

Specific Gravity Lab**What is specific gravity?**

It is the density of a substance relative to the density of water. As an example, when we say that the specific gravity of quartz is 2.65, we mean the weight of quartz is 2.65 times that of an equal volume of water. We can measure the density of the substance and then divide that by the density of water. But, in order to measure the density we must measure both mass and volume. To find the specific gravity without measuring the volume we can simply measure the mass of the sample in air and then suspend the mineral in water for the second massing. Afterwards, use the following equation to solve for the specific gravity (SG) of the sample.

$$SG = \frac{\text{Mass of Mineral in Air}}{\text{Mass of Mineral in Air} - \text{Weight of mineral in water}}$$

Why measure the specific gravity of a mineral?

Because specific gravity is one of the most important, constant, and quantifiable properties of a mineral, and in your effort to identify an unknown mineral, the specific gravity, if known, can narrow down your search to just a handful of possibilities.

Must my mineral specimen be pure?

Yes and No. No, because you can theoretically measure the specific gravity of any solid using this process, whether it be a chunk of plastic, a rock containing a varying amount of minerals, or a pure mineral itself in the form of a crystal. But yes, your mineral specimen must be pure if you wish to compare your measurement to standards of specific gravity for those minerals, which standards were developed using pure mineral specimens. In summary, the more pure your specimen, the more accurate will be your specific gravity measurement.

Materials

For this experiment you will need:

1. triple beam balance
2. string
3. beaker
4. water
5. several mineral samples

**Procedure**

1. Zero the balance.
2. Attach a string (50 cm in length) to the balance plate by tying a knot in the string and then taping it to the balance pan. Allow the string to hang freely off the edge of the table. Now record the beginning mass of the string.
 - *NOTE: When you repeat the procedure the string may have absorbed some water and you must account for the additional mass each time you start again.*
3. Clean the stone with a cloth. If wax or grease is present it must be removed. Examine it for large flaws or inclusions that might affect the accuracy of the results.
4. Place it on the pan and measure the mass of the stone. Record the result as the mass of the sample in air.
 1. *NOTE: Mass is generally measured to the nearest tenth of a gram.*

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5. Tie the rock to the end of the string and hang it over the edge of the table. Submerge the stone in water. Record the result. Brush off any bubbles on the stone or string with a fine brush.
6. Subtract the second result from the first to find the difference.
7. Calculate the specific gravity using the following equation:

$$SG = \frac{\text{Mass of Mineral in Air}}{\text{Mass of Mineral in Air} - \text{Weight of mineral in water}}$$

8. For more accurate results repeat the procedure at least three times and average the results. Make sure the stone is dry before repeating the air weighing.
9. Repeat the procedure for the other mineral samples listed.

Use only those samples listed in the table below!!!

| Sample # | Total mass of string, tape and mineral | Mass of string and tape alone | Mass in Air (of mineral only) | Weight in Water | Specific Gravity | Mineral Name |
|----------|--|-------------------------------|-------------------------------|-----------------|------------------|--------------|
| 6 | | | | | | |
| 7 | | | | | | |
| 10 | | | | | | |
| 11 | | | | | | |
| 12 | | | | | | |
| 18 | | | | | | |
| 19 | | | | | | |

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Analysis/Conclusion Questions

1. Can you determine a mineral type simply by knowing its specific gravity? Why or why not? _____

2. Express the formula for specific gravity another way using density rather than just mass (or weight) of a sample. _____

3. Why might it be helpful to know the specific gravity of a mineral? _____

4. Should your mineral sample be a pure specimen when measuring specific gravity? Why or why not? _____

5. Use your book or mineral identification key to find the specific gravity of Gold. _____
6. Compare SG of Gold to sample number 19. Is there a significant difference? _____

7. How could knowing the specific gravity help you to find Gold? _____
