CHEM 160: MATH ASSIGNMENT FOR FIRST LAB :WORKSHEET # 1

NAME: Answer Key **DUE DATE:** Sep 3, 2014

1. Express these fractions as decimals to four significant figures.

   a. 1/5 = 0.2000 b. 5/16 = 0.3125

   c. 1/7 = 0.1429 d. 1/12 = 0.08333

2. Percentage problems

   a. If there are 16.5 grams of sugar in 225 grams of an aqueous sugar solution, what is the percent-mass sugar? What is the percent-mass water? Express both answers to the correct number of significant figures.

   ? % mass sugar = $\frac{\text{mass sugar}}{\text{mass solution}} \times 100 = \frac{16.5 \text{ g sugar}}{225 \text{ g soln.}} \times 100 =$ 7.33 % sugar

   % H_2O = 100% (total) − 7.33% sugar = 92.67 % water

   b. An aqueous salt solution is 18.0%-mass sodium chloride. How many grams of salt are in 250,0 grams of this solution? (Sig figs again.)

   ? g salt = 250.0 g solution × $\frac{18.0 \text{ g salt}}{100 \text{ g soln}}$ = 45.0 g salt

3. Determining percent error : A student was supposed to measure 200.0 milliliters of water and obtained 197.0 milliliters instead. Her partner was supposed to measure 50.0 mL of water and obtained 49.0 mL instead. Determine who had the largest percent error in correct sig figs. (The equation is:

   $$\%\text{-error} = \frac{|\text{true value} - \text{measured value}|}{\text{true value}} \times 100$$

1) % error = $\frac{200.0 - 197.0}{200.0} \times 100 = \frac{3.0}{200.0} \times 100 =$ 1.5 % error

2) % error = $\frac{50.0 - 49.0}{50.0} \times 100 =$ 2.0 % error ← Largest *

4. Explain the concept of significant figures and why it is important in scientific experiments.

Significant figures show how much error there is in a measured number. Since all data that is measured in experiments has error it is important to write down the measurements with the correct number of significant figures to show what that error is. The amount of error is a way to determine how reliable the measurements are. The greater the error the less reliable the measurement.

ANSWER KEY

Working with Numbers Practice: WORKSHEET # 2 , Name:

1. Rounding: round off the following numbers to the number of significant figures (sf) indicated.
   a. 7.542 to 3 sf 7.54 b. 16.365 to 3 sf 16.4
   c. 84.995 to 2 sf 85 d. 6.02501 to 2 sf 6.0
2. Which of the following are exact numbers and which are measured numbers?
   a. a baby weighs 1.75 kg M b. a baker's dozen E
   c. a 5.0 µL injection M d. 78 students E
3. Determine the number of significant figures in each of the following:
   a. 0.00376 3 b. 1.00376 6
   c. 43,000 2 d. 14.05 4
   e. 14.00 4 f. 3200.0 5
4. Do the calculations and then round off your answers to the correct number of significant figures.
   a. (5.321)(4.2)/(457) = 0.049 b. 24.31 – 3.5 = 20.8
   c. 32.1 – 0.0035 = 32.1 d. 145.357 ÷ 22.5 = 6.46
5. Express the following in proper exponential notation:
   a. 1512 = 1.512×10^3 b. 0.00529 = 5.29×10^{-3}
   c. 21.52×10^{-4} = 2.152×10^{-3}
6. Express the following as ordinary numbers:
   a. 1.42×10^5 = 142,000 b. 2.069×10^{-3} = 0.002069
7. Carry out the following **without** using your calculator:
   a. $10^4 \times 10^5$ = 10^9 b. $10^4 \times 10^{-5}$ = 10^{-1} c. $10^4 / 10^5$ = 10^{-1}
8. Do the calculations, round off your answers to the correct number of significant figures, and express the answer in proper exponential notation.
   a. $2.23 \times 10^7 * 3.0 \times 10^{-4}$ = 6.7×10^3 b. $2.21 \times 10^7 / 5.500 \times 10^{-4}$ = 4.02×10^{10}
   c. $2.2 \times 10^2 + 3.13 \times 10^3$ = 3.35×10^3 d. $7.63 \times 10^{-2} - 3.15 \times 10^{-4}$ = 7.60×10^{-2}
9. What would be the difference in the number of significant figures and in how the numbers were expressed in exponential notation, given the following two pieces of data: 250 people vs. 250 mL. 250 people have 3 sig. Fig (sig fig do not apply). 250 mL has 2 s.f. written same using exponential notation.

Apply the rules of significant figures in doing all these calculations.

10. Convert each of the following to meters:
    a. 2.30×10^{12} nm = 2.30×10^3 m b. 3.6×10^{-4} km = 0.36 m
    c. 100.0 yards = 91.44 m
11. Convert each of the following to liters:
    a. 1.60 mL = 0.00160 L b. 239.0 cm^3 = 0.239 L
    c. 1.00 gal = _____
12. Convert the following temperatures as indicated:
    a. 19.00°F to -7.22°C b. 286.55 K to 13.4 °C
    c. –118°C to 155 K d. –40.00°C to -40.00°F
13. In each case below, determine which is the lower temperature by putting them into the same units of temperature.
    a. 0°C or (0°F?) = $\frac{-32}{1.8}$ = -17.8°C b. 0°C or (0 K?) = -273 °C
14. Calculate the volume of a sample of mercury with a density of 13.6 g/mL and a mass of 1.00 g.
    _____ ? vol Hg = $1.00\ g \times \frac{1\ mL}{13.6\ g}$ = 0.0766 mL Hg
15. The density of a silver coin can be calculated from the following data:

Mass of silver coin	6.581 g
Volume of coin and water	23.7 mL
Volume of water alone	23.1 mL

23.7 – 23.1 = 0.6 mL

The density of the coin should be reported as _____ $\frac{mass}{Vol} = \frac{6.581\ g}{0.6\ mL}$ = 10 g/mL (1 s.f.)