



Name \_\_\_\_\_

Date \_\_\_\_\_ Period \_\_\_\_\_

### Specific Gravity and Mineral Identification

When identifying minerals, sometimes visual inspection and simple tests such as streak, cleavage and hardness are not enough to distinguish one mineral from another. For example, albite and oligoclase, both plagioclase feldspars, are similar in appearance and most other properties. One property that does slightly differ between these two minerals is *specific gravity*: 2.62 for albite and 2.65 for oligoclase. Careful measurements of the specific gravities of each mineral would make it possible to tell the two apart with confidence.

**MATERIALS:** 4 numbered mineral samples, 2 looped rubber bands, wet and dry jars and a digital scale with metal hook underneath

#### LAB SKILLS AND OBJECTIVES:

- ✓ To measure mass and calculate the specific gravities of several minerals
- ✓ To identify minerals using their specific gravities
- ✓ To calculate percent error (deviation from accepted values)

#### PROCEDURE:

1. Follow along as the instructor demonstrates the wet and dry massing technique.
2. Use the large mineral samples (on the whiteboard rail) to match the correctly numbered sample to the 4 mineral samples in your tray. Be sure to record the data for the correctly numbered sample in the proper column on the Data Table!
3. Place sample #1 on the rubber band and hook it under the digital scale.
4. Place the digital scale over (and on top of) the jar of **air**.

**Make sure the mineral sample is hanging freely (only touching air) inside the jar.**

5. Measure the mass (to nearest tenth of a gram), record it as *Mass in Air* on Data Table.
6. Place the digital scale over (and on top of) the jar of **water**.

**Make sure the mineral sample is hanging freely (only touching water) inside the jar.**

7. Measure the mass (to nearest tenth of a gram), record it as *Mass in Water* on Data Table.
8. Find the difference between the mass in air and the mass in water and record the result as *Loss of Mass* on the Data Table.
9. Use the formula below to calculate the specific gravity of mineral sample #1 and record it as *Specific Gravity (calculated)* on the Data Table.

$$\text{Specific Gravity} = \frac{\text{mass (in grams) of mineral sample in air}}{\text{loss of mass (in grams) in water}}$$

10. Repeat steps 3-9 for the other minerals in your tray. Record all results in the Data Table.

**Record the correctly numbered mineral in the proper column on the Data Table!**

<b>Data Table</b>	Mineral 1	Mineral 2	Mineral 3	Mineral 4
Mass in Air (grams)				
Mass in Water (grams)				
Loss of Mass in Water (grams)				
Specific Gravity (calculated)				
Name of the Mineral				
Specific Gravity (accepted value)				
Deviation from Accepted Value				

11. Use the values for specific gravity from the Specific Gravity (accepted value) chart below to identify and name each of the mineral samples in your tray. Select the mineral from the chart whose specific gravity is closest to your calculated value for each mineral. Record the *Name of the Mineral* and the *Specific Gravity (accepted value)* on the Data Table. If you do not find an exact match, the table Properties of Some Common Minerals in Appendix A on pages 644-645 of the Earth Science textbook may be helpful.

Mineral	<b>Specific Gravity (accepted value)</b>
Sulfur	2.1
Gypsum	2.3
Calcite	2.7
Chalcopyrite	4.2
Hematite	4.9
Pyrite	5.0
Magnetite	5.2
Galena	7.5

12. Use the formula below to determine the percentage by which your (calculated) value for specific gravity deviates from the (accepted) value for specific gravity. Record the percent error as *Deviation from Accepted Value* on the Data Table.

$$\text{Deviation} = \frac{\text{your (calculated) value} - \text{(accepted) value}}{\text{(accepted) value}} \times 100\%$$

## ANALYSIS AND CONCLUSION:

1. Were you able to identify any of the 4 minerals by inspection before determining their specific gravities? If so, explain what tests you used in their identification.
2. From your results, were you able to use specific gravity alone in identifying the 4 minerals? Which minerals were you able to easily identify with specific gravity?
3. What sources of error in this investigation might account for any deviations from the accepted value of specific gravity for each mineral?
4. Which of the 4 minerals are nonmetallic? List them with their specific gravities.
5. Which of the 4 minerals are metallic? List them with their specific gravities.
6. In general, how do the specific gravities of the nonmetallic minerals differ from those of the metallic minerals?

7. When identifying a valuable gemstone, why is specific gravity more likely to be used than other mineral tests such as streak, hardness or acid?
  
  
  
  
  
  
  
  
  
  
8. Why can't this procedure (to find the specific gravity) be used for halite?
  
  
  
  
  
  
  
  
  
  
9. Imagine you are holding a sample of sulfur in one hand and an equal-sized sample of galena in the other hand. Use the Specific Gravity (accepted value) chart to determine which will feel heavier.
  
  
  
  
  
  
  
  
  
  
10. Explain your answer (to # 9) by using the words specific gravity in your response.
  
  
  
  
  
  
  
  
  
  
11. Explain how a liquid with a specific gravity of 5.1 can be used to distinguish pyrite from magnetite.