

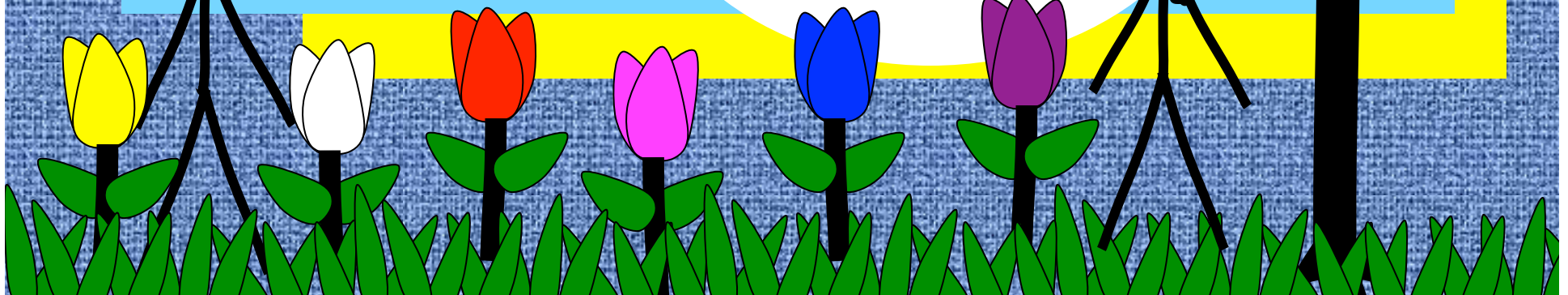
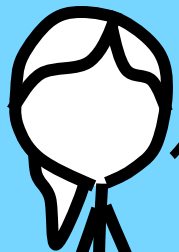
First Week Orientation to Lab 16 January 2020

*I can see
the beach!*

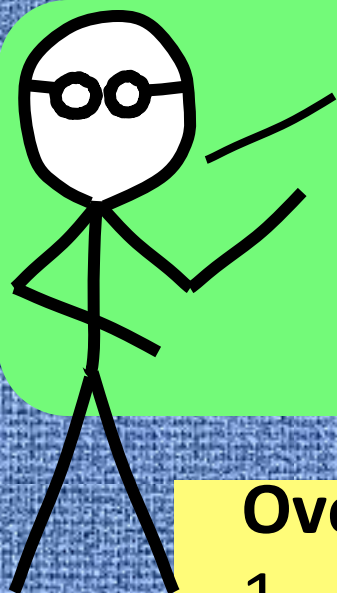


*Welcome to Dr.
M's lab, new
people! Welcome
back returning
peeps.*

*We are bringing you
this intro from our
imaginary winter get-
away where flowers are
blooming and the sun is
shining – and it's warm.*



Objectives: Become familiar with the format of Chm 206 and what is required.



What do we do in lab and... how is our lab similar and different from some of the other sections?

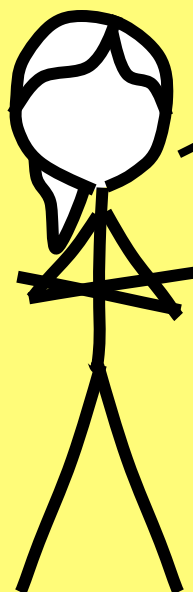
In this orientation, we will cover these topics:



Overview:

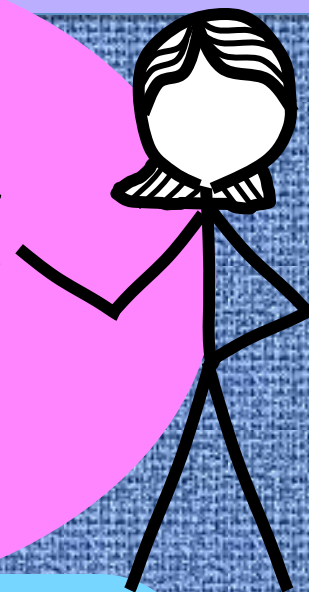
1. Syllabus, website, lab station, lab partner
2. Format of weekly lab experience
3. Safety orientation
4. Laptop, Excel, LoggerPro
5. Your work product (what you do/turn in)
6. For next week...

1. Syllabus, website, lab station, lab partner

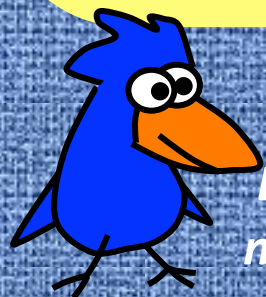
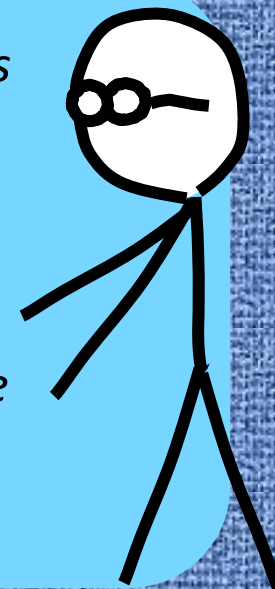


The syllabus covers everything you need to know about the course, Chm 206. It provides the weekly schedule, lab reports, grading, quizzes, as well as unusual situations – such as not having a lab partner or missing lab.

There is a quiz every week at the start of lab. The quiz next week will be about the syllabus – and on the pre-lab presentation for Experiment 1!



