18** | Black | Metallic | Dark gray to black | 6 – 6.5 | Octahedron; sometimes dodecahedron | **Cleavage:** none  **Fracture:** uneven or slightly conchoidal | + |

### Data Table 3: Identification of Mineral Samples

| **Sample #** | **Name of Mineral** |
| --- | --- |
| **1** | Plagioclase Feldspar |
| **2** | Gypsum |
| **3** | Calcite |
| **4** | Talc |
| **5** | Calcite |
| **6** | Potassium Feldspar |
| **7** | Talc |
| **8** | Biotite |
| **9** | Plagioclase Feldspar |
| **10** | Biotite |
| **11** | Halite |
| **12** | Apatite |
| **13** | Amphibole |
| **14** | Quartz |
| **15** | Sulfur |
| **16** | Graphite |
| **17** | Biotite |
| **18** | Magnetite |

## Photo Requirements

N/A: Keep Rocks for Future Experiments

THANK YOU SO MUCH FOR ALLOWING ME TO BORROW YOUR MINERALS

# Lab Question Answers

## Exercise 1 Questions

1. **A student calculates the specific gravity of magnetite as 3.34, when the actual specific gravity is 5.15. What factor(s) outside of human error would cause the student’s calculation to be so inaccurate?**

A factor outside of human error that would cause the student’s calculations to be so inaccurate could be if the mineral had massive air bubbles entrapped within its shape. This would decrease the mass of the mineral while increasing the volume of the mineral in water. Therefore, the calculations would yield a substantially smaller specific gravity than expected – as outlined in the student’s calculation. Also, the type of water used, for example: tap water, distilled water, muddy water, carbonated water could also impact the calculations – a factor which is disjoint form human error.

1. **Explain how specific gravity relates to the continental and oceanic crusts.**

Specific gravity relates to the continental and oceanic crusts because the specific gravities of specific minerals vary based on the “presence of impurities in the mineral structure” (HOL lab manual, 2020). According to the Lab Manual Background, “Minerals with a low specific gravity are typically found in the Earth’s continental crust, whereas the heavier minerals are found in the oceanic crust and mantle. This difference in density is what causes the oceanic crust to subduct, or sink, below the continental crust” (HOL lab manual, 2020). Oceanic crust is therefore more dense than continental crust. And in turn it has a greater specific gravity than continental crust.

## Exercise 2 Questions

1. **Use the internet to determine the identity of a black to silver gray metallic mineral sample with a hardness of 5 to 6, hexagonal crystals in thin plates, and strong magnetism when heated.**

Using the internet, the mineral that is black to silver gray metallic mineral sample with a hardness of 5 to 6, hexagonal crystals in thin plates, and strong magnetism when heated is Hematite (Hematite).

1. **Explain the reaction between hydrochloric acid and calcite, including the products of the reaction. Write the chemical equation for this reaction.**

The reaction between HCl and CaCo3 creates a fizzing unlike any other on the Calcite mineral. In this reaction the fizzing is Carbon dioxide being released during the reaction. The balanced chemical equation is: CaCo3 + 2HCl 🡪 CO2 + H2O + Ca(+) + 2Cl(-). Where: Calcium carbonate (CaCo3) reacts with hydrochloric acid (HCl) to produce Carbon Dioxide (Co2), water (H2O), and dissolved ions of Calcium (Ca+) and (Cl-). I am able to recall this information because I took 2 years of chemistry! I referenced my old notes to craft the most complete answer.

1. **Explain the purpose of each of the mineral identification tests performed in Exercise 2? Include any positives or negatives to using each test to identify minerals. Which test gives an indication of the uses of the mineral?**

Color: This allows for a slight generalization of the mineral being worked with. Some minerals have notorious colors such as sulfur and the color of that mineral made it easy to identify. On the other hand, this was not enough to determine most minerals because the colors were blending together a lot.

Luster: This helped in determining which items were metallic or not When it came to a noticeable metallic item such as graphite, I was able to identify this mineral easily. Otherwise, more information was needed.

Streak: I used the streak information towards the end of my experiment to determine Biotite mostly. This allowed me to see easily which minerals made a distinctive colored streak.

Hardness: I was able to use the fact that some of the minerals were CLEARLY harder than glass to deductive reasoning down to the mineral. Hardness was difficult because the hardness ranges were so flexible. For this reason, when it came to the table, I used the hardness values given from the lab assistant to fill that category in -- knowing beforehand where the range was.

Crystal Form: I personally found this helpful to distinguish different forms of Biotite. I also used the tetrahedral shape to lead me to discover the Amphibole in my collection. This was most helpful just by looks as opposed to further research.

Cleavage/ Fracture: This was personally the least helpful test. At this point of my minerals I already had a good idea of what they each might be, so this test helped in confirming as opposed to redefining my mineral.

Reaction to Acid: For the most part this test confused me because a rock has a reaction and sometimes was not the best fit for Calcite based on its other characteristics. This test is very helpful in determining Calcite though.

# Conclusions

In all honestly, this lab was incredibly difficult for me. I definitely had to adjust to a scientific learning curve to identify each of the minerals. That being said, I used 150% of my knowledge and deductive reasoning and evidence to make a well-educated decision on identifying each mineral.

Beginning with part 1 of the lab, the most interesting per of knowledge for me was understanding how I needed to suspend the mineral in the water to measure its volume. This was a new piece of information that was really cool to learn. I found the Specific Gravity conversions interesting given the density of water as well. I learned that Specific Gravity is the ratio between the density of a substance and the substance chosen for us as water. Specific gravity is used in indicting where minerals are found in Earth’s layers.

Moving onto the identification of the minerals, I conducted several tests wh9ch I assume are used with more precifi0n in the working field. I enjoyed conducting the tests, especially the Cleavage and Fracturing test with a hammer but did not really enjoy having to identify the minerals. Each mineral has a specific set of characteristics which determine what it is. These characteristics are perpetuated by the mineral’s chemical equation in lattice form!

Ultimately, this lab was informative on minerals and their qualities and identifiers.

# References

Hematite: The mineral hematite information and pictures. (n.d.). Retrieved July 01, 2020, from <https://www.minerals.net/mineral/hematite.aspx>

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>