

CH-131 Laboratory Skills

A. Comparing the Accuracy of Various Pieces of Glassware

Measure the mass of your empty 10 mL graduated cylinder and record on your data sheet. Fill the graduated cylinder to the 10mL mark with H₂O. Measure the mass of the graduated cylinder with H₂O and record on your data sheet. Repeat this procedure using your 100 mL graduated cylinder, 50 mL beaker, and 25 mL Erlenmeyer flask.

Calculate the mass of water in each container.

B. Bunsen Burner and Excited Ions

Obtain a well plate from your instructor. Fill the well plate with a sample of each of the salt solutions listed on your data sheet. Each well should be approximately 1/3 full. Light and properly adjust your Bunsen burner. Completely saturate the end of a Q-tip with the potassium chloride solution in the well plate. Hold the saturated Q-tip in the hottest portion of the flame and observe the color emitted. Record this color on your report sheet. Repeat this process with each of the salt solutions using a clean Q-tip with each solution. Return the Bunsen burner to the cabinets at the end of the bench. Dispose of the salt solutions and used Q-tips in the appropriately labeled waste containers.

C. Solution Chemistry

Following your instructor's direction weigh approximately 1 gram of Sodium Chloride (NaCl) using your weigh boat and the tare mechanism on the balance. Record the mass on your report sheet. Weigh and record the empty mass of your 150 or 100 mL beaker. Transfer the NaCl from the weigh boat into your weighed beaker. If necessary, a small amount of deionized water from your wash bottle may be used to rinse traces of NaCl from the weight boat. Add deionized water until the volume reaches 60 mL on the beaker. Stir continuously until all of the NaCl dissolves. Weigh the NaCl solution and beaker and record this mass on your report sheet. Transfer the solution into your 100 mL graduated cylinder. Measure and record the volume of the solution on your report sheet.

Calculate both the mass/mass percent concentration and mass/volume percent concentration of the NaCl solution following the example below:

A student placed 1.065 g of NaCl in an empty 150 mL beaker weighing 48.372g. After dissolving the salt in 50 mL of deionized water the student determined the mass of the beaker and solution to be 97.553 g. He then determined that the

actual volume of the solution was 49.5 mL. Calculate the mass/mass percent and mass/volume percent concentration of the salt solution.

$$\text{Mass/mass \% Concentration:} \quad \frac{1.065 \text{ g}}{49.181 \text{ g}} \times 100\% = 2.165\%$$

$$\text{Mass/volume \% Concentration:} \quad \frac{1.065 \text{ g}}{49.5 \text{ mL}} \times 100\% = 2.15\%$$

D. Use of a Pipet

Measure the temperature of the NaCl solution prepared in Part B, in degrees Celsius, and record on your report sheet. Pour a small amount of the solution into your 10 mL graduated cylinder (no more than 2-3 mL). Rinse the pipet with the solution following your instructor's directions. Discard all rinses into the appropriate waste container. Weigh and record the mass of your empty and dry 25 mL Erlenmeyer flask. Pipet a 10.00 mL sample of your solution from the 100 mL graduated cylinder into the 25 mL Erlenmeyer flask. Measure and record the mass of the 25 mL Erlenmeyer flask and the solution. Dispose of the salt solution in the appropriately labeled waste container. Repeat this procedure with two more 10.00 mL samples of the salt solution. Each time you must reweigh the 25 mL Erlenmeyer flask; it is not necessary that it be completely dry. Dispose of any remaining solution in the appropriately labeled waste container.

Calculate the mass of 10.00 mL of the salt solution for each trial. Using your data calculate the mean mass of the salt solution. Following Example 1.3 (pp 11-12 of your laboratory manual) calculate the individual deviations from the mean for each of your three trials and then the average deviation. State the mean mass with its average deviation on your report sheet.

Name _____

Drawer Number _____

REPORT SHEET
Laboratory Skills

A. Comparing the Mass of a Liquid Using Various Pieces of Glassware

	<u>10mL graduated cylinder</u>	<u>100mL graduated cylinder</u>	<u>25mL Erlenmeyer flask</u>	<u>50mL beaker</u>
Empty mass (g)	_____	_____	_____	_____
Mass of glassware and water (g)	_____	_____	_____	_____
Mass of water (g)	_____	_____	_____	_____

Which of the four containers will allow you to obtain the most accurate volume? Explain.

