NAME_____ SECTION _____ Dana ID_____ DATE_____

CHM 152L - LAB ASSIGNMENT II

One of the primary goals of CHM152L is developing the ability to critically interpret experimental results. In a few weeks you will start work on the synthesis of an iron salt. After the iron salt is made and purified it will be analyzed to determine the empirical formula during the semester as extensions to other experiments. The synthesis, purification, and analysis of a chemical product are a very common task in industry and research and are usually done by groups or teams. Each member (or members) of the team is assigned a different portion of the task or will verify each other's work. A similar organizational design will be used to analyze the product from experiment C in CHM152L.

Form a group of up to 4 students according to lab benches. Work as a group to solve the following problem and answer the questions posed below. It is assumed that every student can do these types of calculations and manipulations so review them!

List Names of Team Members_____

1. Each group devise and carry out a procedure that provides data or demonstrates to the TA to prove that each member can use a 5 or 10 mL volumetric pipet and read the buret and thermometer. Calibrate the pipettors in your work area using the same procedure used in experiment 1 of CHM151L. Your TA will demonstrate the use of the pipettors. Balances and vials are available. See the "CHM152L Lab Exercise" calibration handout.

2. The objective of this problem is to determine the empirical formula of $Na_x(S_2O_3)_y \cdot zH_2O$. You will need to determine x, y, and z using the following experimentally determined percent by mass results:

% Na^+ = 18.75, 18.71, 19.01
% $S_2O_3^{2-}$ = 45.95, 45.91, 46.10
% H_2O = 34.35, 31.97, 35.91, 34.25

Use unit cancellation (dimensional analysis) for any calculations.

a. Determine the best percent for each component:

b. Do the three percents add up to 100%?

c. Calculate the empirical formula and the molecular mass:

d. Are there any problems with this data? Which component has the best data? Poorest Data? Why? (hint: calculate range and percent range for each)

e. What additional experimental work would you do to get an improved result?

f. What is the percent Na^+ in the compound if 7.330g were found in 50.001g of a sample of the compound:

3. Calculate the following values for NaCl (Use unit cancellation for any calculations):

a. The molecular or formula mass:

b. The moles or mol in 10.000g of the compound:

c. The molarity (M or mol/L) if 10.000g is placed in a 100mL volumetric flask, dissolved in water, and water added to the calibration mark and mixed:

d. The solution from "c" is diluted by pipetting 5.00 mL into a 100mL volumetric flask and water added to the calibration mark and mixed. What is the molarity? (hint use $M_1V_1=M_2V_2$)

e. How many grams of NaCl are there in 10.00 mL of solution from "d" above?

4. **GRAPHING ASSIGNMENT:** Using the Data Acquisition program ("Logger Pro" by Vernier) on a computer in lab make a temperature versus time plot following the suggestions of your TA. Open the program by double click on the icon "Chemistry Applications" on the desktop or go to "Start", "Programs", "Chemistry Applications" and then click on "CHM152L-B Calorimetry". Now modify the graph by changing the scale on each axis so that the graph will provide the best data possible for time and temperature and enter a title (double click on the graph). Save this graph on your "Z" drive, in "My Documents" (can access file in CEFNS computer labs only where Logger Pro is available to open file), or thumb drive and print the file. Close Logger Pro and try reopen the file by clicking on it (see your TA is you have trouble with this). Attach the graph to this sheet and turn it in to the TA.

5. Look up SDS (MSDS) information on 5M NaOH and 3M HCl and list the primary hazards and precautions that need to be taken to used them:

6. **MSDS Tutorial/Quiz (If you did not take CHM151L at NAU complete this):** Go to the web: http://jan.ucc.nau.edu/~jkn/Labs.html
Note that you can check your grades from this web page. See what information is in the CHM152L site such as the syllabus. Click on back to get to the above location. Next, click on safety. Investigate the types of information available on this web site. Click on "Quiz" and take the on-line safety quiz. Complete the entire quiz and print the "Certificate of Achievement" with you name filled in. Turn in the "Certificate of Achievement" to your TA before you leave or at the start of the second lab period.

NAME_____ SECTION_____ DATE_____

Calibration and Technique Check

In CHM152L pipettors and the buret will be used extensively. You will calibrate the 5 mL pipettor (as was done in CHM151L) and the other pipets to insure that you know how to use them and to make sure they are calibrated correctly. You will also read the volume level in a buret to check your technique.

First make sure all your glassware is clean and rinsed with distilled water. To calibrate your volumetric pipets, pipet the volume called for into a preweighed vial. Reweigh the vial to determine the mass of distilled water delivered. Measure the temperature of the water and use the density chart posted in the lab to determine the density of water. Calibrate the pipettors by taring a container to zero and pipetting 5mL (for 5mL pipettor) into the tared container and recording the mass. Repeat twice. Using the density of water in g/mL, convert the mass to a volume. Next read the volume in a buret setup by your TA. Finally if the volume calculated from the mass of water delivered is not within ±0.05 mL of the desired volume check with your TA. Next calibrate the volumetric indicated below if directed to do so by the TA. View the videos on the web for help.

Water temperature_____

5 mL Pipettor (mass in g)	_____	_____	_____
(volume mL)	_____	_____	_____

Read Volume of Buret Setup by TA _____ mL (if setup)

_____

	Volumetric Pipet 10.00 mL	Volumetric Pipet 5.00 mL
Mass Vial (g)	_____	_____
Mass Vial & Water (g)	_____	_____
Mass Water (g)	_____	_____
Temperature (°C)	_____	_____
Density Water (g/mL)	_____	_____
Volume (mL)	_____	_____

Get help from your TA if your volumes are not close to what they should be.