Tips for Keeping an Organized Chem-31 Lab Notebook

1) READ THE LAB MANUAL before you start an experiment!

- You need to know the objectives, the order of procedures, and what results you will be calculating at the end of the experiment to know what information you should take note of as you work through the experiment!
- To do this, you need to read the entirety of what the lab manual says about each experiment before you begin working on it.

2) REWRITE THE OBJECTIVES AND PROCEDURES into your own lab notebook!

- For one, it will help you get an even better understanding of what you need to do.
- For another, rewriting them into your notebook BEFORE you start working on the lab will help you keep your notebook organized
- **Tips for rewriting objectives and procedures:**
  - **Only write on the right facing page! Leave the left page blank, so that later during the experiment you can use the blank space for any class notes, observations, or to fix/rewrite any errors.**
  - **Don’t try to cram your procedure onto a small amount of pages. Space it out! For example, leave extra lines between the different steps of the procedure. Just like the blank left page, this will leave you room to make notes, observations, or revisions.**

3) ORGANIZE YOUR DATA PAGE(S) before you start the experiment!

- If you make tables for your data before you start the experiment it will help your notebook stay organized and help you understand what information you will be gathering during the lab.
- **Tips for making data tables:**
  - **The lab manual already has data tables designed for you to use for the majority of the experiments. If they make sense to you, redraw them in your notebook after the procedures! If they don’t make sense to you, make any needed additions, changes in wording, or changes in design and draw them in your notebook.**
  - **Make any additional data tables that you might need that the lab manual hasn’t already designed for you. You should make sure to have a table or designated area to write down ALL data, observations, etc. that you will need to take note of during the experiment.**
  - **Title EVERYTHING! Be sure to give every table or piece of data a heading, title, label, or description. This will keep your notebook organized, easy to read, and easy to find information in.**
  - **Space it out! Make the boxes of your tables at least twice as large as you think they need to be. Leave some blank space before and after each table. If a table takes up even just half of the page, leave it as the only table on that page and put the next table on the next page! These will all give you the extra room necessary to later make notes, observations, or revisions as you are gathering your data during lab.**

4) ORGANIZE YOUR CALCULATION PAGES before you start the next experiment!

- Sometimes you may have to begin lab work for the next experiment before you have finished the calculations for the current experiment. Of course before you begin the next experiment you should write the objectives, procedures, and data tables for it in your notebook. If you have to do this before you are done with the previous experiment's calculations, you will have to estimate how many pages you should leave available to finish the calculations (how many pages you should skip before beginning the new experiment).
- **Tips for making calculation pages:**
    - **As with writing the procedures and creating the data pages, do NOT be afraid to leave extra space! Leave yourself more pages than you think you will need to do the calculations! You never know if you may have to redo some calculations, rewrite them for clarification, make notes, etc.!**
    - **If you end up not using all of the pages you left blank, you can simply draw a line through the extra blank pages when you are finished with that experiment.**
    - **On the calculation pages, TITLE EVERYTHING! Be sure to give every calculation a heading, title, label, or description. This will keep your calculations organized and easy to follow.**

In brief:

- Enter all data (**with units**) directly into your notebook.
- Do **not** record data elsewhere for transfer into the notebook.
- Do **not** change the page number.
- Record all reagents, concentrations with sufficient information.
- The pre-calculations (**with title**), observations, results, and conclusion should be made clear.
- A line should be drawn between different subjects.
- If you want to delete an entry, draw a line through it so that is still legible. Add any corrections adjacent to the deleted entry.

Example A: First page for a new experiment.

Sydney Hagen Section 4 Locker 87 3-4-14

Experiment 3: Water Hardness (EDTA) Titration

Objective

This lab will introduce you to methods used to determine the "hardness" of a water sample. ~~Wa~~ "Hard" water is water that contains large quantities of dissolved salts, usually calcium & magnesium as cations & carbonates, bicarbonates, or sulfates as ~~to~~ anions. In this lab, the degree of hardness of a water sample will be determined by titration with a standardized EDTA soln to determine the amount of $CaCO_3$ (the water hardness will be reported as ppm $CaCO_3$).

Methods

I. Preparation of Samples & Solutions

1) Before beginning this lab, turn in a clean labeled 500 mL volumetric flask to instructor for the Ca^{2+} & Mg^{2+} unknown.

