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Chemistry 223



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College



化学

Chemistry 223



How To Contact Me: (listed on syllabus)

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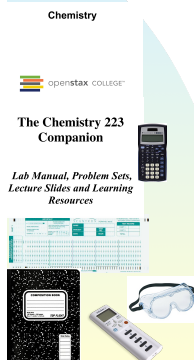
office hours: M 8 AM, 10 AM & 11 AM and

W 10 AM & noon

Introduce Yourself! Let me know who you are!



What Do I Need For CH 223?



- A Textbook (*OpenStax*, free download, also as app "OpenStax + SE")
- *The Chemistry 223 Companion* (Bookstore or website)
- 4-5 Scantrons (100 questions total, 50 questions per side)
- Scientific Calculator (Exp or EE, log, ln), no cell phones as calculators
- Bound Lab Notebook
- Safety Glasses for select labs
- iClicker 2 (optional, for lecture)

What Is In the Companion?

- All of the CH 223 Lab Experiments
- All of the CH 223 Problem Sets
- Lecture ("PowerPoint") Notes
- A plethora of Study Guides including Handouts, Concept Guides, Practice Problem Sets and Quizzes - more!
- Purchase from MHCC Bookstore or Download & Print from CH 223 website (mhchem.org/223)

The Chemistry 223
Companion

Lab Manual, Problem Sets,
Lecture Slides and Learning
Resources

Registering an iClicker

- Go to iClicker.com/register-a-remote
- Select iClicker Classic (formerly iClicker 7) and My institution does not use an LMS
- Press **Click here** then follow the instructions using your MHCC ID for the "Student ID" field
- Ask me if questions arise! See: <http://mhchem.org/ic>

"Normal" Lab Period

- * Turn in last week's lab
 - * Put problem on chalk board, get stamp, self correct problem set, then turn in - use "check" system for grade, problem sets in Companion
 - * Take a quiz - no make up quizzes, drop lowest quiz, no cell phones as calculators
- Complete lab in AC 2507, get stamp**
- Exams - two midterms, need scantrons, no problem sets or quizzes**
- Sick? Must call and complete within one week**



The Problem Sets

Problem sets found in the CH 221 Companion... complete problem set before coming to class

- **First:** put a problem on the chalk board
- **Second:** get a stamp from me (on time!)
- **Next:** self-correct each problem set problem (both right and wrong), then turn it in
- **Check plus = 5 points, check = 3 points, check minus = 1 point**



Common self-correct symbols for correct problems

The Labs (AC 2507)

Labs in CH 223 Companion, need bound lab notebook, safety glasses

Notebook: Have me stamp before leaving lab; notebook reviewed for completeness by me at end of term

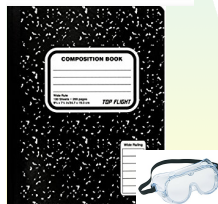
Lab reports: due the following week in recitation; most must be typed to avoid point penalty. No email submissions of labs.

Late labs: one point off by end of next day, one point each day thereafter

Turn in all 8 labs, receive Lab Completion Bonus (20 pts) at end of term

The Chemistry 223 Companion

Lab Manual, Problem Sets, Lecture Slides and Learning Resources



Key Items:

Title
Your Name
Partner(s) name(s)
Purpose
Data / Results
Conclusion
Postlab questions

No procedure required

Use individual flair

Ask me to preview during first week

Labs must be printed (no electronic versions accepted)

Identification of an Unknown Metal Density

Michael A. Russell
Lab Partner: Jovita Shepa
September 26, 2018

Purpose: Why you are performing the experiment

We wish to identify the unknown density value (in grams / cm³) for unknown metal sample X. We will perform multiple measurements on unknown sample X in order to determine its correct value with high precision.

Data / Results: Include all information to answer the purpose

Unknown metal: X. Always include the unknown identifier! Include all data values collected in lab (grams, mL, temperatures, etc.). Tables are wonderful!

	mass (g)	volume (cm ³)	density (g/cm ³)
trial #1	32.334	11.92	2.713
trial #2	32.332	11.90	2.717
trial #3	32.321	11.93	2.709

example calculation: 32.334 g / 11.92 cm³ = 2.713 g/cm³
include sample calculation(s) in your lab report

average density: 2.713 g/cm³
average deviation: 0.003
parts per thousand: 1.1

Conclusion: Answer the question presented in the Purpose

We successfully determined the density of unknown metal X to be 2.713 g/cm³. Our measurements included a high level of precision due to our parts per thousand value of 1.1.

