CHM151AA Name: _____

Date: _____

AP Chemistry: Unit 1 Packet

Introduction – Thinking & Learning as a Community

To the Student:

Welcome to AP Chemistry or dual enrollment CHM 151AA - General Chemistry with Lab! I hope you will find this class to be both challenging as well as educational. Whether you are taking this class as a starting point for a career in science or just taking it as a science requirement, I hope to help you open your eyes to a wide world of chemistry.

This class is taught from an understanding of student learning. I will define student learning as an actual understanding of underlying concepts and not just memorization of random facts or equations. I will strive to give the student the opportunity to make the same logic jumps that were made throughout the history of chemistry. This class will challenge you in ways you may not be familiar with, but will prove to be valuable as you continue to learn in your career and in life.

My goal is to be your guide in this process, responsible for allowing appropriate learning experiences, probing your thoughts, and fostering positive classroom discussion. Your responsibility is to be the active participant in the process, engaging in the work of constructing knowledge. (For more background on science education & research, please visit www.modelinginstruction.org)

Success in this class will rely on the following:

1. **Prerequisites:** Make sure you have a good grasp of basic algebra skills. Most students who are unsuccessful in this class attribute the results to their math skills or lack of prior chemistry knowledge.

2. **Come to class and be ready to work.** This should go without saying, but being physically present in class each day is absolutely necessary. While the textbook and online resources are a supplement to the class, they are not a substitute for the observations and discussions that take place within our learning community. In addition to be being physically present, you need to be actively engaged in what we are doing each day. You don't show up to the gym only to sit around for an hour and expect positive results. Likewise, don't come to class and expect to just "absorb" information. Spend time outside of class working on concepts so you are ready to learn during class time.

3. **Keep up with the work assigned.** The activities, labs and assignments that you will be doing this semester are designed to be done in a certain order at a certain time. If you fall behind on your assignments, you will likely be lost when we start with the next set of material. Waiting until right before a test or a major deadline to get caught up will not be in your best interest.

4. **Get comfortable asking for help.** Chemistry can be challenging because we are observing things at a macroscopic scale, we are trying to understand what happens on the microscopic scale and we use symbolic representations for both of those concepts. if you are not used to moving between these different scales and representational tools, Chemistry can seem confusing at times. I want you to succeed in this class. Reach out to me if you need help. The Natural Science Tutor Center is another great resource for you. Ask your fellow students for help, sometimes the perspective of another student who is new to learning the material is even more helpful than talking to someone who is extremely well versed with the concepts.

5. **Pay close attention to the ideas and concepts in this course.** This course requires both *active participation* and *active listening*. Ask yourself why and how particles work the way they do. This can be both fun and entertaining as we learn!

6. **We use two books one is on line Go to**

   https://openstax.org/details/books/chemistry-atoms-first-2e

   I would download the PDF, throughout this course I will reference this on most assignments and notes

In the following show all work including units to receive any credit.

$$2\ CO + O_2 \text{ -------> } 2CO_2$$

1. Calculate the number moles of oxygen necessary to produce 4.6 moles of carbon dioxide.

2. Calculate the number of grams of carbon monoxide needed to react with 27.4 grams of oxygen.

$$N_2 + 3H_2 \text{ -------> } 2NH_3$$

3. Calculate the volume of nitrogen needed to react with 15.0 L of hydrogen @STP.

4. Calculate the volume of ammonia formed when 32.0 g of hydrogen react @STP.

$$3H_2SO_4 + 2Al(OH)_3 \text{ -----> } 6H_2O + Al_2(SO_4)_3$$

60.0 g of sulfuric acid reacts with 50.0 grams of aluminum hydroxide reacts following the above reaction. In the questions below we will calculate the limiting reactant.

5. Calculate how many grams of water is produced if 60.0 g of sulfuric acid reacts.

6. Calculate how many grams of water is produced if 50.0 grams of aluminum hydroxide reacts.

if 60.0 g of sulfuric acid reacts with 50.0 grams of aluminum hydroxide what is the: (nothing to do look at 5&6)

7. limiting reagent? _____

8. amount of water produced?_____

9. Use you answer to # 8 to figure out how much aluminum sulfate is produced.

10. If 15.0 g of water is produced, what is the percent yield of this reaction?

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Unit 1 - Worksheet 1

Chem 1 Review Practice Problems[1]

Instructions: For mathematical questions, show all work and reasoning used. For conceptual questions, explain all thoughts, reasoning, and evidence!

Review Theme: Matter ("Stuff") and Properties of Matter **(See Openstax *Chemistry* Ch. 1.1 – 1.3 for review!)**

1. As best you can, give a definition of *and* give an example of the following "Matter"-related terms:
   a. Solid

   b. Liquid

   c. Gas

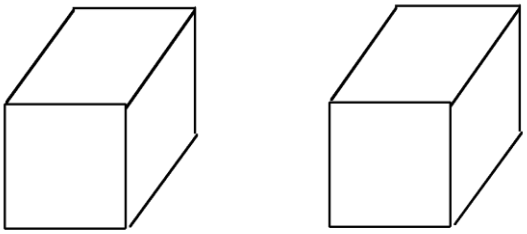
   d. Pure Substance

   e. Mixture

   f. Element

2. Describe the reason(s) why equally sized objects may have different masses.

   Example:



[1] Use our textbook, Openstax Chemistry, Chapter 1 for review and additional end of chapter practice problems!

