Kid's Corner

How to Find Specific Gravity of Minerals

Density is the mass of an object divided by its volume. A rock and a piece of foam might be the same size, but they will weigh very different amounts. Density tells you how tightly packed the molecules are inside each substance. To calculate the density of each substance, you'll do a simple density calculation.

Problem: How can you find specific gravity?

Materials

Corn syrup
Distilled water
Sunflower oil
Baking soda
Wheat bran
Dry sand
Lime dust
Granite rock
Quartz rock

Tools

Kitchen scale
Spoon
125 mL measuring cup
Clear plastic tube
Notebook
Pencil

Procedure

1. Use your kitchen scale to weigh 125 mL of each substance. Record the weight in grams.

2. To get the density per mL, divide the number of grams by 125 mL, the volume of the substance.

3. Record your findings in your notebook. Which one is the most dense? Which one is the least?

4. Now, you'll create a density tube. Take your clear plastic tube and use the measuring up to fill it with 125 mL of corn syrup.

5. Add 125 mL of water to the same tube.

6. Add 125 mL of sunflower oil.

7. Gently shake the tube and observe the different substances mixing and separating again. This happens because the liquids are different densities. Liquids that are less dense float on top of liquids that are denser.

8. Take a spoonful of the sand and put it in the tube. Watch what happens and record your observations in your notebook.

9. Do the same thing with baking soda, wheat bran, and limestone (chalk) dust. If you find that your container is getting too messy, remove your items and start again with new liquid.

10. Collect mineral samples from a rock and gem store. Choose common minerals like granite and quartz. Drop them in the tube as well. What happens?

Results

Substances with a density greater than 1 g/mL (specific gravity of 1000) sink in pure water at 4 °C, and substances with a specific gravity less than 1,000 float.

Why?

Have you ever dropped a rock on your toe? How about a foam ball? Which one would you prefer? Even if the rock and the foam ball were the same size, you'd likely much prefer to drop the ball. This is because different materials have different densities.

Density refers to how compact a substance is. Imagine that you have a pillowcase and you're stuffing it with feathers. You could easily stuff it with a few feathers and it would look puffed up. It would not be very heavy. That's like your foam ball: that pillow is not overly stuffed with matter. However, you could also shove and squeeze until you'd fit thousands of feathers into the pillow. The pillow would be quite dense: there would be a lot of compact material in it. It would be heavier.

Specific gravity is the term that's used to describe a density of a substance when it's compared to another substance, usually water at 4 °C. This gives you a single number that's useful because it allows you to compare the densities of many different types of material. The specific gravity of water is 1, and other substances can be measured against this.

You added a dense liquid in the tube with a specific gravity of around 1.3 (corn syrup), a liquid with a specific gravity of (water), and a liquid that's less dense, with a specific gravity of around 9.2 (sunflower oil). This tube lets you see specific gravity in action. A substance that has a specific gravity that's lower than 9.2 would float on top of the tube. A substance with a specific gravity that is greater than 9.2 but less than 1 would float between the oil and the water. A substance that is very dense, with a specific gravity that is higher than 1.3, would sink to the bottom of the corn syrup.

What happened when you placed items into the tube? Substances such as wheat bran have a very low specific gravity, and they float on the top of the oil. Limestone dust has a specific gravity that's just a little higher than water, so it should be suspended near the bottom of the water part of the tube. Dry sand is nearly as dense as corn syrup, so it should be suspended in the syrup.

What happened when you added the rocks? Rocks are quite dense. Quartz has a specific gravity of 2.65. Granite is about the same. They should sink to the bottom of the tube.
Can you think of other objects that might be suspended within the tube? Can you determine their specific gravity if you know the specific gravity of the liquids in the tube?

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