Post-Lab Questions: Complete sentences, show all calculations for full credit

1. Objects that are dipped in water will have an increase in their recorded mass.
2. An analytical scale will record masses with a greater precision than a top loading balance.
3. To find the mass of the object, subtract the empty beaker mass first.
114.131 g - 32.363 g = 81.768 g

This example is in the Companion under "Lab Notes"

Class Presentations

Topic: Something in Science That Interests You

Everyone: 5 minute presentation and paper on a unique topic

Step 1: Reserve a unique topic (Week 2 - next Friday!)

Step 2: Class Presentations Rough Draft Paper (Week 4)

Step 3: Give Class Presentation, submit final Class Presentation Paper (week 6)

More info: Class Presentations FAQ (syllabus and online)



The Web Site: <http://mhchem.org/223>

Access in libraries, coffee shops, at MHCC, wherever

Resources: Answers to quizzes, Web Lectures, Chemistry Links, Handouts, Labs, Announcements, extra credit, syllabus, Web Quests, much more - Explore!

Grades posted after second week (use ID number)



I Need Help!

Tutoring center (LSC/AVID)
above library, also online

Office Hours

(M 8, 10 & 11 W 10 AM & noon)

Email mike.russell@mhcc.edu

Phone messages

Post questions to mhchem

Talk to me if feeling stressed!



Determination of an Equilibrium Constant



$$K_c = \frac{[\text{FeSCN}^{2+}]}{[\text{Fe}^{3+}][\text{SCN}^-]}$$

Goal is to find K_c in this lab
Use Beer-Lambert Law and a Spec 21
or SpectroVis Plus:

$$A = \epsilon bc = \log(100\% / \%T)$$



Determination of an Equilibrium Constant

The Beer-Lambert Law:

$$A = \epsilon bc = \log(100\% / \%T)$$

A = Absorbance (unitless)

ϵ = molar absorptivity ($M^{-1} \text{ cm}^{-1}$)

b = path length (1.00 cm)

c = concentration of FeSCN^{2+} (M)

T = transmittance (unitless)

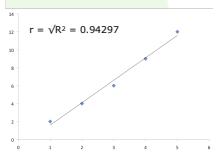
Record %T on Spec 21, convert to A
wavelength = 450 nm for this lab, or
use SpectroVis Plus



Determination of an Equilibrium Constant

Part A: Determine ϵ

- Use $[\text{Fe}^{3+}] \gg [\text{SCN}^-]$, so by "limiting reactant theory", $[\text{SCN}^-] = [\text{FeSCN}^{2+}]$
- Create graph of Absorbance vs. $[\text{FeSCN}^{2+}]$, should be straight line
- Perform linear regression using Excel / calculator, report a (slope), b (y-int), r (correlation coefficient)
- Slope = ϵ for part B



Determination of an Equilibrium Constant

Part B: Determine K_c

Use ϵ from part A, find $[\text{FeSCN}^{2+}]$ for five solutions, then use "ICE" table:

	$[\text{Fe}^{3+}]$	$[\text{SCN}^-]$	$[\text{FeSCN}^{2+}]$
initial	$[\text{Fe}^{3+}]_0$	$[\text{SCN}^-]_0$	0
change	-x	-x	+x
equilibrium	$[\text{Fe}^{3+}]_0 - x$	$[\text{SCN}^-]_0 - x$	x

$$K_c = \frac{(x)}{([\text{Fe}^{3+}]_0 - x)([\text{SCN}^-]_0 - x)}$$

where $x = [\text{FeSCN}^{2+}]$
and
 $x = A / \epsilon b$

$[\text{Fe}^{3+}]_0$ = initial Fe^{3+}
concentration

$[\text{SCN}^-]_0$ = initial SCN^-
concentration

Determination of an Equilibrium Constant

Part B: Determine K_c

- Work in groups, get names of lab partner(s)
- Solvent = HNO_3 for this lab
- Acquire five K_c values; average and perform parts per thousand analysis
- Remember graph (part A) and "dilution" rules:

Ex: Find $[\text{SCN}^-]$ if 20.0 mL of 1.50×10^{-4} M KSCN diluted to 25.0 mL.

$$[\text{SCN}^-] = \frac{20.0 \text{ mL} * 1.50 \times 10^{-4} \text{ M}}{25.0 \text{ mL}} = 1.20 \times 10^{-4} \text{ M}$$

Next Week's Assignments

Turn in "Determination of an Equilibrium Constant" lab

Turn in Problem Set #1 (also: Practice Problem Set #1)

Take Quiz #1 (also: Sample Quiz #1)

Reserve Class Presentation topic by next week Friday

Prepare for "Chemical Equilibrium - Le Chatelier's Principle" Lab

See "What's Due This Week" (Syllabus)

...and always... if questions, ASK ME!