3. Mickey, a student, made the following statement: "Large objects always have more mass than small objects." Do you agree or disagree with Mickey? Provide evidence to support what you say.

4. Minnie, another student, made this statement: "Objects made of steel or concrete always have more mass than objects made of plastic or Styrofoam." Do you agree or disagree with Minnie? Provide evidence to support what you say; your evidence may include a labeled drawing.

Review: Measurement and Significant Figures Concepts **(See Openstax *Chemistry* Ch. 1.4 – 1.6 for review!)**

5. Measurement of Matter involves quantitative observations that include both a number and units.
   a) Measurements always involve a comparison to a scale. What are the SI units (bases of comparison) for mass, length, and volume?

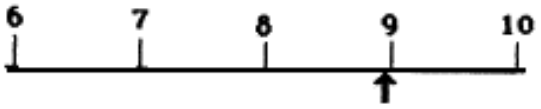
   b) What is meant by the term "uncertainty" in measurement? Why do measurements have "uncertainty"?

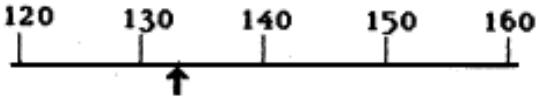
   c) Which number in a measurement is assumed to be uncertain?

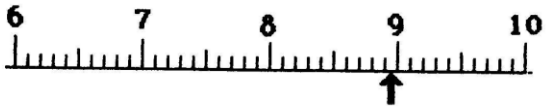
   d) How does the uncertainty or precision of a measurement depend on the device used for the measurement? Explain. (See next page for sample measuring devices if necessary)

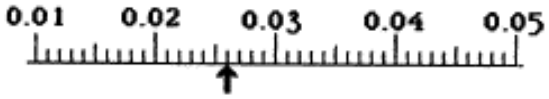
Continued on next page…

6. For each of the following, write the scale reading to the appropriate precision. Then indicate the number of significant figures in your measurement[2]. Assume each scale is in units of centimeters.

a. 

b. 

c. 

d. 

7. For each of the following measurements, identify the estimated digit. Then state how many significant figures are in the measurement. For help, write the number using correct scientific notation

   a. 2900.735 g

   b. 0.0207 s

   c. 380,400 m

   d. 3.80×10^{-4} cm

8. Calculations review: Assuming all numbers are measured quantities, give the answer for each calculation to the correct number of significant figures:

   a. 314.4 + 18.2 + 103.42 =

   b. $\dfrac{7.2 + 3.5 + 4.7 + 2.715}{3.25} =$

   c. 27.445 + 18.02 – 0.8751 =

   d. $\dfrac{(5.608 \times 1.95)}{(19.8 - 18.2)} =$

Review: Unit Conversions (**See Openstax *Chemistry* Ch. 1.6 for review and practice!)**

[2] Helpful Website for Measurement & Sig Fig Review: **http://antoine.frostburg.edu/chem/senese/101/measurement/index**

9. Perform the unit conversion for each of the following measurements. Show all reasoning used (i.e. multiplication and/or division steps used). Round answers to the appropriate number of sig figs.
   a. 1.445×10^4 m to kilometers

   b. 8.4 cm to millimeters

   c. 903 nm to micrometers

   d. 68 ^{o}F (~room temperature) to ^{o}C

   e. 5^{o}C (a cold winter day) to Kelvin

Check your Work!

1. See Openstax Chemistry Ch. 1.2
2. There are actually two possible explanations at the particle level! Try to determine at least one. Visit Academic Support Hours for help if needed.
3. I would disagree! Can you come up with an example from your everyday experience to show why Mickey's statement is false?
4. I would disagree here as well! Can you come up with an example using concrete and Styrofoam to show why Minnie's statement is false?
5. See Openstax Chemistry Ch. 1.4-5
6. See Openstax Chemistry Ch. 1.4-5
7. See Openstax Chemistry Ch. 1.5
8. See Openstax Chemistry Ch. 1.6
9. See Openstax Chemistry Ch. 1.6

CHM151 Course Competencies in Unit 1

During this unit, you will be challenged to improve your ability in the following course competencies (numbered according to the Maricopa County Community College District course competency). While you do not need to turn this in, it is strongly suggested you complete this section as we progress through the unit. Since these are the competencies you are responsible for learning, defining them and providing examples would be a very good idea.

Course Competencies:	**Summary/Notes/Examples:**
1. Define "chemistry" and describe its main branches.	
2. Use the factor-label (dimensional analysis) method in solving chemistry-related problems.	
3. Use metric and SI systems of units.	
4. Define the relationships between matter and energy.	
5. Describe the physical states of matter with the aid of the kinetic molecular theory.	
6. Classify matter as elements, compounds, or mixtures.	
7. Describe the properties of metallic and nonmetallic elements.	
8. Write formulas for and give names of simple inorganic	

compounds.	
12. Determine the empirical and molecular formula from percentage composition or mass data.	
13. Perform calculations using the mole concept of mass and number.	
15. Solve problems involving energy changes that result from physical state changes. ● Focus 1: changes involved in physical state changes ● Focus 2: changes involved in temperature changes	
20. Use the periodic table to predict the properties of elements and compounds.	
21. Identify compounds as electrolytes or nonelectrolytes.	

Name: _____