Lab Report Notes

Read This: *This document contains notes/hints/suggested readings/corrections to help you with specific labs in Chem 0871. 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.

PERIODICITY OF ELEMENTS

[1] (Sample Calculations) Show sample calculations for all calculated quantities.
[2] (Graph) (a) The atomic number scale should be linear. (b) The curve should follow the given ionization energy values fairly closely. (c) The curves should be smooth ... no sharp corners. (d) Label each graph with its group number.
[3] (Predicted IE Determination Steps) To predict the IE for a given element: (a) Locate its atomic number on the atomic number axis. (b) Draw a dashed vertical line from here until it intersects the graph. (c) Draw a horizontal dashed line from this point to the ionization energy axis. (d) Read the predicted value of the IE from the ionization energy axis.
[4] (Question 1) (a) Properties should relate to atomic radius, ionization energy, electron configuration, valence electrons, etc ... (b) Read about “periodic properties” in the textbook. (c) Suggested answer structure for a periodic property: Since <periodic property> <increases/decreases> down the halogens group, it is expected that the <periodic property> of astatine would be <larger/smaller/higher/lower> than that of iodine. (d) Answer structure for a halogens property: Since halogens are known to <property>, it is expected that astatine would also possess these

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same properties. (e) The following answers may not be accepted: (i) It is a halogen. (ii) It is located in Group VIIA. (iii) It has an atomic number of 85. (iv) It has a mass of 210. (v) Its symbol is At. (vi) It has more protons/electrons. (vii) It is located on a higher energy level. (f) Do not state properties that apply only to astatine and not to the other halogens. (g) If you run out of ideas, it may be necessary to do some research. Try the library (e.g., science encyclopedia, etc ...) or search for "halogens" or "properties of halogens" on the internet.

[5] (Question 2) Read about "Electron Structures and the Periodic Table" in the textbook.

[6] (Questions 3-4) Read about "Periodic Trends in Atomic Properties" in the textbook.

[7] (Note) Element 81 is "Tl" (that's an "l", as in "ladder", not an "i").

[8] (Note) % error formula should not have the "%" after the "100".

[9] (Procedure #4) Change "Use these lines" to "Use these curves".

ORGANIC CHEMISTRY (Synthesis of Aspirin)

[1] (Question 1) (a) This question is referring to this experiment. (b) This question does not ask, "What is the difference ...?" ... it is asking, "Why is there a difference ...?" (c) Give some specific ways of improving the amount of actual yield. Don't say, "being more careful", etc ...

[2] (Question 3) "Write down" means to state the functional group symbolically.

[3] (Question 4) This question asks about the general formula of an ester, not the equation illustrating how an ester is formed. Use "R" to represent the rest of the molecule.

[4] (Question 5) (a) Show the structural formulas in your equation, like in the example:
Hint: Replace "acetic acid" with "salicylic acid" (the structural formula of it is in the lab manual).
(b) The question says, "the formation of methyl salicylate" ... it should really say, "the formation of methyl salicylate and water". (c) Side Note: Esters are compounds formed by replacing the -OH group of the carboxyl group (-COOH) of the acid with the -OR group of an alcohol. (d) Reference: The formula for methyl salicylate can be found in the **Merck Index** (available at the Learning Centre), just in case you want to check.

[5] (Question 6) You will need to know the total volume of water used to wash the aspirin.

[6] The % yield formula should not have the "%" after the "100".

MOLECULAR MODELS

[1] (Question 1) Consider where 25°C is in relation to the melting point and boiling point for each substance.

[2] (Question 2) Work with the carbon skeleton, put in the hydrogens later. It makes it easier.

[3] (Question 3) Consider the polarities.

[4] (Question 4) "chemically" means whether it's reactive or not

[5] (Question 5) It might help to research "ethane", "ethene" and "ethyne" on the web.

FREEZING POINTS

[1] (Experiment) During the initial cooling period, don't forget to agitate the solution somehow, in order to encourage freezing.