2) Your sample will be a soln containing an unknown amount of Ca^{2+} & Mg^{2+}. It must be diluted to precisely 500.0 mL by addition of DI water. Insure complete mixing by adding water in 100 mL increments & swirling. Bring volume to 500.0 mL w/ a dropper pipet. Stopper & invert ~20 times.

3) Calculate how much $CaCO_3$ is needed to prepare 500 mL of 0.015 M soln. Weigh out about twice this amount on the top loading balance into a clean, labeled weighing bottle.
* see calc. top of next pg! *

labeled weighing bottle
on cap "1"
around lip of bottle "$CaCO_3$ Soda Au Unknown"

Example B: Observations

Preparation of Standard Ca^{2+} Soln

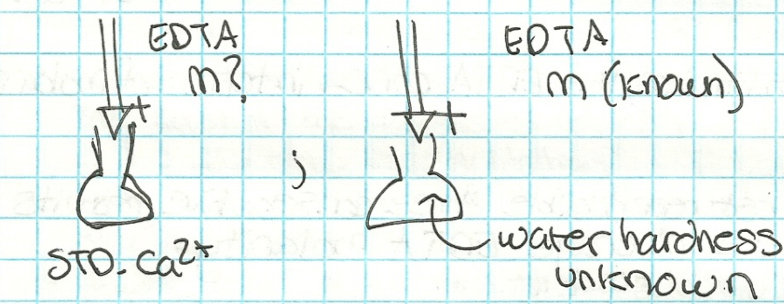
Calculations: ~~20.919T~~

0.7688

~~21.6692~~ g $CaCO_3$ $\frac{1 \text{ mol } CaCO_3}{100.09 \text{ g } CaCO_3} = 0.007681 \text{ mol } CaCO_3$

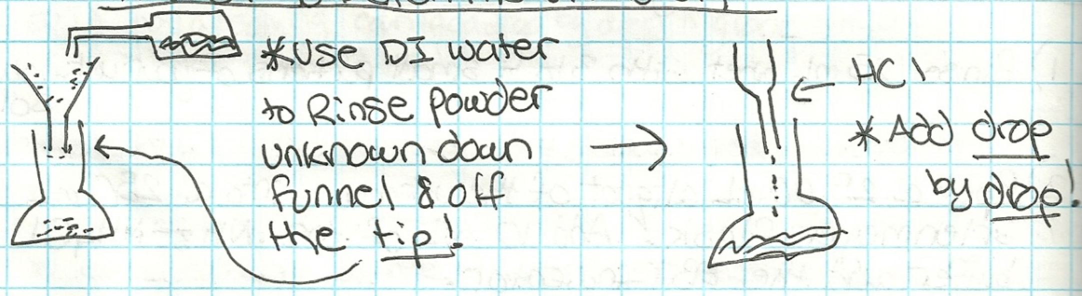
$\frac{0.007681 \text{ mol } CaCO_3}{500 \text{ mL soln}} \cdot \frac{1000 \text{ mL}}{1 \text{ L}} = \frac{0.01536 \text{ mol Ca}}{\text{*L soln}}$

3/6/14 Notes: EDTA Standardization Titrations Set up



*Endpoint = Blue

Preparation ~~Titration~~ to Determine Unknown



Example C) While writing the procedures and creating the data tables before working on the experiment, the left facing page below was left blank. This left room to write down class notes from the white board without crowding your notebook. Also note that the extra space in the boxes of the data table allowed room to make corrections and notes, and that calculations were not crammed onto the same page as the data table.

Notes 4/8/14:

IC unkn → turn in 100mL clean volumetric flask w/ full labels, after rinse w/ DI water few times, rinse flask w/ small portions of nano-water!

To weigh Na_2CO_3 for the standardization $0.10\,M\ HCl \equiv \frac{0.10\,mol}{1L}$

$1\,L \equiv 0.10\,mol$

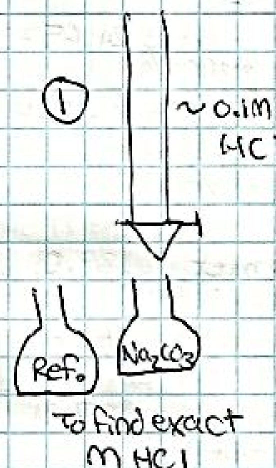
$0.035L \equiv X_3$

$1\,mol\ Na_2CO_3 \equiv 2\,mol\ HCl$

$y\,mol \equiv X\,mol$

mass = mol × (m.w.)

mass Na_2CO_3 = y mol × 106.0g/mol



To weigh unkn sample ...

