CH 221 Fall 2025: **Problem Set #1** *Instructions*

Step One:

• Learn the material for Problem Set #1 by reading Chapter 1 of the textbook and/or by watching the videos found on the website (https://mhchem.org/221video)

• **Try the problems** for Problem Set #1 found on the next pages on your own first. Write your answers in the space provided or write your answers on separate paper (your choice.) Include your name on your problem set!

Step Two:

Watch the recitation video for Problem Set #1:

http://mhchem.org/1/1

Self correct *all* **of the problems** while viewing the video. Mark correct problems with a star (or other similar mark), and correct all incorrect problems (show the correct answer and the steps required to achieve it.)

Step Three:

Turn the Problem Set in at the beginning of recitation to the instructor on Monday, September 29 (section L1), Tuesday, September 30 (section L2) Wednesday, October 1 (section L3) *or* Friday, October 3 (section L4) The graded problem set will be returned to you the following week during recitation.

Do not include this page to avoid a point penalty; your front page should be page II-1-3.

If you have any questions regarding this assignment, please email (mike.russell@mhcc.edu) the instructor! Good luck on this assignment!

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CH 221 Problem Set #1

<u>Name</u>:

Complete the problem set on your own first using these sheets for your work or separate paper (your choice.) Self correct your work (*all problems!*) using the recitation video for this problem set, found here: http://mhchem.org/1/1

* Covering: Chapter One and Chapter Guide One

* *Important Tables and/or Constants:* 1 cm³ = 1 mL, **273.15** (*temperature*); *know these metric prefixes:* **nano** (10-⁹), **micro** (10-⁶), **milli** (10-³), **centi** (10-²) and **kilo** (10³); also, the **periodic table** found here: http://mhchem.org/pertab

1. Give the **name** or **symbol** of each of the following elements using a periodic table

<u>Symbol</u>	Name	Symbol	<u>Name</u>
Mn			silver
Cu			fluorine
Na			plutonium
Fe			tin
Kr			technetium

- 2. A piece of silver metal has a mass of 2.365 g. If the density of silver is 10.5 g/cm³, what is the volume of the silver in cm³?
- Make the following temperature conversions. Watch significant figures!
 a. 77 K to °C
 - b. 63 °C to K
 - c. 1450 K to °C
 - d. 67.6 °F to °C *Helpful equation:* °F = 1.8*(°C) + 32

- 4. A compact disc has a diameter of 11.8 cm. Calculate the surface area of one side of the disc in square centimeters (cm²) and square meters (m²). (area of a circle = πr^2 where r = radius; ignore the center hole.)
- 5. The separation between carbon atoms in diamond is 0.154 nm. Express this distance in **meters** (**m**) and **micrometers** (**μm**) using correct scientific notation.
- 6. You have a white crystalline solid known to be one of the potassium compounds listed below. To determine which, you measure the solid's density. You measure out 18.82 g and transfer it to a graduated cylinder containing kerosene (which doesn't dissolve the salts.) The liquid level rises from 8.50 mL to 15.30 mL. Calculate the density of the solid and identify the compound from the following list:
 - a. KF, density = 2.48 g/cm^3
 - b. KCl, density = 1.98 g/cm^3
 - c. KBr, density = 2.75 g/cm^3
 - d. KI, density = 3.13 g/cm^3
- 7. Four balloons are each filled with a different gas. If the density of air is 1.12 g/L, which balloon or balloons float in the air?
 - a. He, density = 0.164 g/L
 - b. Ne, density = 0.825 g/L
 - c. Ar, density = 1.633 g/L
 - d. Kr, density = 4.425 g/L
- 8. Carry out the following calculation and report the answer to the correct number of significant figures.

$$(1.68)\left[\frac{23.56 - 2.3}{1.248 \times 10^3}\right]$$

9. Copper has a density of 8.96 g/cm³. An ingot of copper with a mass of 57 kg (126 lb) is drawn into a wire with a diameter of 9.50 mm. What length of wire (in meters) can be produced? [Volume of the wire = πr^2 (length)]

10. Automobile batteries are filled with an aqueous solution of sulfuric acid. What is the mass of acid (in grams) in 500. mL of the battery acid solution if the density of the solution is 1.285 g/cm³ and if the solution is 38.08% sulfuric acid by mass?

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