Lab Report Notes

Read This: *This document contains notes/hints/suggested readings/corrections to help you with specific labs in Chem 0861. The notes are the opinions of this author, and may or may not be what your instructor wants. If you are not sure about something, ask your instructor.*

General

[1]	(a) For chemistry, use metric graph paper, not the type with 1/4" squares. (b) All graphs must be done manually, not by computer (unless the teacher allows it).
[2]	Change the scale of your graph if it doesn't fit on one page. Never glue extra pieces onto your graph paper.
[3]	Make an effort to read the related material associated with a particular lab. Read the preamble in the lab manual. Read the related material in your textbook.
[4]	Some questions may have more than one correct answer.
[5]	Before you hand in your lab report, flip through the pages to make sure everything is there.

Chemistry Spelling List

accuracy	discrepancy	metallic	soluble
affect (verb)	effect (noun)	occurred	sulfur (or sulphur)
aspirin	inversely	precipitate	valence
attached	it's (it is)	preparation	varying
combustible	length (not lenght)	proportional	visible
crystallization	magnesium	separate	yield
definite	manganese	similar	
dependent	meniscus	slope	

GENERAL INFORMATION

Data can be classified as either qualitative or quantitative. Qualitative observations do not have numbers associated with them; however, it is still important to adhere to the lab instructions (e.g., if you are told to add about 1 mL of solution, don't add 5 mL). Quantitative experiments would involve the collection of numerical data. For a successful quantitative experiment, the following conditions should be met: (1) The reaction should be fully-completed (e.g., if the product involves a precipitate, it should be completely precipitated). (2) The product should be a stoichiometric compound of known composition. (3) The product should be pure.

INVESTIGATING MASS-VOLUME RELATIONSHIPS

TIP: There is a far greater thing to learn in this lab than the mass-volume relationship. Remember, in math, how you determined the slope by taking two points from the table and using the formula? That won't work here. You have to draw the line first, and then choose two convenient points from the line. Then, you would apply the above formula. The reason for this difference is that, in math, the points in the table are all on the line; in science, the points in the table may not be on the line.

[1] (Graph) (a) Determine the slope of each graph using the "rise over run" method. (b) Draw a slope triangle, using **any** two points on your line, neither of which is the origin. DO NOT CALCULATE THE SLOPE BY USING TWO POINTS FROM YOUR DATA TABLE.

[2] (Discussion) (a) Discuss the graph (i.e., what was graphed? what type of graph resulted? what does the type of graph indicate about the relationship between mass and volume? etc ...). (b) Cite important values from the lab (e.g., experimental values, literature values, % errors, etc ...); why

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are the values different? etc ... (c) Discuss sources of experimental error, focussing specifically on the source of error and its possible effect on the results.

[3] (Question 1a) This is asking about the relationship between mass and volume, not the difference between glass and rubber.

[4] (Question 1b) If your mathematical description includes any variables, be sure to explain what each variable means.

[5] (Question 2a) The value you obtained by determining the slope ... what is it?

[6] (Question 3) Solve graphically ... DO NOT CALCULATE. To determine the volume of 25.62 g of rubber: (1) locate 25.62 g on the m-axis (2) draw a dotted horizontal line until it intersects the rubber graph (3) draw a dotted vertical line from this point to the V-axis (4) read the value of V from the V-axis. This value should be correct to one or two decimal places, depending on the fineness of the graph paper used.

[7] (Questions 4a-c) All calculations MUST be shown. Don't forget the units. Remember, NO UNITS = NO MEANING TO YOUR ANSWER.

[8] (Question 5) (a) Reworded: For glass and rubber, determine the % error between the experimental value and the literature value for density. The literature value for the density of glass (at 20°C) is 2.6 g/mL. The literature value for the density of rubber (at 20°C) is 1.19 g/mL. (b) The formula for % error should not contain the "%" after the "100".

[9] (References) (a) For more information on graphing, see the "Graphing" section in the appendices of the lab manual. Reading this will also help you understand Question #1. (b) Read about "Density" in the textbook. (c) Read "Graphical Representation of Data" in the textbook.

PREPARATION & PROPERTIES OF OXYGEN

TIP: Be sure to understand the difference between "supports combustion" and "combustible".