The pre-lab presentations are available from Dr Mattson's Chm 206 website. Study it before lab. Four out of the 10 questions will be over the presentation. Keep it so you can refer to it later.



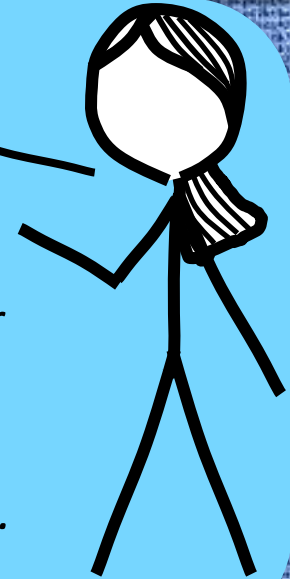
Link to the lab website from mattson.creighton.edu. Click Chm 206. Bookmark it!

1. Syllabus, website, lab station, lab partner

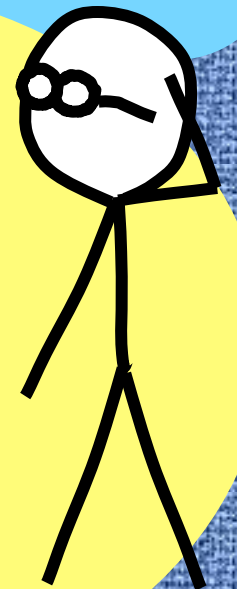


Your lab partner is your most important lab accessory. You will do all of experiments with your partner. You and your lab partner will turn in individual lab reports, but will turn in one set of on-line results. Exchange phone numbers. Wake each other up.

If your lab partner is absent, notify Dr. Mattson and you will be re-assigned for the day. Joining the other two people at your station is not automatically allowed.

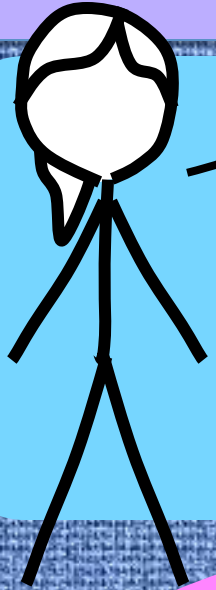


If you are going to be absent, tell your lab partner and Dr. Mattson as early as possible so arrangements can be made.



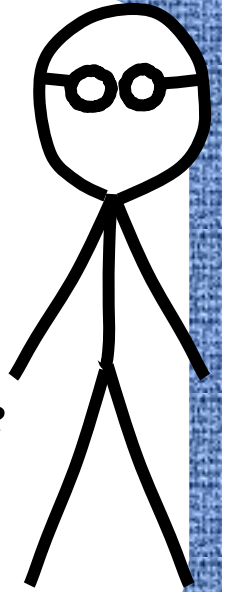
Be kind to your lab partner.

2. Format of weekly lab experience



So every teacher is different and has slightly different requirements. For example, we submit some results on-line.

In our section, you should bring your laptop every week. You will use your laptop to refer to the pre-lab presentation during the lab, and to collect data and make graphs.



Read and follow the safety rules in the lab manual. Usually we wear long pants, closed toe shoes and safety glasses. We call this "Dress for a mess." In the weekly introduction, we will tell you if you should plan to dress for a mess – or not.

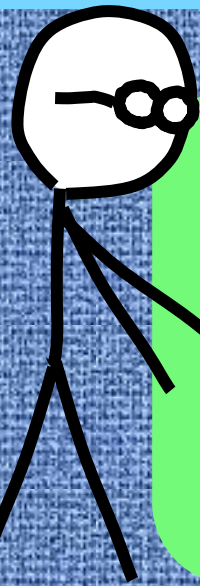


*I like the sun...
A lot.*

2. Format of weekly lab experience



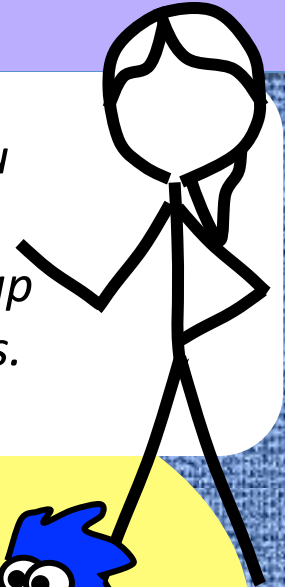
Each experiment is worth 50 points, of which 10 points come from the quiz. The quiz starts promptly at 8 AM or 11 AM and lasts usually 10 minutes. Spend 30 or more minutes with the pre-lab presentation before the quiz. Use it to write your introduction before the lab starts.



After the quizzes are collected, things go like this:

- 1. Introduction by Dr. Mattson (<5 minutes)*
- 2. Perform the experiment (60 – 90 minutes)*
- 3. Submit on-line results (15 min, but not every week)*
- 4. Clean up your area and put stuff back.*
- 5. Finish your lab report and turn it in as instructed.*

Don't be late or you will miss the quiz. There are no make-up quizzes or late-takes.



Arrange to call your lab partner 30 minutes before lab.



