Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per \_\_\_\_

Dunkin’ for Density!

Important Definitions & Equations:

Mass:

Volume:

Density:

Objectives:

• to determine the density at which an object will float, suspend or sink in water.

• to know the density of water

• to develop an understanding of the relationship between mass, volume, and density

Materials:

• Triple Beam Balance

• 3 empty film canisters per group

• beakers

• marble, pebble, and metal spheres

Procedure Part 1:

1. Using the materials at your desk, modify three film canisters so that they will float, sink, or remain suspended in the middle of a beaker of tap water. Your goal is to use as FEW molecule (marbles)s as you can!
2. First measure the mass of an empty canister and record it. Mass of empty canister

3. Next, fill one canister with at least one “molecule” so that it floats (1), *record the mass*.

4. Then fill a different canister so that it sinks to the bottom (2), *record the mass*.

5. Calculate the volume *when your canister sinks*! Will the volume of the canister ever change? \_\_\_\_\_\_\_

6. Write in the same volume for each canister.

7. Fill the final canister so that it will suspend (hovering right below the surface) (3) *record the mass*.

8. After you record the mass and volume of each canister calculate and write the densities below.

Procedure Part 2:

1. Once you have completed Part 1, use the equipment provided to calculate the density for each canister using the formula D=M/V Density = mass(weight) x volume.

Data:

|  |  |  |  |
| --- | --- | --- | --- |
| Film Canister | Mass (g) | Volume (mL) | Density (g/mL) |
| 1. Float |  | 40ml |  |
| 2. Sink |  | 40ml |  |
| 3. Suspend |  | 40ml |  |

What is the main thing that you learned from doing this experiment? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Analysis and Results:

What is the density of water? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Based on each given density below, predict the location of each item if placed in a tub of tap water.

*Choose: float, sink, or suspended.*

A. 0.2 g/ml \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ D. 1.0 g/ml \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

B. 2.3 g/ml \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ E. 0.5 g/ml \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

C. 0.99 g/ml \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ F. 1.9 g/ml \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What is the mass of an empty film canister? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Did the mass of the canister change when you added molecules? \_\_\_\_\_\_\_Explain why. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. What is the volume of an empty film canister? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Did the volume of the film canister change when you added molecules? \_\_\_\_\_\_\_Explain why. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. If you increased the mass of an object, but kept the volume the same, would it make the density of the object get HIGHER or LOWER? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. If you increased only the volume of an object, would it make the density of the object get HIGHER or LOWER? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. What caused each canister to stay at their level in the water? Explain why a canister will float, sink, or suspend using the term density.

-A canister will float because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
  
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-A canister will sink because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
  
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-A canister will suspend because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
  
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1. Why do you think it’s easy to float in the ocean or the Great Salt Lake than in Jordan Lake?

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