CH-101 Laboratory Skills

A. Comparing the Accuracy of Various Pieces of Glassware

Measure the mass of your empty 10mL graduated cylinder and record on your data sheet. Fill the graduated cylinder to the 10mL mark with H_2O. Measure the mass of the graduated cylinder with H_2O and record on your data sheet. Repeat this procedure using your 100mL graduated cylinder, 50mL beaker, and 25mL 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 100mL 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 100mL 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 150mL beaker weighing 48.372g. After dissolving the salt in 50mL 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.

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

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

D. Determining Mass of a Salt Solution

Measure the temperature of the NaCl solution prepared in Part B, in degrees Celsius, and record on your report sheet. Measure and record the mass of your dry 10mL graduated cylinder. Place a 10.0mL sample of your solution from the 100mL graduated cylinder into your weighed 10mL graduated cylinder. Measure and record the mass of the 10mL graduated cylinder and the solution. Dispose of the salt solution in the appropriately labeled waste container. Repeat this procedure with two more 10.0mL samples of the salt solution. Dispose of any remaining solution in the appropriately labeled waste container.

Calculate the mass of 10.0mL of the salt solution for each trial. Using your data calculate the mean mass of the salt solution.

Name _____ Drawer Number _____

REPORT SHEET
Laboratory Skills

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

	10mL graduated cylinder	100mL graduated cylinder	25mL Erlenmeyer flask	50mL beaker
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

Salt Solution	Color of Flame
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. Determining Mass of a Salt solution

Temperature of Solution, ºC _____

	Trial 1	Trial 2	Trial 3
Mass of 10mL graduated cylinder, g			
Mass of graduated cylinder and solution, g			
Mass of solution, g			

Mean mass of the solution, g _____

	Trial 1	Trial 2	Trial 3
Individual deviations from the mean			

Average deviation from the mean _____

Mass of solution _____ g ± _____ g

(Show all calculations on a separate page.)

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 _____ d. 0.00004715 _____

   b. 0.104 _____ e. 576,004 _____

   c. 53,069.2 _____ f. 5100 _____

5. Round the following numbers to four (4) significant figures:

   a. 231.554 _____ c. 1144.31 _____

   b. 0.0084355 _____ 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:

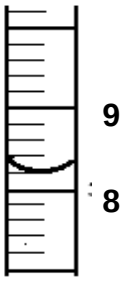
   a. beaker _____ c. flask _____

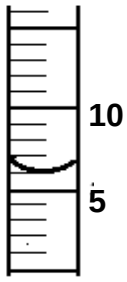
   b. graduated cylinder _____ d. scale _____

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

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