Lab: Liquid Density Layers   1 pt ec printing

Purpose: Determine the order of density, most dense to least dense, of the five colored solutions

Pre-Lab Questions:

1. List 2 liquids that have different densities: _____ & _____

2. How may one determine whether a liquid is more or less dense than another liquid?

_____

_____

Materials: six test tubes labeled 1-6, colored pencils, & five pipettes with the following solutions:

       Solution 1: Brown Karo syrup

       Solution 2: Palmolive dish-washing detergent (yellow)

       Solution 3: Water (dyed with red food coloring)

       Solution 4: Mineral Oil (Clear)

       Solution 5: Alcohol (dyed with blue food coloring)

Procedures:

1. Make sure the test tubes are labeled 1-5 & place them in order on a piece of white paper.

2. In test tube #1, use the pipette to place a SMALL amount (about 1cm of the test tube) of solution #1 (brown).

3. Then, SLOWLY and carefully add a small amount of solution #2 (yellow) to the same test tube.

4. Which solution is on top? Which is on the bottom? **<u>Color in the answer</u>** on the table below.

5. Repeat with the remaining 4 combinations in test tubes #2-5

Solutions	**1** **Brown & Yellow**	**2** **Yellow & Red**	**3** **Red & Clear**	**4** **Clear & Blue**	**5** **Blue & Brown**
Top					
Bottom					

6. After completing all combinations, think about how all six solutions would stack upon another. The densest solution will lie on the bottom, while the least dense solution will float on the top.
Color your hypothesis in the box labeled "Hypothesis.

7. Combine all solutions in test tube 6 according to this order.
Add the densest first so it lies on the bottom.
If added carefully, you should see the correct layers.

8. Please clean up by washing each test tube thoroughly.
   Return your test   tube & pipettes to your teacher.

TOP

Bottom

Hypothesis	Actual

Conclusion:

1. Does the order in which you squirt the liquids affect how they layer?

_____

_____

2. What makes one solution denser than another?

_____

_____

3. Does "thick and heavy" mean the same thing as "dense"? Explain.

_____

_____

_____

_____

_____

Lab: Determining Density

Part 1: Mystery Cubes

1. Find the mass, volume, & density of each cube.
2. Use the table to hypothesize what material each cube is made of.
3. Find your teacher to check your answers & record the actual material of each cube.

Cube #	Mass (g)	Volume (cm³)	Density (_____)	Hypothesis: Cube Material	Actual: Cube Material
1					
2					
3					
4					
5					
6					
7					
8					
9					

Density Chart

Substance	Density (g/cm³)
Air (avg)	0.0009
Cork	0.12
Poplar Wood	0.35-0.5
Cedar Wood	0.38
Alder Wood	0.4-0.7
Pine Wood	0.45
Mahogany Wood	0.57
Maple Wood	0.6-0.75
Oak Wood	0.6-0.9
Walnut Wood	0.65-0.7
Polypropylene	0.9-0.92
Acrylic	1.1-1.2
Nylon	1.13
PVC	1.4
Plastic	2.0
Concrete	2.3
Granite	2.6
Glass	2.7
Aluminum	2.7
Titanium	4.5
Steel	7.6-7.9
Brass	8.0-8.5
Copper	8.9

How accurate are your results? Explain what caused you to be accurate or inaccurate._____
_____
_____

Part 2: Density of Irregular Objects Find the mass, volume (using the displacement method) & density of the objects below.

Object	Mass (g)	Volume (ml)	Density
1. Metal Bolt			
2. Mini Pencil			
3. Three Marbles			

Part 3: Density of Water

1. Find the mass of a 100 mL graduated cylinder: _____ grams
2. Fill the graduated cylinder with exactly 20mL of water. Find the mass & record in column B.
3. Calculate the mass of *just* the 20 mL of water. (Subtract the mass of water & cylinder (B) by the mass of the empty graduated cylinder). Record this in column C.
4. Calculate the water's density by dividing the water's mass (C) by the water's volume (A).
5. Repeat steps 2-4 with the different volumes of water listed below.

Volume of Water (mL)	Mass of Water & Cylinder (g)	Mass of Water (g)	Density of Water (g/mL)
20			
40			
60			
80			
100			

What is the density of water? _____
Did you prove this?

Formulas to Remember:

$D=m/v$ $\qquad$ $V=D/m$ $\qquad$ $m=D \times V$

D= Density $\quad$ V= Volume $\quad$ m= Mass