[1] (Discussion) Idea: Discuss what happened in each test and draw a conclusion from each test (e.g., a paragraph for each test, making 4 in all).

[2] (Questions) Many of the answers to the questions in Part 1 are given in the lab manual.

[3] (Part 1, Question 1) "Formula" refers to the molecular formula, not the formula equation.

[4] (Part 1, Question 3) Name an alternative method for the preparation of oxygen in the laboratory.

[4] (Part 1, Question 4) State experimental evidence, besides the fact that O_2 is less dense than H_2O.

[5] (Part 1, Question 5) (a) "composition" refers to the composition of the gas collected. (b) Hint: Consider what was in the system before you turned on the Bunsen burner.

[6] (Part 2, Question 1) Sample word equation for the combustion of barium:

barium + oxygen ➔barium oxide

Sample balanced formula equation for the combustion of barium:

$2Ba + O_2 \rightarrow 2BaO$

[7] (Part 2, Question 1c) The reason the lab manual told you to call the product "iron oxide" is because the oxide Fe_3O_4, known as magnetite, contains iron in two oxidation states (one Fe^{2+} ion and two Fe^{3+} ions); therefore, to say iron(II) oxide or iron(III) oxide would be incorrect.

[8] (Part 2, Questions 1d) This is a "freebie" for those who have read their textbook.

[9] (Part 2, Question 2c) EXPLAIN the difference in combustion time, do not calculate it.

[10] (Part 2, Question 2d) (a) Consider the following analogy: If I lock you an airtight auditorium. After a few days, you suffocate due to the lack of oxygen. At that moment, I conclude that there is no oxygen in the auditorium. Was that a valid statement? (b) Another analogy: You drive your car around the block for hours, until the gas level drops below "E", and the car finally stops. You conclude that there is no gas in the car. Was that a valid statement?

[11] (Part 2, Question 3) (a) See "Diffusion", FCC (13^{th} ed only), p 253 ... diffusion is a non-topic in the 14^{th} edition (b) Also, read about "Physical States of Matter" in the textbook.

[12] (Part 2, Question 4) This question is referring to the rate (speed) of the reaction, not the time of the reaction.

[13] (Reference) Read about "Writing & Balancing Equations" in the textbook.

PERCENTAGE OF OXYGEN & POTASSIUM CHLORIDE IN POTASSIUM CHLORATE

[1] (Results) Submit both tables in the lab report.
[2] (Data Table, Part 1, Row 3) Make sure you use the lowest mass reading obtained after repeated heating in all your calculations.
[3] (Calculations) For all the % formulas in the manual, there should be no "%" after the "100".
[4] (Question 5) There will be ONE CALCULATION for the % error for oxygen and ANOTHER ONE for the % error for KCl.
[5] (Question 6 reworded) Based on the tests in Part II, can it be concluded that the residue was potassium chloride (i.e., a compound consisting of K and Cl)? Hint: What was the $AgNO_3$ test ONLY testing for?
[6] (Question 7) (a) This question does NOT refer to the $AgNO_3$ test. (b) Review the "Procedure" section of the lab manual.
[7] (Question 4) (a) Balance the equations by putting numbers in FRONT of the molecules; do not change the formulas of the molecules involved; do not insert numbers "inside" a formula. (b) Count atoms on either side to see if balance had indeed been achieved. (c) If you are using an older lab manual, one of the equations should be: $NH_4NO_3 \rightarrow H_2O + N_2O$

EXPT 5: DOUBLE REPLACEMENT REACTIONS

[1] (General) Don't forget to use arrows to indicate gases and precipitates.
[2] (Question 1) (a) This is NOT asking which reactions had no reaction at all. (b) Give two examples from the experiment (i.e., state the equations).
[3] (References) (a) See the "Double Replacement Reactions" worksheet (Learning Centre). (b) See "Double Replacement Reactions" in the textbook.

EXPT 6: SINGLE REPLACEMENT REACTIONS

[1] (Question 1) You actually did this in the lab. Check your results.
[2] (Question 4) In other words, to go from Zn to Zn^{2+}, did the Zn gain or lose electrons? Likewise, to go from Cu^{2+}, did the Cu gain or lose electrons?
[3] (References) (a) See the SINGLE REPLACEMENT REACTIONS worksheet (Learning Centre). (b) See "Single Replacement Reactions" in the textbook.