$0.040L \times \frac{[HCl]exact}{1L} = a\,mol$

$1\,mol\ Na_2CO_3 \equiv 2\,mol\ HCl$

$b\,mol \equiv a\,mol$

b = a/2 mol of Na_2CO_3 in your unkn

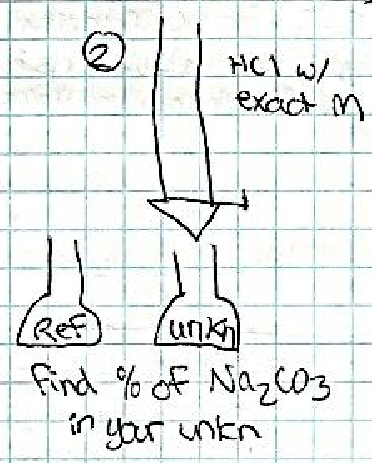
mass = mol × (m.w.)

= b × (106.0) = c g of unkn

$c \times \left(\frac{100}{25}\right)$ = d g of unkn (use analytical balance)

assume → 25

~~.4437~~
~~23.5922~~
~~.38875~~
~~28.2027~~
~~.4465~~
~~27.2585~~
27.339



Sydney Hagen Experiment 5 4-2-14

Unknown Sample Titration

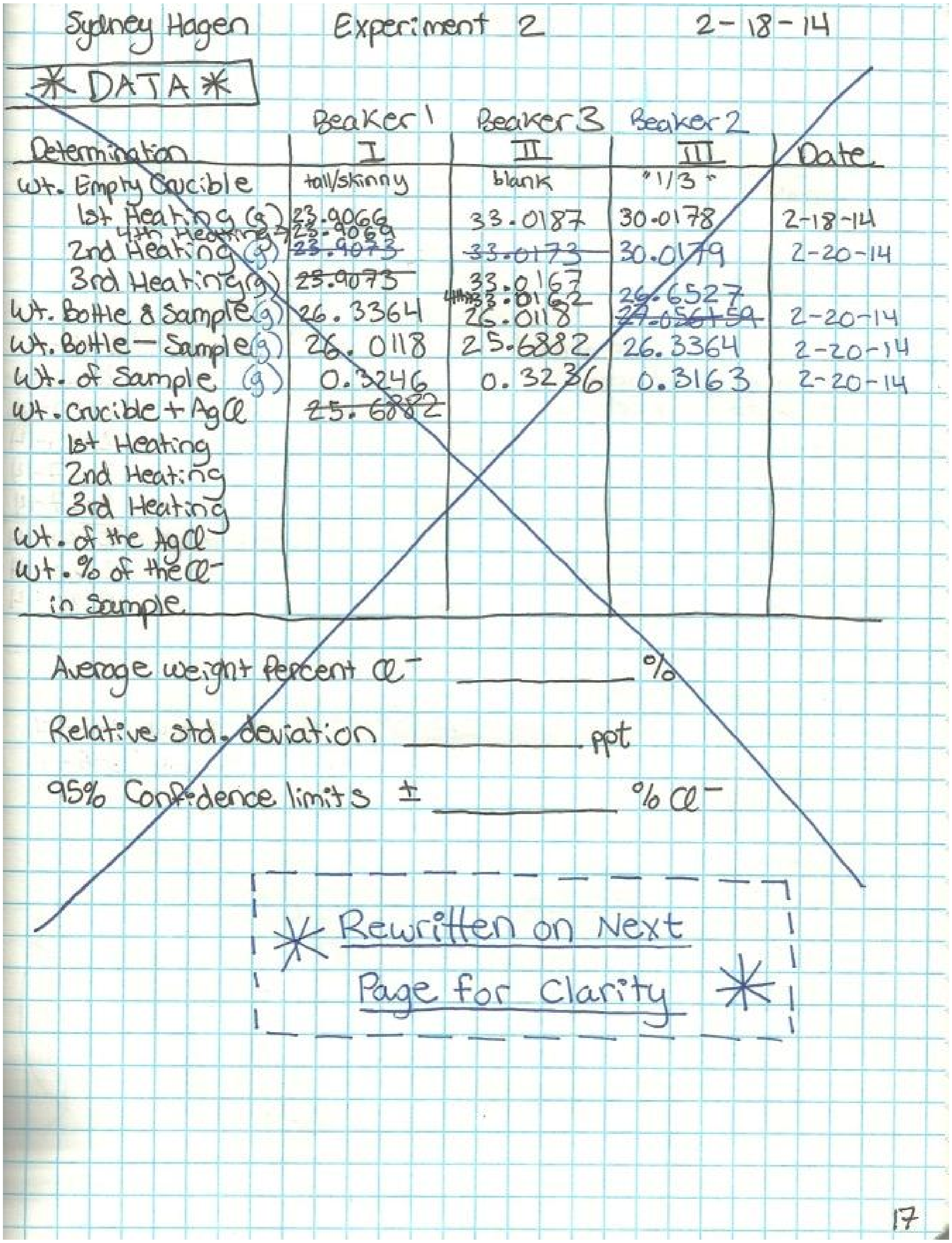
Trial #	I	II	III	IV
Date of Work	4-17-14	4-17-14	7-17-14	
weight of bottle w/ unknown (g)	29.0859	28.5919	28.1750	27.7555
weight of bottle less unknown (g)	29.5918	28.1754	~~27.7897~~ 27.7556	27. 3169
weight unknown (g)	0.5059	0.4165	0.4194	0.4386
Final Buret Reading (mL)	46.10	38.21	38.70	~~45.54~~ 40.54
Initial Buret Reading (mL)	0.60	0.01	0.31	0.34
Apparent Volume HCl (mL)	45.50	38.20	~~38.70~~ 38.39	40.20
True Volume HCl (mL)	45.57	38.29	38.48	40.29
mol HCl ~~used~~ consumed				
mol Na_2CO_3 used				
g Na_2CO_3 used	see calculations next page			
Na_2CO_3 % in unknown	44.46%	45.38%	45.30%	45.34%