B. Bunsen Burner and Excited Ions

<u>Salt Solution</u>	<u>Color of Flame</u>
Potassium Chloride	_____
Barium Chloride	_____
Calcium Chloride	_____
Sodium Chloride	_____

C. Solution Chemistry

Mass of sodium chloride, g _____

Mass of 150 (or 100) mL beaker, g _____

Mass of beaker and solution, g _____

Mass of solution, g _____

Volume of solution, mL _____

Mass/mass % Concentration _____

Mass/volume % Concentration _____

Show all calculations on a separate page. Attach to your completed report.

D. Use of a Pipet (Show all calculations on a separate page.)

Temperature of Solution, °C _____

	<u><u>Trial 1</u></u>	<u><u>Trial 2</u></u>	<u><u>Trial 3</u></u>
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Mass of 25mL Erlenmeyer flask, g	_____	_____	_____
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Mass of Erlenmeyer flask and solution, g	_____	_____	_____
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Mass of solution, g	_____	_____	_____
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Mean mass of the solution, g _____

	<u><u>Trial 1</u></u>	<u><u>Trial 2</u></u>	<u><u>Trial 3</u></u>
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Individual deviations from the mean	_____	_____	_____
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Average deviation from the mean _____

Mass of solution _____ g ± _____ g

Compare the three masses obtained. Do they differ? How might you account for these differences, or lack thereof?

Name _____

Drawer Number _____

Questions

1. Indicate which of the following statements demonstrates proper lab technique?
 - a. Data is to be recorded directly on your data sheet in ink.
 - b. To read a graduated cylinder hold it in your hand at eye level.
 - c. Data may be collected on a scratch piece of paper and then transposed on your laboratory data sheet.
 - d. All glassware should be clean before use.

2. A beaker has a mass of 115.714 grams. Water is placed into the beaker. The mass of the beaker plus water is 126.914 grams. What is the mass of the water?

3. A student measured the mass of a beaker and recorded it as written below. He realized he had made an error and the actual mass of the beaker was 115.714 grams. Demonstrate below how the student should correct his error.

Mass of beaker, g 105.714

4. Indicate the number of significant figures in each number below:
 - a. 0.0030 _____
 - b. 0.104 _____
 - c. 53,069.2 _____
 - d. 0.00004715 _____
 - e. 576,004 _____
 - f. 5100 _____

5. Round the following numbers to four (4) significant figures:
 - a. 231.554 _____
 - b. 0.0084355 _____
 - c. 1144.31 _____
 - d. 43.720 _____

6. How many milliliters are in 114.2 liters?

7. How many decimals should you record for the units of the following pieces of equipment:

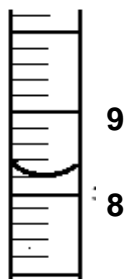
a. beaker _____ c. flask _____

b. graduated cylinder _____ d. scale _____

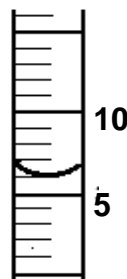
8. A student measured the mass of a solid sample and recorded the mass on his data sheet as 2.928 grams. He recorded his initial volume as 5.4mL and his final volume as 7.2 mL. Calculate the density of the sample.

9. Read the volume of the liquid in the graduated cylinder illustrated below:

a. _____



b. _____



10. In reference to the equipment used in today's experiment, circle the value with the correct significant figures?

a. graduated cylinder 1.1 mL 1.10 mL 1.100 mL

b. scale 13.15 g 13.157 g 13 g

c. thermometer 23°C 23.10°C 23.1°C

d. pipet 10.0 mL 10.00 mL 10 mL

Name _____ Drawer Number _____

11. A properly adjusted Bunsen burner flame has two distinct flames; an inner and an outer cone.

True or False

12. If you smell gas when using a Bunsen burner what should you do?

13. A student measures the mass of a 10.00mL sample of salt water in three consecutive trials as follows: 10.325 g, 10.446 g, and 10.335 g. Find the mean mass and the average deviation from the mean.

14. A 121mg sample was placed on a watch glass that weighed 8.203g. What is the weight of the watch glass and sample in grams?

15. You must shake a lab thermometer to get it back to room temperature.

True or False

16. Select the diagram below that indicates the correct use of a thermometer for measuring the temperature of a liquid.

a.



b.



c. both a and b