

Identification of an Unknown Liquid

Name_____

Report

Section_____

Unknown #_____

A. Density of unknown:

Wt. of Erlenmeyer flask, stopper & unknown _____g

Wt. of Erlenmeyer flask & stopper _____g

Wt. of 10.00 mL. aliquot of unknown _____g

Density of unknown _____

B. Boiling point of unknown _____

observed

temp.
at refractometer

correction

corrected
value

C. Refractive index of water _____

Refractive index of unknown _____

D. Identity of unknown liquid: _____

Fill in the table below comparing your values with those found in TABLE #1.

	Density	Boiling Pt.	n_D^{20}
Found values	_____	_____	_____
True values	_____	_____	_____

If your figures do not agree very well with the true values, give possible reasons.

Questions

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1. Define the following terms and give an example of each.

a. physical property

Example_____

b. chemical property

Example_____

c. boiling point

Example_____

2. In this experiment, it is important to keep the flask in which you weigh your density sample stoppered except when you are adding liquid to it. Why?

3. If this experiment were conducted in Denver (elevation 5,000 ft.) what would be the effect on the observed boiling points of the liquids?

4. Which of the following are not physical properties?

Molecular weight, density, refractive index, heat of reaction, heat of vaporization, flammability, melting point, water solubility, boiling point.

5. If none of your determinations (density, boiling point, and refractive index) agree exactly with the possible unknown values, what is the most likely source of error?

Problems

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1. A 10.00 mL aliquot of unknown liquid was added to a stoppered Erlenmeyer flask which weighs 48.217 g. If the weight of the unknown liquid plus the stoppered Erlenmeyer flask was 57.056 g, calculate the density of the unknown to the correct number of significant figures.
2. An unknown sample was found to have a density of 0.9016 g/mL and a refractive index of 1.3699. What is the most probable identity of the unknown? See Table #1.
3. A stoppered bottle, weighing 38.215 g when empty, weighs 45.362 g when filled with water. When filled with an unknown liquid the bottle and unknown weighs 44.221 g. Calculate the liquid's specific gravity: $\text{s.g.} = \frac{\text{density of unknown}}{\text{density of water}}$.
4. What unknown liquid boils at 171°F? See Table 1.

Problems (continued)

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5. A 25.00 mL sample of a liquid weighs 20.00 grams.

a. Calculate the density of the liquid.

b. Assuming that the error in this experiment is not greater than 0.1%, which of the liquids listed in Table #1 have densities that are within experimental error ($\pm 0.1\%$) of the determined density? Justify your answer.

c. If the error in this experiment is not greater than 1.0%, which of the liquids are within experimental error ($\pm 1.0\%$) of the density determined? Justify your answer.