[2] (Discussion - Some Ideas) (a) Indicate what the freezing points of the substances tested were. (b) Discuss your results, as it relates to the items mentioned in the preamble of this experiment (see lab manual).

[3] (Question 1) (a) Read "Physical Properties of Water" in the textbook. (b) This is the same as one of the review questions in the book. (c) Do not use a kinetic energy (motion) explanation, since both phases are at the same temperature and have the same average kinetic energy.

[4] (Question 2) (a) Read "Freezing Point or Melting Point" in the textbook. (b) Read the preamble in the lab manual. (c) This is also one of the review questions at the end of the chapter in the textbook.

[5] (Question 3) Read the Preamble in the lab manual.

[6] (Question 4) Read "Physical States of Matter" in the textbook.

[7] (Question 5) Read "Physical Properties of Water" in the textbook.

QUALITATIVE ANION ANALYSIS

[1] (Data Table) (a) When filling out the data table, refer to the instructions given in the Procedure, part 2. (b) Make sure you record the colour of the cyclohexane layer in each case.

[2] (Question 2) (a) For the given compounds to be tested, only the negative ions from them are being tested (i.e., the CO_3^{2-} from Na_2CO_3 and the Cl^- from the $BaCl_2$). (b) Your flow chart should distinguish between the compounds in question, not every compound tested in the experiment. (c) The Anions Lab Test Scheme distinguishes between all 6 anions. (d) See flow chart example on "Anion Analysis" worksheet (Learning Centre).

[3] (Question 3 reworded) (a) Identify the unknown anion, given the following results:

	Test A		**Test B**		**Test C**
	$AgNO_3$	HNO_3	$BaCl_2$	HCl	Cyclohexane
Unknown	white ppt	ppt dissolves	white ppt	ppt dissolves	colourless

(b) Your goal is to identify the anion (one of the six) which yields the above results. (c) Also, keep in mind that the reason you didn't do the cyclohexane test for three of the ions is because it would yield no reaction (i.e., the cyclohexane layer would be colourless).

[4] (Question 4b) See "Factors Related to Solubility" in the textbook. Read the section entitled, "The Nature of the Solute and Solvent".

[5] (Question 5a) Give the formula of any ions formed. Hint: What ions make up sodium sulphate? What ions make up silver nitrate?

[6] (Question 5b) Give the formula of any precipitate formed (if any).

[7] (Question 6) (a) Indicate precipitates (down arrow) and gases formed (up arrow). (b) Review the "Double Replacement Reactions" lab from Chem 0861. (c) See the "Molecular, Ionic & Net Ionic Equations" worksheet (Learning Centre). (d) Read the section in the book on net ionic equations.

[8] (References) See the "Anion Analysis Lab Notes" worksheet (Learning Centre). It has a sample flow chart, explanation of the cyclohexane test (as asked in Question 4), etc ...

PROPERTIES OF ACIDS & BASES (optional)

[1] (Data Tables - Effect of Indicators) If the indicator does not change colour, write something like "remains yellow" rather than "no change".

[2] (Data Tables - Electrical Conductivity) Indicate whether the substances tested are strong or weak.

[3] (Question 6a) "Changes" refer to colour changes. Describe the colour changes from beginning to end.

[4] (Question 6b) "Condition" refers to whether it was acidic, basic or neutral.

ACID-BASE TITRATION

[1] (General) Be careful with significant figures in this lab.

[2] (Calculations) (a) Show a full set of sample calculations for one of the trials. (b) Don't forget to show the concentration of the standard acid calculation, unless the acid was prepared beforehand. (c) When determining the molarity of the unknown, it is referring to 10 mL of the unknown. It is NOT asking for the molarity of the solution after topping it off at 50 mL.

[3] (Questions) Watch significant figures. Do not leave answers in fractional or repeating decimal form.

[4] (Question 1) Read the preamble in the lab manual.

[5] (Question 2) See "Dilution Problems" in the textbook.