CHM 217: Principles of Chemistry Lab I

Fall 2009
2:00 PM Tuesday
465 Science Hall (pre-lab lecture), 474/476 (laboratory)

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Office Hours Monday 1:30-3:30 PM
              Tuesday 10:00-11:00 AM
              Wednesday 1:30-3:30 PM
              other times by appointment

Required materials
        CHM 217 Lab Manual
        lab notebook (must have sewn binding, not spiral binding)
        goggles
        non-graphing calculator for tests and exams (it must not have keys for the alphabet)
        ink pen for exams and recording in the lab notebook

Course Description
A laboratory course that demonstrates the application of concepts introduced in CHM 211.
2.00 credits. Corequisite or prerequisite: CHM 211.

Grading Policy
lab notebook	150	points
lab reports (including pre- and post-lab questions)*	500	points
midterm	100	points
final exam	200	points
instructor's evaluation of student's performance	50	points
1000		**TOTAL POINTS**

*Your lowest lab report grade of the semester will be dropped. Lab reports will be collected
during the pre-lab lecture. Late reports will not be accepted without a valid excuse. (See the
university policy on excused absences.) The university policy on academic honesty
(http://www.marshall.edu/academic-affairs/Academic Dishonesty Policy.pdf) will be enforced.

Grading Scale   A 900-1000 points
                     B 800-899
                     C 700-799
                     D 600-699
                     F 0-599

The final grading scale may be adjusted in order to lower the point threshold for a letter grade. Any changes will work in the students' favor. If you believe there has been an error in the grading of your work, please consult Dr. McCunn. The *entire* piece of work will be graded again, which may result in a lower or higher grade.

LAB SCHEDULE

Date	Exp. No.	Experiment	Lab report/questions due
8/25	1 part I	Lab check-in & Density of Water	
9/1	1 parts II & III	Density of Sugar Water & Sodas	9/8
9/8	2	Separating Components of a Mixture	9/15
9/15	3	Percent Oxygen in Air	9/22
9/22	4	Determination of Avogadro's Number	9/29
9/29	5	Empirical Formula	10/6
10/6	6	Synthesis of an Alum	
10/13	**midterm**	Synthesis of an Alum continued	10/20
10/20	7	Analysis of Commercial Antacids	10/27
10/27	8	Determination of Water Hardness	11/3
11/3	9	Combustion - Reactions of Oxygen	11/10
11/10	12	Synthesis of an Ester	11/17
11/17	13	Energy of a Peanut	12/1
12/1	lab check-out	**Final Exam**	

SAFETY

The safety rules for the laboratory are outlined in your lab manual. Proper clothing is of the utmost importance. This means that your legs should be covered (wear pants) and bare midriffs are forbidden. Your shoes must completely cover your feet (toes and heels included)!! If your attire is unsafe, I will deduct at least 10 points from your grade and send you to change before entering the lab. Any reckless disregard for safety (horseplay, not wearing goggles, etc.) may result in your dismissal from the lab. Cell phones, MP3 players and similar electronic devices should be turned off while in the lab.

Students with disabilities must contact the Office of Disabled Student Services in Prichard Hall 117, phone 696-2271, to provide documentation of their disability to ensure proper accommodation. Also, please visit http://www.marshall.edu/disabled for additional information.

Title

CHM 217   Name
Date

Please do NOT copy this lab report word for word. These are guidelines for what you should write. Please use your own words! The words in italics are suggestions to keep in mind!

Introduction
In this experiment, the density of water was measured using a beaker, a graduated cylinder and a volumetric pipette. The experimental density values obtained were 1.10, 1.05, and 1.010 g/mL, respectively. The % error was also determined and it was found to be 10%, 5%, and 1.0%, respectively. In addition, the density of aluminum metal, using the water displacement method, was found to be 2.85g/mL. The percent error associated with this determination is 5.6%.
Note: It is best to avoid first-person pronouns such as "I" or "we". Write in the 3rd person. This section is labeled and is concisely written. The results are mentioned and the reason the experiment was conducted was given. Details of the experimental procedure were NOT given and they should NOT be given!

Data
The following data were collected to determine the density of water. (*Pay attention to significant figures. Make sure you include your units. The table should be able to fit on one page. You can change font size, page breaks, row height and column width to achieve this objective!*)

Density of Water Using Different Measuring Devices

Measuring Device	Trial 1 (g/mL)	Trial 2 (g/mL)	Trial 3 (g/mL)	Average (g/mL)	% error
50mL grad cylinder	1.09	0.985	1.07	1.05	*3 sig figs*
250 ml beaker	1.25	1.13	0.910	1.10	*3 sig figs*
Volumetric pipette	1.013	1.010	1.007	1.010	*4 sig figs*

Measurement of the Density of Aluminum *(sample table)*

	Trial 1	Trial 2	Trial 3
Mass (g)			
Final Volume (mL)			
Initial Volume (mL)			
Volume of Metal (mL)			
Density (g/mL)			
% error			
Average Density (g/mL)		Not applicable	Not applicable

(notice units are indicated)

Sample Calculations:
*The calculations may be neatly handwritten in **ink** if you do not wish to type them*
density = m/V   d= 201.1g / 200 mL = 1.01 g/mL for beaker
Do this sample calculation for each of measuring devices!

% error = (observed density − 1.000 g/mL) / 1.000 g/mL × 100%
% error = (1.010 – 1.000)/1.000 × 100% = 1.0%
(use the absolute value so the % error is positive)
Also, for the second part of the experiment, you would include a sample calculation for density of aluminum metal and the % error calculation for that part of the experiment.

Results and Discussion
In paragraph form, discuss the accuracy of your calculated water density value compared to the accepted value. Use % error results to determine accuracy. Was the % error smaller for the graduated cylinder measurement or for the trials using a beaker? Are beakers well suited for measuring volume accurately? What type of measuring device is the most accurate?
Discuss the density of aluminum that you determined in lab. Compare your experimental density value with the known value. Discuss how you could improve this experiment. How could you collect more accurate data?

Pre-lab Questions:
Type or neatly write in ink. Show your math and formulas that you use to calculate the answer.
No credit will be given for answers without showing how you obtained that answer. *Write down the mathematical process you went through to obtain the answer, including units, so that I can follow your thought process. If it is a question that requires an explanation, then explain your answer using complete sentences and good grammar.*

Post-lab questions: *The same rules apply as listed for pre-lab questions.*

COPYING A FRIEND'S LAB REPORT IS ACADEMIC DISHONESTY!