2. Format of weekly lab experience

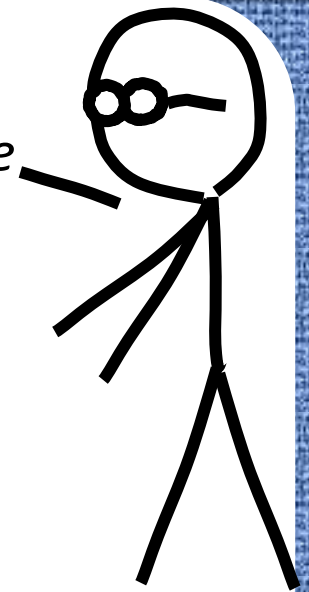


There are a few things that should be part of who you are, but let's talk about them, just so we know what they are.

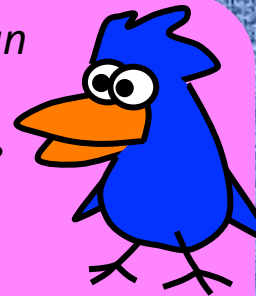


Your writing should be your own. This applies to the introduction and the conclusion. And sources of error if there are any. Discussing what to write with your partner is fine, but don't copy what they wrote. Write it in your own words.

Ethical behavior is imperative. CU people and all good people behave ethically. We do nothing to hurt others or to unjustly improve our own results.



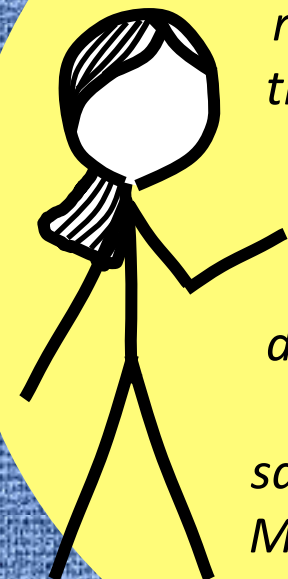
For example, suppose you had an 8% error but knew that if we fudged a bit, we could improve that. But doing so would be unethical. Instead, maybe you could repeat the experiment or live with the 8% error.



3. Safety orientation



Today Dr. Mattson and the TAs will show you the safety features of the lab.



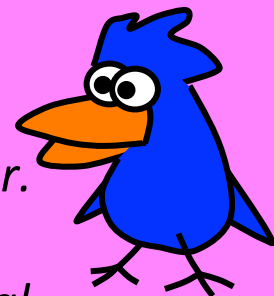
Regarding personal safety, read the Safety section in the Lab Manual. It covers attire (clothing), lab etiquette, chemical and glassware safety and disposal of materials. We almost always keep our safety glasses on unless Dr. Mattson announces we can take them off.

The Safety tour includes:

- 1. Fire extinguisher (2)*
- 2. Doors (4)*
- 3. Eye washes (3) and sinks*
- 4. Safety shower (1)*



Not mentioned: If you break glassware, do not pick it up yourself. Immediately ask a TA or Dr. Mattson for help. Ask about cleaning up chemical spills before doing so.



4. Laptop, Excel, LoggerPro

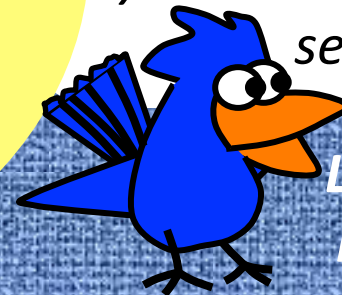
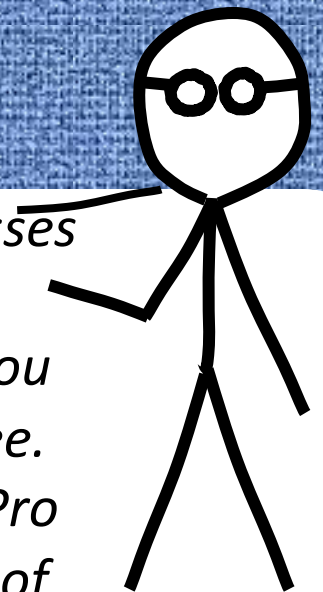


We will learn how to use Excel. You can get a free copy of Microsoft Office just by being a Creighton student. Get your copy today!



Generally, lab reports are due the day after lab at the start of lecture. That way you can think about your conclusions a bit more carefully. And check your calculations and so on...

The lab manual discusses LoggerPro, a data collection program you can download for free. We will need LoggerPro this semester. Most of you still have it from last semester.

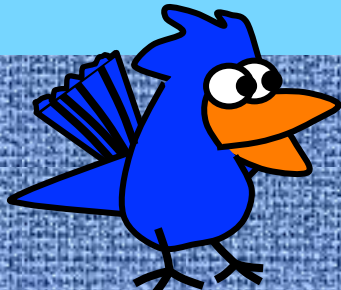


LoggerPro is a hoot!

5. Your work product (what you do/turn in)

Laboratory Report Format

- A. Cover Sheet
- B. Lab report (carbon copy pages)
 - 1. Introduction (written prior to lab.)
 - 2. Experimental Details, Observations, Results, Calculations (in detail, units, significant figures)
 - 3. Conclusions
 - 4. Sources of error
 - 5. On-line results (not every week)
- C. Graphs produced during lab



The cover sheet gives a summary of what is needed

This is the general format for every lab report.



5. Your work product (what you do/turn in)

The lab notebook is a "live notebook" – it is a record of what you did, recorded as you were doing it. Do not take notes on a separate paper and write it later.