Average Na_2CO_3 % in unknown: 45.34%

95% C.I.

*See calculations next pages →

Example D) The data table on the left was created without enough extra space to make corrections or notes. It is not worth trying to cram a lot of information onto a single page! Thankfully, there were some extra pages left available for this experiment in the notebook, so the data table was able to be remade on the following page. This time the data table was made leaving extra space for corrections and notes, and the calculations were pushed to the following page so as not to crowd the data table page.



Sydney Hagen Experiment 2 2-18-14

DATA

Determination	Beaker 1 I	Beaker 3 II	Beaker 2 III	Date
Wt. Empty Crucible	tall/skinny	blank	"1/3"	
1st Heating (g)	23.9066	33.0187	30.0178	2-18-14
4th Heating	23.9069			
2nd Heating (g)	~~23.9073~~	~~33.0173~~	30.0179	2-20-14
3rd Heating (g)	~~23.9073~~	33.0167; 4th 33.0162		
Wt. Bottle & Sample (g)	26.3364	26.0118	26.6527 ~~27.056159~~	2-20-14
Wt. Bottle − Sample (g)	26.0118	25.6882	26.3364	2-20-14
Wt. of Sample (g)	0.3246	0.3236	0.3163	2-20-14
Wt. Crucible + AgCl	~~25.6882~~			
1st Heating				
2nd Heating				
3rd Heating				
Wt. of the AgCl				
wt. % of the Cl⁻ in Sample				

Average weight percent Cl⁻ ________ %

Relative std. deviation ________ ppt

95% Confidence limits ± ________ % Cl⁻

Rewritten on Next Page for Clarity

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Continue…

Sydney Hagen Experiment 2 2-25-14

DATA

Determination	Trial I	Trial II	Trial III
Crucible Label	tall/skinny	"1/3"	blank
Beaker Label	"1"	~~1~~ "3"	~~3~~ "2"
Wt. Empty Crucible (g)			
1st heating	23.9066	30.0178	33.0187
2nd heating	23.9073	30.0179	33.0173
3rd heating	23.9073	30.0179	33.0167
4th heating	~~23.9064~~ ~~not cool~~		~~33.0162~~ ~~not cool~~
	23.9077		33.0167
	23.9075		33.0168
Wt. Bottle & Sample (g)	26.3364	26.0118	26.6527
Wt. Bottle − Sample (g)	26.0118	25.6882	26.3364
Wt. of Sample (g)	0.3246	0.3236	0.3163
Wt. Crucible & AgCl (g)	24.6593		
1st heating	~~33.7467~~	30.7635	33.7467
2nd heating	24.6595	30.7632	33.~~7460~~ 7466
3rd heating			~~33.74~~
Wt. of the AgCl (g)	0.7520 ~~0.7518~~	0.7455	0.7301 ~~0.7299~~
Wt. % of the Cl^- in sample	57.31	56.99	57.10

See Calculations on next page