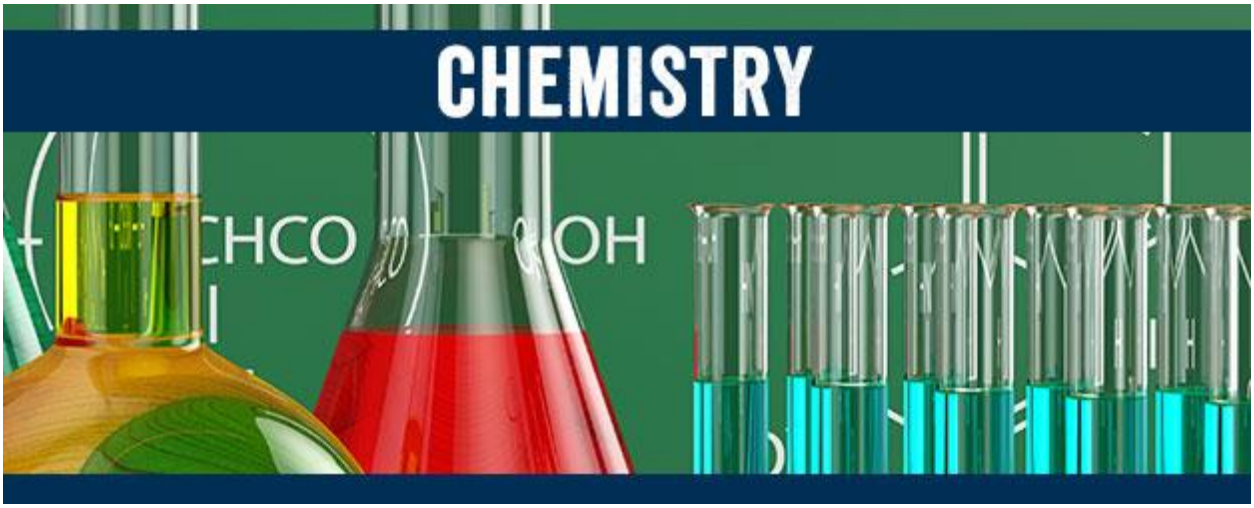
Chemistry R (2016-2017)
Summer Homework Assignment



Hi Everyone,

This assignment will be due on the first day of class and your work will be graded. There will be a quiz on or around our third class meeting, so please make sure you are comfortable with this material. If you need assistance or have any questions, you can email me at rweisman@vths.org. In general, I encourage students to work together and help one another in learning new material. For this reason, I will set up a WhatsApp group to include all of the students in this course. We can use this as a forum for each of you to be able to ask and answer questions and I will be there to assist as well. I look forward to meeting you all in the Fall!

Only and all the best,

Mrs. Weisman

***In order to complete the summer homework, you must have your own copy of our course textbook:

Introductory Chemistry: A Foundation Zumdahl, DeCoste 7th Edition (make sure that it is the 7th edition) 2011 Ed. Brooks/Cole Publishing ISBN-13: 978-0-538-74052-4

Directions: Please read all of the assigned sections in your Chemistry textbook. Define all of the key terms, answer each question to the best of your ability, and show your work.

Chapter 1: (Chemistry: An Introduction)

1) **Read** Sections 1.1 - 1.4
    a. **Define** the following key terms:
        i. Chemistry
        ii. Scientific Method - include all of the steps
        iii. Quantitative observation
        iv. Qualitative observation
        v. Theory
        vi. Natural Law
    b. Discuss how a hypothesis can become a theory. Can a theory become a law? Explain.
        i. What is the difference between a theory and a natural law?
    c. What is the difference between a quantitative observation and a qualitative observation?
        i. Make five qualitative and five quantitative observations about the room in which you now sit.
    d. List four chemical reactions that are part of your everyday life. Explain why they would be considered "chemical reactions".
2) There is no "one way" of doing the scientific method. However, making observations, formulating hypotheses, and performing experiments are generally components of "doing science". Read the following passage:

    "Joyce and Frank are eating raisins and drinking ginger ale. Frank accidentally drops a raisin into his ginger ale. They both notice that the raisin falls to the bottom of the glass. Soon, the raisin rises to the surface of the ginger ale, and then sinks. Within a couple of minutes, it rises and sinks again. Joyce asks, "I wonder why that happened?" Frank says, "I don't know, but let's see if it works in water." Joyce fills a glass with water and drops the raisin into the glass. After a few minutes, Frank says, "No, it doesn't go up and down in the water." Joyce closely observes the raisins tin the two glasses and states. "Look, there are bubbles on the raisins in the ginger ale but not on the raisins in the water." Frank says, "It must be the bubbles that make the raisin rise." Joyce asks, "Ok, but then why do they sink again?"

    a. In the passage above, highlight any observations in yellow, any hypotheses in green, and any experiments in pink.

b. Please describe a possible hypothesis for Joyce's question, "…why do they sink again?"
c. Come up with an experiment to test your hypothesis and describe your results.