Also, fill out the boxes at the top, and sign and date it at the bottom.



Lab notebook page titled "Enthalpy of Neutralization" with student information and handwritten notes. The page includes an introduction, data, a graph, and calculations for moles of solution.

Header: Title: Enthalpy of Neutralization; Student: Tony Peng; Date: 11/14/17

Introduction: In this lab we will be using calorimetry to measure heat released in a chemical reaction (particularly a mixture of a strong base and strong acid). In the net ionic equation of any acid-base reaction, $\text{H}_3\text{O}^+(\text{aq}) + \text{OH}^- \rightarrow 2\text{H}_2\text{O}$

- q - extensive property; heat (J/g deg); depends on st producing heat; measured by calorimeter
- $q = C \times m \times \Delta T$
- $T_{\text{final}} = m \times t + b$ → measured by the exact time solution were mixed → in which we find $\Delta T = T_f - T_i$ with 2.0M $\Delta T > 10$
- Using $n = MV$ we can calculate mol of acid & base
- $\Delta H_{\text{neut}} = q_{\text{rxn}} / n_{\text{LR}}$ → Enthalpy of reaction

Data: 30mL HCl (acid) 2.00M
50mL KOH (base) 0.862M Density = 1.049/g/mL

Graph: Temperature = $mt + b$ RMSE: 0.02849°C
 m (Slope): -0.003653°C/s
 b (Y-intercept): 27.77°C
 Correlation: -0.9989
 Appropriate time used for graph slope: 150 ~ 110 sec

Moles of Solution: $M = n/v$

$\text{HCl} = 2.00\text{M} = \frac{n}{(30\text{mL})}$	$\text{KOH} = 0.862\text{M} = \frac{n}{(50\text{mL})}$
$n = (2.00\text{M})(30.0\text{mL})$	$n = (0.862\text{M})(50.0\text{mL})$
$n = 60.0\text{mmol HCl}$	$n = 43.1\text{mmol KOH}$
$30.0\text{mL} \left(\frac{1\text{L}}{1000\text{mL}} \right) 2.00\text{M} = \frac{n}{0.03\text{L}}$	$0.862\text{M} = \frac{n}{0.05\text{L}}$
$n = (2.00\text{M})(0.03\text{L})$	$n = 0.862\text{M}(0.05\text{L})$
$n = 0.060\text{mol HCl}$	$n = 0.0517\text{mol KOH}$

$\Delta T = T_f - T_i$
 $T_f = 25.2^\circ\text{C}$
 $T_i = 19.2^\circ\text{C}$
 $\Delta T = 6.0^\circ\text{C}$

Footer: Student: Tony Peng; Date: 11/14/17

If you make a mistake like you see here, simply cross it out with a line. Do not scratch it out or erase it.



5. Your work product (what you do/turn in)

Large spaces at the bottom of each page are sometimes X-ed out like you see here.

We mention this because in future lab courses, you may need to follow this "standard practice" for keeping a lab notebook



EXP. NUMBER 11	EXPERIMENT/SUBJECT Enthalpy of Neutralization	DATE 11/16/17	30
NAME Mary Piedad	LAB PARTNER Tony Berg	LOCKER/DESK NO. Table 4B	COURSE & SECTION NO. Chm CC

Sources of Error: None; because the styrofoam cup is not a perfect calorimeter, temperature change may have been influenced by the pores that allowed external air to enter and cool the solution

Conclusion: Overall, this lab reinforced the use of a calorimeter to analyze how much heat was released in the equation. By finding moles we found that KOH was the limiting reagent. Our T_f was 27.4°C based off the linear equation of our graph. Our $T_i = 19.1^\circ\text{C}$, which was the exact temperature when both solutions were mixed. Given that our specific heat was 37 J/g deg and our total mass was 93.8g , our $q = 2900\text{J}$. Because $q_{\text{surr}} = -q_{\text{rxn}}$ $q_{\text{rxn}} = -2900\text{J}$. To find ΔH we divided -2900J by the LR (KOH) and our final value was -56 kJ/mol . The ideal ΔH was roughly -57.6 kJ/mol . Our % error was 2.8% .

$$\frac{56 - 57.6}{57.6} \times 100 = 2.78\%$$

Overall, we found that the base added accelerated the temperature change from T_f and T_i . This indicates the exothermic reaction had weak intermolecular forces. We could see these intermolecular relationships through the graph's steep change and through our $q = cm\Delta T$ equation.

~~_____~~

SIGNATURE Mary Piedad	DATE 11/16/17	WITNESS/TA	DATE
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THE HAYDEN-WEAVER STUDENT LAB NOTEBOOK

NOTE: INSERT DIVIDER UNDER COPY SHEET BEFORE WRITING

5. Your work product (what you do/turn in)

Before you come to lab you should study the pre-lab presentation and write an Introduction that includes the main purpose/objective. This is always stated in Slide 2 of the pre-lab. Include additional information from slides labeled with this yellow alert

Info for Introduction



Name: _____ CHM 204 General Chemistry I Lab
Partner: _____ 18 January 2018
Lab Station: 1 2 3 4 5 6 7 8 9 10 11 12 Experiment 1. Molar Mass of an Unknown Gas
Circle your section: CC (8 AM) or FF (11 AM)
Note: Penalty points apply if incomplete information, rough edges, not stapled

