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. For chemistry, use metric graph paper, not the type with 1/4" squares. (b) All graphs must be done manually, not by computer.
2. Change the scale of your graph if it doesn't fit on one page. Never glue extra pieces onto your graph paper.
3. If your lab report looks like someone else's, you will be heavily penalized, regardless of who copied who.
4. 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.
5. Some questions may have more than one correct answer.
6. Before you hand in your lab report, flip through the pages to make sure everything is there.

Chemistry Spelling List

<table>
<thead>
<tr>
<th>Accuracy</th>
<th>Discrepancy</th>
<th>Metallic</th>
<th>Soluble</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affect (verb)</td>
<td>Effect (noun)</td>
<td>Occurred</td>
<td>Sulfur (or sulphur)</td>
</tr>
<tr>
<td>Aspirin</td>
<td>Inversely</td>
<td>Precipitate</td>
<td>Valence</td>
</tr>
<tr>
<td>Attached</td>
<td>It's (it is)</td>
<td>Preparation</td>
<td>Varying</td>
</tr>
<tr>
<td>Combustible</td>
<td>Length (not length)</td>
<td>Proportional</td>
<td>Visible</td>
</tr>
<tr>
<td>Crystallization</td>
<td>Magnesium</td>
<td>Separate</td>
<td>Yield</td>
</tr>
<tr>
<td>Definite</td>
<td>Manganese</td>
<td>Similar</td>
<td></td>
</tr>
<tr>
<td>Dependent</td>
<td>Meniscus</td>
<td>Slope</td>
<td></td>
</tr>
</tbody>
</table>

A Note About Plagiarism and Collaboration

When writing your lab report, do it by yourself, without your lab partners there or your classmates; and without any unauthorized aids, as guides. Lab reports that demonstrate collaborated efforts will be penalized. All parties involved will be penalized. The lab report must be 100% written/typed by yourself.

Collaborated efforts are easy to spot. You can't hide it by rearranging sentences or by using a thesaurus. If you did the lab report by yourself:

1. Your graph will not be the same as your partner's.
2. Your sources of errors will not be the same as your partner's. One or two similarities may occur, but not for all of them.
3. The presentation of the lab report will in no way resemble what your partner did.
4. The references used for the lab are different.

How To Avoid Getting Penalized for Collaboration

1. Don't lend people your computer disk. For example, changing the font doesn't make it your own work.
2. Don't let people read your lab report. Think about why anyone would want to read your lab report.
3. Don't let someone else hand in your lab report. That someone may extract the “goodies” before handing it in.
4. Don't dispose of the rough copy in the recycling bin at school. Some students will "recycle" your work.
If other students are having trouble, you can help them by asking what they're having trouble with and offering ideas to get them going. Lending out your lab report will cost you marks, as well as those who copied you.

Why It Isn’t Good to Plagiarize and Collaborate

1. You devalue your own efforts. You may be a genius, but no one will notice it was you, when all your partners came up with the same ideas.
2. You may get marks taken off; you may get a zero; or you may even get expelled from school.
3. For every good thing that you do in the future, people will wonder if you did it by yourself.

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 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 p 109 of the lab manual (2014 version).
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.

[5] (Part 1, Question 4) State experimental evidence, besides the fact that O₂ is less dense than H₂O.

[6] (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.

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

$\text{barium} + \text{oxygen} \rightarrow \text{barium oxide}$

Sample balanced formula equation for the combustion of barium:

$2\text{Ba} + \text{O}_2 \rightarrow 2\text{BaO}$

[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 in 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 (13th ed only), p 253 ... diffusion is a non-topic in the 14th 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.


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 AgNO₃ test ONLY testing for?

[6] (Question 7) (a) This question does NOT refer to the AgNO₃ 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: $\text{NH}_4\text{NO}_3 \rightarrow \text{H}_2\text{O} + \text{N}_2\text{O}$

EXPT 5: DOUBLE REPLACEMENT REACTIONS

[1] (General) Don’t forget to use arrows to indicate gases and precipitates.

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(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).

(References) (a) See the “Double Replacement Reactions” worksheet (Learning Centre). (b) See “Double Replacement Reactions” in the textbook.

EXPT 6: SINGLE REPLACEMENT REACTIONS

(Question 1) You actually did this in the lab. Check your results.

(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?

(References) (a) See the SINGLE REPLACEMENT REACTIONS worksheet (Learning Centre). (b) See “Single Replacement Reactions” in the textbook.

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