Chapter 2: (Measurements and Calculations)

3) **Read** all of Chapter 2
   a. **Define** the following key terms:
      i. Measurement (Note: A measurement always consists of what two parts?)
      ii. Scientific Notation
      iii. Volume
      iv. Mass
      v. Significant Figures
      vi. Conversion Factor
      vii. Equivalence Statement
      viii. Dimensional Analysis
      ix. Density
   b. **Scientific Notation**- Complete the attached worksheet titled "Scientific Notation".
      *For additional assistance on how to express a number in scientific notation, go to the following link: http://getchemistryhelp.com/chemistry-lesson-scientific-notation/
   c. **Metric System and SI units of measurement:** be very familiar with the metric system/ SI units of measurement (note: "SI" stands for International System).
      i. Make flashcards for the commonly used prefixes in Table 2.2. One side should have the prefix with its symbol, and the other side should have the meaning and its power of 10.
         1. Complete the attached worksheet titled "SI Units Worksheet".
            * For additional assistance on making conversions between different units of measurements, please go to the following link: https://www.youtube.com/watch?v=o-PJq7PT30w
   d. "**Rules for Counting Significant Figures**"- write them all down.
      i. **Counting Significant Figures:** Please indicate how many significant figures are in each number listed below:
         1. 00.700
         2. 0.052
         3. 370.
         4. 10.0
         5. 705.001
         6. 37,000
            *For additional assistance on how to count significant figures, please go to the following link: https://www.youtube.com/watch?v=fXL06Eu4uVg
   e. **"Rules for Using Significant Figures in Calculations"**- write them all down.

i. How many significant figures should be used to report the answer to each of the following calculations? You do NOT need to perform the calculations.
   1. (2.7518 + 9.01 + 3.3349)/(2.1)
   2. (2.7551 x 1.95)/(.98)
   3. 12.0078/3.014
   4. (0.997 + 4.011 + 3.876)/(1.86 x 10^{-3})

ii. Consider the addition of "28." and "15.4". What would a mathematician say the answer is? What would a scientist say? Justify the scientist's answer, not merely citing the rule, but explaining it.

*For additional assistance on how to determine the number of significant figures that should be in your answer for any calculation, please go to the following link: http://getchemistryhelp.com/chemistry-lesson-significant-digits-calculations/

f. **"Rules for Rounding Off"**- write them all down.

i. In a multi-step calculation, is it better to round off the numbers to the correct number of significant figures in each step of the calculation or to round off only the final answer? Explain.

ii. Round off each of the following numbers to three significant figures, and express the result in standard scientific notation.
   1. 254,931
   2. 0.00025615
   3. 47850
   4. 0.08214

g. **Conversion Factors and Dimensional Analysis**– Dimensional analysis is a very important technique used for solving problems. You will need to understand how equivalence statements and conversion factors are related and how they are used to solve problems with dimensional analysis.

i. What is the relationship between an equivalence statement and a conversion factor? Please give an example to show this relationship.

ii. You are driving 65 mph and take your eyes off the road "just for a second." How many **feet** do you travel in this "**second**" of time?

iii. You are in Paris, and you want to buy some peaches for lunch. The sign in the fruit stand indicates that peaches cost 2.45 euros per kilogram. Given that 1 euro is equivalent to approximately $1.20, calculate what a **pound** of peaches will cost in **dollars**.

iv. Los Angeles and Honolulu are 2558 miles apart. What is this distance in kilometers? (Note: 1 mi= 1760. Yd; 1.094 yd= 1m; 10^3m= 1km)

* For additional assistance on how to solve problems using dimensional analysis please go to the following links:

1) http://getchemistryhelp.com/chemistry-lesson-unit-analysis/

**Note: In the video above, "Unit Analysis" is the same thing as "Dimensional Analysis".

2) https://www.youtube.com/watch?v=7N0lRJLwpPI

(Take notes on this video.** It is VERY helpful).

h. **Temperature Conversion Formulas**- write them all down, except for the one that says "Celsius to Fahrenheit".

   i. Make the following temperature conversions:

      1. 275 K to ^{o}C
      2. 82 ^{o}F to ^{o}C
      3. -40 ^{o}F to ^{o}C (Anything unusual about your answer? Please explain).
      4. 24.3 ^{o}C to Kelvins

i. **Density**-

   i. What does the density of a substance represent?
   ii. Is the density of a gaseous substance likely to be larger or smaller than the density of a liquid or solid substance at the same temperature? Why?
   iii. What property of density makes it useful as an aid in identifying unknown substances?
   iv. For the masses and volumes indicated, calculate the density in **grams per cubic centimeter**.

      1. Mass = 452.1 g; volume = 292 cm^3
      2. Mass= 2.49 g; volume = 0.12 m^3