1. General appearance and quality, pre-lab notes 5 pts
For use by the TAs: Was the main purpose/objective correctly stated in the introduction? (Use material from the pre-lab presentation and the lab manual) _____ out of 3
Compared to the other reports you graded this week, how would you rate this report?
In terms of clarity and easy-to-follow details and calculations? Best Good Fair Poor Score: 0.00, 1
In terms of accuracy (good notes, details, observations) Best Good Fair Poor Score: 0.00, 1
Score: _____ out of 5 TA Score: _____ out of 5

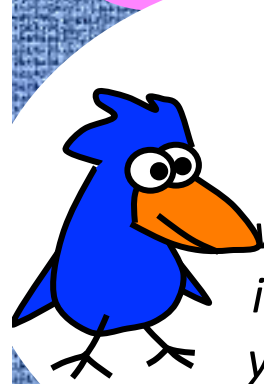
2. Experimental Details, Observations, Calculations, Results 11 pts
A. Record all observations that may be important to the experiment, including things that went wrong. _____ out of 4
B. (4 pts) Show all calculations in complete detail for the values summarized in the yellow columns in the table. (2 pts) What MM did you determine for CO₂? (1 pt) How accurate is your value? _____ out of 5
C. Consider the possible identities of the unknown gas (based on the board in lab). Given that the Avogadro's law method is generally more accurate, what is the identity of your unknown? _____ out of 2

3. Conclusions. Were the major conclusions discussed in a logical manner as they pertained to the experimental results? _____ out of 3
4. Sources of error (See Syllabus)
5. Complete the on-line form before leaving lab today! See lab course website. 21 pts

Questions 1 - 7 pertain to measurements you made in lab:
1. (1 pt) _____ is the mass of the air-free syringe (under vacuum)?
2. (1 pt) _____ is the mass of the CO₂-filled syringe?
3. (1 pt) _____ is the mass of the syringe filled with your unknown gas in Trial 1?
4. (1 pt) _____ is the mass ... your unknown gas in Trial 2?
5. (2 pts) _____ is the volume of the syringe, in mL?
6. (2 pts) _____ is the temperature that you recorded?
7. (1 pt) _____ is the pressure you recorded?
Questions 8 - 11 The MM ... using the ideal gas law.
8. (2 pts) What molar mass, MM, did you calculate for your unknown in Trial 1 using the ideal gas law?
9. (2 pts) _____ is the volume of the syringe, in mL?
10. (2 pts) What AVERAGE molar mass did you calculate for your unknown using the ideal gas law?
11. (1 pt) _____ was your calculated percent error in molar mass using the ideal gas law?
Questions 12 - 15 MM ... using Avogadro's law.
12. (2 pts) What molar mass, MM, did you calculate for your unknown in Trial 1 using Avogadro's law?
13. (1 pt) What MM ... Trial 2 using Avogadro's law?
14. (2 pts) What AVERAGE molar mass did you calculate for your unknown using Avogadro's law?
15. (1 pt) _____ was your calculated percent error in molar mass using Avogadro's law?

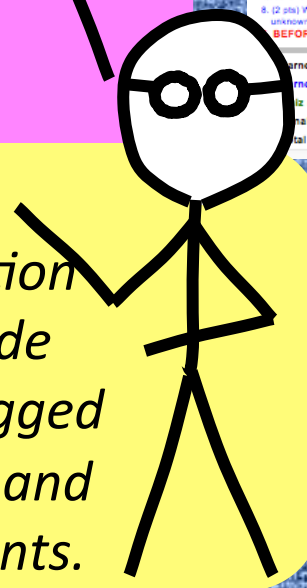
BEFORE YOU LEAVE: TA initials indicating that your station is clean and no penalty points apply: TA: _____

Turned points: Lab report (15) _____ /15
Turned points: On-line data (6) _____ /6
Turned points: Quiz (10 pts) _____ /10
Penalty points: (Reason: _____) _____
Total score: _____ /50



The Intro is carefully read. Don't copy the work of others – including that of your lab partner.

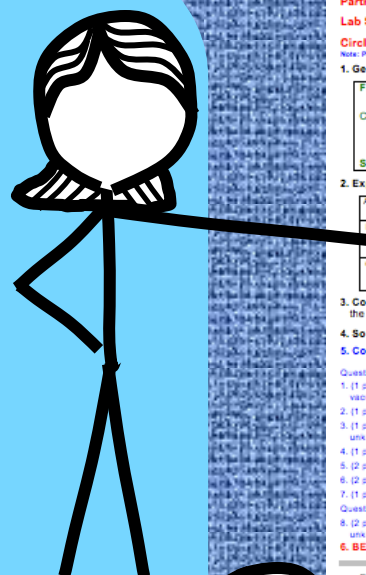
The introduction should include everything flagged in the pre-lab and is worth 3 points.



It's ok to discuss what you are going to write, but always write it yourself.

5. Your work product (what you do/turn in)

In the second part, we provide experimental details, observations, calculations, and results. This part varies with every experiment. Make sure you've done everything mentioned. If calculations are called for, carefully show your work, using proper units and significant figures.



