Cornell Notes

Name: Ashley Martinez

Date: 9/8/11

Topic: Chem Lab: Density Continued

Class/Subject: Chemistry P.1 - Fragoso

Density

mass (g)

volume (mL)

1) Finish Data Collection for Density Lab.

2) Density Lab Calculations + Questions

HW

Study for Quiz tomorrow!

Started Lab 8:05 am

Received 3 new pipets and a unknown substance.

Procedure:

Measure mass + volume to be able to determine the density.

Questions in Notebook 8:35 am

Answer the following Questions in your lab notebook

1) Find the average density of water based on the results of the 3 trials.

Quiz tomorrow! Fri 9/9/11

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Ex. on % error on next pg.

2) Find the average density of your unknown solution based on the results of the three trials.

Identify your unknown substance from the list below:

a. #1) 1-Butanol, density = 0.810 g/mL
b. #2) 3% Hydrogen Peroxide, density = 1.05 g/mL
c. #3) Methanol, density = 0.791 g/mL

3) Could your unknown be a liquid that is not listed above?

4) Compare your experimental values with the accepted values for the density of each solution. To do so you have to calculate the percent error for the average density of water and your unknown solution.

5) Why do you think your measured values differ from the accepted values for water and the unknown liquid?

(2)

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% error equation

$$= \frac{|\text{measured value} - \text{accepted value}|}{\text{accepted value}} \cdot 100$$

EX: % error for water

$$= \frac{|1.01\ g/mL - 1.00\ g/mL|}{1.00\ g/mL} \cdot 100$$

8:50 am

accepted value for water = 1.00 g/mL

$$= \frac{0.01\ g/mL}{1\ g/mL} \cdot 100$$

$$= 1.00\%$$ group 1 ex.

On your own →

Find % error for your unknown

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DENSITY LAB

9/8/11

Small Scale Lab 2

Name _____

3. Why is the accuracy of the laboratory balance that you use in this investigation important? What effect would a less accurate balance have on your results? _____

4. What is the advantage in taking three sets of measurements instead of just one or two when determining the density of each liquid? _____

5. Why should you avoid skin contact with the unknown solution? _____

6. Do you expect your measured values for the density of water and the unknown to differ from the accepted values? Explain your answer. _____

Problem

What is the density of tap water and how can a property such as density be used to identify an unknown substance?

Materials

chemical splash goggles
laboratory apron
6 plastic micropipets
tap water
laboratory balance
graduated cylinder, 10-mL
unknown liquid

Safety

Wear your goggles and lab apron at all times during the investigation. Handle the unknown liquid with care. It may be toxic, flammable, or it may give off hazardous vapors. Avoid spills and contact with your skin or clothing. Do not inhale the vapors. If contact occurs, flush with water. Do not bring an open flame into the laboratory.

Note the caution alert symbols here and with certain steps of the Procedure. Refer to page *xi* for the specific precautions associated with each symbol.

Name Ashley Martinez

Small Scale Lab 2

Procedure

1. Put on your goggles and lab apron. Obtain six micropipets and number them 1, 2, 3, 4, 5, and 6. Make sure each micropipet is dry and clean.
2. Place micropipet #1 on the laboratory balance. Measure its mass to the nearest 0.01 g and record this value in Data Table 1.
3. Fill the micropipet with tap water as completely as possible. Place it on the balance and measure its mass to the nearest 0.01 g. Record the mass in Data Table 1.
4. Completely transfer the water in the micropipet into a *dry* graduated cylinder. Measure and record the volume of the water to the nearest 0.1 mL. (Note: If the graduated cylinder is made of glass, your eye must be at the same level as the bottom of the meniscus to measure the volume accurately. See Figure 2–1.)

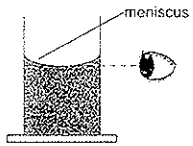

Figure 2–1

5. Using micropipets #2 and #3, repeat Steps 2–4 so that you have three sets of mass and volume data for water.
6. Obtain 50 mL of an unknown liquid from your teacher. Use micropipets #4, #5, and #6 and the preceding procedure to measure the mass and volume of three samples of the unknown. Record your measurements in Data Table 2. CAUTION: *The unknown solutions may be flammable or toxic, or they may give off hazardous vapors. Avoid skin contact and inhaling their vapors. Do not work near a burner flame.*
7. Dispose of all chemicals according to your teacher's instructions. Clean up your work area and wash your hands before leaving the laboratory.

Observations

DATA TABLE 1 Water

	Trial 1	Trial 2	Trial 3
mass of empty micropipet (g)			
mass of filled micropipet (g)			
mass of water (g)			
volume of water (mL)			
density of water (g/mL)			

Small Scale Lab 2

Name _____

DATA TABLE 2 Unknown

	Trial 1	Trial 2	Trial 3
mass of empty micropipet (g)			
mass of filled micropipet (g)			
mass of unknown (g)			
volume of unknown (mL)			
density of unknown (g/mL)			

Calculations

1. Calculate the mass of each water sample by subtracting the mass of the empty micropipet from the mass of the water-filled micropipet. Record this value in Data Table 1.

2. Calculate the density of each water sample at room temperature in grams per milliliter (g/mL). Enter this value in Data Table 1.

3. Find the average density of water based on the results of the three trials.

Average density of water _____

4. Similarly calculate the mass and density of each sample of unknown and record these values in Data Table 2. Then find the average density of the unknown.

Average density of unknown _____

Critical Thinking: Analysis and Conclusions

1. Based on your data, which of the liquids in the table on the next page could be your unknown? Explain. *(Drawing conclusions)*

Name _____ Date _____ Class _____

Small Scale Lab 2

Density of Liquids

Text reference: ***Chapter 1***

Introduction

Have you ever wondered why the oil in bottled salad dressing settles on top of the water-and-vinegar mixture? The answer has to do with the different densities of the liquids in the dressing. Oil has a lower density than the water-and-vinegar mixture. When two liquids of different densities are mixed, the liquid that is less dense, in this case the oil, floats above the other liquid.

Density is the mass of a substance per unit of volume. The density of any substance is a ratio and may be calculated by dividing the mass of the sample by its volume.

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

The most common units of measurement for density that you will encounter in this course are g/mL and g/cm^3.

When measured at the same temperature and pressure, all samples of a particular substance have the same density regardless of the quantity or shape of the sample. Thus, density is a characteristic property of matter that is often used by chemists to identify a substance.

In this investigation, you will first determine the density of tap water by finding the density of three separate samples and calculating an average. You will then repeat this procedure for an unknown liquid. Finally, you will compare your measured values with the accepted values for the densities of these liquids and compute the percent error for your results.

Pre-Lab Discussion

Read the entire laboratory investigation and the relevant pages of your textbook. Then answer the questions that follow.

1. Define *density* in your own words and give two everyday examples of substances that differ in density. _____

2. How can the density of an unknown substance help you identify it? _____