Name: _____ CHM 204 General Chemistry I Lab
Partner: _____ 18 January 2018
Lab Station: 1 2 3 4 5 6 7 8 9 10 11 12 Experiment 1. Molar Mass of an Unknown Gas
Circle your section: CC (8 AM) or FF (11 AM)
Note: Penalty points apply if incomplete information, rough edges, not stapled

1. General appearance and quality, pre-lab notes 5 pts

For use by the TAs: Was the main purpose/objective correctly stated in the introduction? (Use material from the pre-lab presentation and the lab manual) _____ out of 3
Compared to the other reports you graded this week, how would you rate this report?
In terms of clarity and easy-to-follow details and calculations? Best Good Fair Poor Score: 0.00, 1
In terms of thoroughness (good notes, details, observations) Best Good Fair Poor Score: 0.00, 1
Score: _____ out of 5
TA Score: _____ out of 5

2. Experimental Details, Observations, Calculations, Results 11 pts

A. Record all observations that may be important to the experiment, including things that went wrong. _____ out of 4

B. (4 pts) Show all calculations in complete detail for the values summarized in the yellow columns in the table. (2 pts) What MM did you determine for CO₂? (1 pt) How accurate is your value? _____ out of 5

C. Consider the possible identities of the unknown gas (based on the board in lab). Given that the Avogadro's law method is generally more accurate, what is the identity of your unknown? _____ out of 2

3. Conclusions. Were the major conclusions discussed in a logical manner as they pertained to the experimental results? _____ out of 3

4. Sources of error (See Syllabus)

5. Complete the on-line form before leaving lab today! See lab course website. 21 pts

Questions 1 - 7 pertain to measurements you made in lab:
1. (1 pt) What is the mass of the air-free syringe (under vacuum)?
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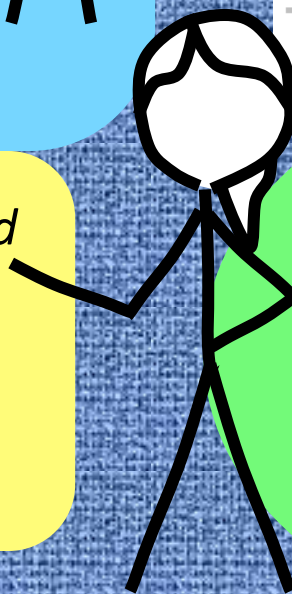
6. BEFORE YOU LEAVE: TA initials indicating that your station is clean and no penalty points

Earned points: Lab report (19 pts)
Earned points: On-line data: (21 pts)
Quiz score (10 pts)
Penalty points: (Reason: _____)
Total score: _____



Double-check each other with reading volume. They are easy to mess up.

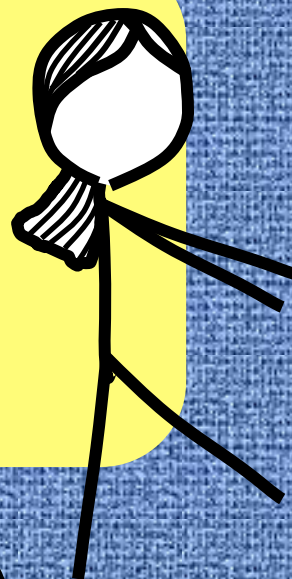
Make sure you and your lab partner agree on all measured and calculated values.



Regarding Experimental Details, you can write "We followed the procedure in the lab manual" unless we or you made changes, of course.

5. Your work product (what you do/turn in)

Then we have conclusions and sources of error. Spend time writing the conclusions. It's here we write about what we now know from our hard work. Discuss conclusions with your partner, but write it yourself.



Name: _____ CHM 204 General Chemistry I Lab
Partner: _____ 18 January 2018
Lab Station: 1 2 3 4 5 6 7 8 9 10 11 12 Experiment 1. Molar Mass of an Unknown Gas
Circle your section: CC (8 AM) or FF (11 AM)
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1. General appearance and quality, pre-lab notes 5 pts

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Compared to the other reports you graded this week, how would you rate this report?
In terms of clarity and easy-to-follow details and calculations? Best Good Fair Poor Score: 0.00, 1
Sources of error noted (good notes, details, observations) Best Good Fair Poor Score: 0.00, 1
Score: _____ out of 5
TA Score: _____ out of 5

2. Experimental Details, Observations, Calculations, Results 11 pts

A. Record all observations that may be important to the experiment, including things that went wrong. _____ out of 4

B. (4 pts) Show all calculations in complete detail for the values summarized in the yellow columns in the table. (2 pts) What MM did you determine for CO₂? (1 pt) How accurate is your value? _____ out of 5

C. Consider the possible identities of the unknown gas (based on the board in lab). Given that the Avogadro's law method is generally more accurate, what is the identity of your unknown? _____ out of 2

3. Conclusions. Were the major conclusions discussed in a logical manner as they pertained to the experimental results? _____ out of 3

4. Sources of error (See Syllabus) _____

5. Complete the on-line form before leaving lab today! See lab course website. 21 pts

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2. (1 pt) _____ is the mass of the CO₂-filled syringe? _____

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4. (1 pt) _____ is the mass ... your unknown gas in Trial 2? _____

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6. (2 pts) _____ is the temperature that you recorded? _____

7. (1 pt) _____ is the pressure you recorded? _____

Questions 8 - 11 The MM ... using the ideal gas law.

8. (2 pts) What molar mass, MM, did you calculate for your unknown in Trial 1 using the ideal gas law? _____

9. (2 pts) _____ was your calculated percent error in molar mass using Avogadro's law? _____

10. (2 pts) What AVERAGE molar mass did you calculate for your unknown using the ideal gas law? _____

11. (1 pt) _____ was your calculated percent error in molar mass using the ideal gas law? _____

Questions 12 - 15 MM ... using Avogadro's law.

12. (2 pts) What molar mass, MM, did you calculate for your unknown in Trial 1 using Avogadro's law? _____

13. (1 pt) What MM ... Trial 2 using Avogadro's law? _____

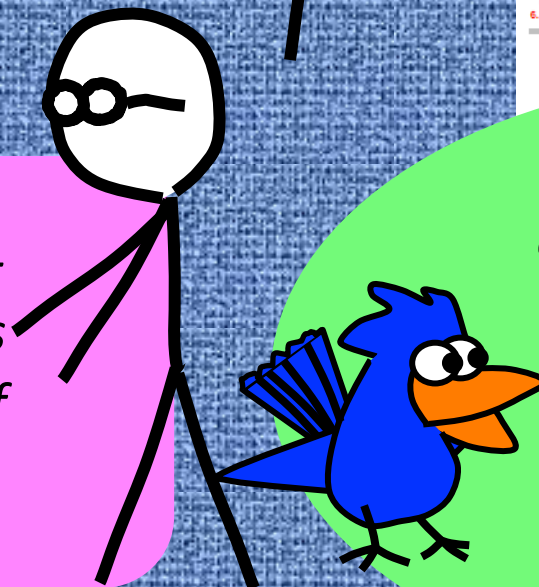
14. (2 pts) What AVERAGE molar mass did you calculate for your unknown using Avogadro's law? _____

15. (1 pt) _____ was your calculated percent error in molar mass using Avogadro's law? _____

6. BEFORE YOU LEAVE: TA initials indicating that your station is clean and no penalty points apply: TA: _____

Earned points: Lab report (19 pts) _____ /19
Earned points: On-line data: (21 pts) _____ /21
Quiz score (10 pts) _____ /10
Pre-lab _____ /50

So with sources of error... sometimes – usually even – everything just works. It is ok to write, “None noted” if that’s the case. We’ll visit this topic again a bit later.



If there was a source of error that you noted along the way, discuss this with Dr. Mattson. In many cases you can just do it over. Experiments this semester are shorter.

5. Your work product (what you do/turn in)

The on-line portion allows Dr. Mattson to check your calculations. Most of the experiments this semester involve submitting results on-line. You and your lab partner normally submit only one set. Enter the data carefully and read the questions carefully. In addition, you will be graded for significant figures and units

Name: _____ CHM 204 General Chemistry I Lab
Partner: _____ 18 January 2018
Lab Station: 1 2 3 4 5 6 7 8 9 10 11 12 Experiment 1. Molar Mass of an Unknown Gas
Circle your section: CC (8 AM) or FF (11 AM)
Note: Penalty points apply if incomplete information, rough edges, not stapled

1. General appearance and quality, pre-lab notes 5 pts
For use by the TAs: Was the main purpose/objective correctly stated in the introduction? (Use material from the pre-lab presentation and the lab manual) _____ out of 3
Compared to the other reports you graded this week, how would you rate this report?
In terms of clarity and easy-to-follow details and calculations? Best Good Fair Poor Score: 0.00, 1
In terms of accuracy of good notes, details, observations, etc. Best Good Fair Poor Score: 0.00, 1
Score: _____ out of 5 TA Score: _____ out of 5

2. Experimental Details, Observations, Calculations, Results 11 pts
A. Record all observations that may be important to the experiment, including things that went wrong. _____ out of 4
B. (4 pts) Show all calculations in complete detail for the values summarized in the yellow columns in the table. (2 pts) What MM did you determine for CO₂? (1 pt) How accurate is your value? _____ out of 5
C. Consider the possible identities of the unknown gas (based on the board in lab). Given that the Avogadro's law method is generally more accurate, what is the identity of your unknown? _____ out of 2

3. Conclusions. Were the major conclusions discussed in a logical manner as they pertained to the experimental results? _____ out of 3
4. Sources of error (See Syllabus)
5. Complete the on-line form before leaving lab today! See lab course website. 21 pts

Questions 1 - 7 pertain to measurements you made in lab:
1. (1 pt) _____ is the mass of the air-free syringe (under vacuum)?
2. (1 pt) _____ is the mass of the CO₂-filled syringe?
3. (1 pt) _____ is the mass of the syringe filled with your unknown gas in Trial 1?
4. (1 pt) _____ is the mass ... your unknown gas in Trial 2?
5. (2 pts) _____ is the volume of the syringe, in mL?
6. (2 pts) _____ is the temperature that you recorded?
7. (1 pt) _____ is the pressure you recorded?
Questions 8 - 11 The MM ... using the ideal gas law.
8. (2 pts) What molar mass, MM, did you calculate for your unknown in Trial 1 using the ideal gas law?
9. (2 pts) _____ was your calculated percent error in molar mass using Avogadro's law?
10. (2 pts) What AVERAGE molar mass did you calculate for your unknown using the ideal gas law?
11. (1 pt) _____ was your calculated percent error in molar mass using the ideal gas law?
Questions 12 - 15 MM ... using Avogadro's law.
12. (2 pts) What molar mass, MM, did you calculate for your unknown in Trial 1 using Avogadro's law?
13. (1 pt) What MM ... Trial 2 using Avogadro's law?
14. (2 pts) What AVERAGE molar mass did you calculate for your unknown using Avogadro's law?
15. (1 pt) _____ was your calculated percent error in molar mass using Avogadro's law?

6. BEFORE YOU LEAVE: TA initials indicating that your station is clean and no penalty points apply: TA: _____

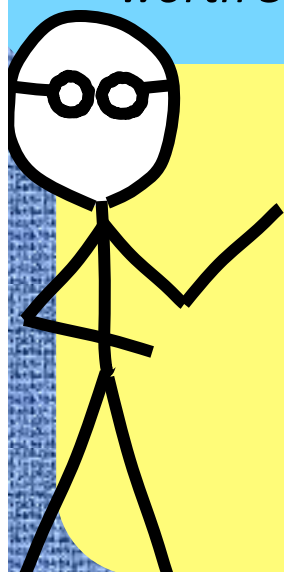
Earned points: Lab report (19 pts) _____ /19
Earned points: On-line data: (21 pts) _____ /21
Quiz score (10 pts) _____ /10
Penalty points: (Reason: _____) _____
Total score: _____ /50

On-line results can be worth quite a few points. Enter data together, double-checking what is being entered.

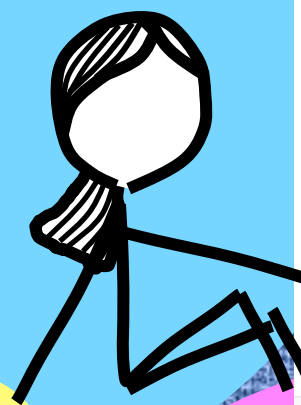
If you mess up, you can enter everything again. Dr. Mattson uses the most recent data set received before the deadline (end of the lab period)

5. Your work product (what you do/turn in)

After you are done, clean up your station. Dispose of chemical wastes as instructed. Wash all glassware, rinse with distilled water, and set to dry on paper towels. Wipe down your bench top. It should look great for the next group. Call your TA over and she/he will sign you out. This signature is worth 5 points! Don't leave without it.



You can turn in your lab report the same day, or prior to the start of class tomorrow. Some weeks you have to turn it in the same day.



Name: _____ CHM 204 General Chemistry I Lab
Partner: _____ 18 January 2018
Lab Station: 1 2 3 4 5 6 7 8 9 10 11 12 Experiment 1. Molar Mass of an Unknown Gas
Circle your section: CC (8 AM) or FF (11 AM)
Note: Penalty points apply if incomplete information, rough edges, not stapled

1. General appearance and quality, pre-lab notes 5 pts

For use by the TAs: Was the main purpose/objective correctly stated in the introduction? (Use material from the pre-lab presentation and the lab manual) _____ out of 3
Compared to the other reports you graded this week, how would you rate this report?
In terms of clarity and easy-to-follow details and calculations? Best Good Fair Poor Score: 0, 0.5, 1
In terms of thoroughness (good notes, details, observations) Best Good Fair Poor Score: 0, 0.5, 1
Score: _____ out of 5
TA Score: _____ out of 5

2. Experimental Details, Observations, Calculations, Results 11 pts

A. Record all observations that may be important to the experiment, including things that went wrong. _____ out of 4
B. (4 pts) Show all calculations in complete detail for the values summarized in the yellow columns in the table. (2 pts) What MM did you determine for CO₂? (1 pt) How accurate is your value? _____ out of 5
C. Consider the possible identities of the unknown gas (based on the board in lab). Given that the Avogadro's law method is generally more accurate, what is the identity of your unknown? _____ out of 2

3. Conclusions. Were the major conclusions discussed in a logical manner as they pertained to the experimental results? _____ out of 3

4. Sources of error (See Syllabus) 21 pts

6. BEFORE YOU LEAVE: TA initials indicating that your station is clean and no penalty points apply: TA: _____

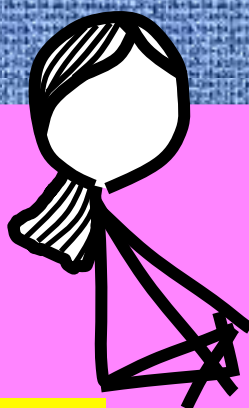
Earned points: Lab report (19 pts)	_____ /19
Earned points: On-line date: (21 pts)	_____ /21
Quiz score (10 pts)	_____ /10
Penalty points: (Reason: _____)	_____
Total score:	_____ /50

Oh, one more thing about on-line results... If you submit on-line results as an individual, they will be graded just for you, separate from your lab partner. This is always a choice you have.

6. For next week... Experiment 1



Download and study the lab presentation before coming to lab. The quiz will include four questions about the pre-lab presentation.



Lab starts right on time with a quiz. Special attire and is not necessary next week.

Stick people inspired by xkcd cartoons by Randall Munroe (www.xkcd.com)



Experiment 1
23 January 2020
Colligative Properties

I can see the beach!

Welcome to Dr. M's lab, new people! Welcome back returning peeps.

We are bringing this intro to you from our winter get-away in the tropics, somewhere. We'll be back on location in Omaha next week.

The quiz next week also includes 6 questions over Chm 205/206 syllabus.



Chem Lab with the Stick People and Bird was created and produced by Dr. Bruce Mattson, Creighton Chemistry. Enjoy it and share it if you wish.