Unit 1 Review

1. Describe the proper way to smell a substance in the laboratory

WAFT TOWARDS NOSE

2. Why is safety important in the lab?

FOR EVERYONE'S WELL BEING

3. True/~~False~~ Acid should always be diluted by adding water to large volumes of acid and stirring quickly. ADD ACID TO WATER

4. Three different people weigh a standard mass on the same balance. Each person records a mass of 3.40g. The accepted mass is 9.2 g. This demonstrates-

    A. accuracy and precision   C. accuracy but not precision

    (B.) precision but not accuracy   D. neither accuracy nor precision

5. Convert to scientific notation. Remember significant figures.

1890 g 1.89×10^3 g   0.00134 cm 1.34×10^{-3} cm

98,200 mg 9.82×10^4 mg   - 0.000573 mm -5.73×10^{-4} mm

56280 mi 5.628×10^4 mi   - 0.00000005 m -5×10^{-8} m

6 km 6×10^0 km   - 190000000 nm -1.9×10^8

6. Convert to standard notation. Remember significant figures.

4.78×10^{-3} km 0.00478 km 5.50×10^9 mi 5,500,000,000 mi

-9.4×10^5 g -940,000 g 8.32×10^{-4} mm 0.000832 mm

7. How many significant figures are in the following values?

a) 0.0001 __1__   b) 4009 __4__ c) 100.00 __5__ d) 3400 __2__ e) 0.0501 __3__

8. Perform the following calculations and report your answer using the correct number of significant figures:

a) 0.001 + 45.6 __45.6__   b) 4008 + 34.99 __4043__   c) 500.0 - 12.13 __487.9__

Use the following conversion factors to complete these problems. Report your answer using the correct number of significant figures (Remember: Conversion factors don't affect sig figs)

60 s = 1 min	1 hr = 60 min	1.6 km = 1 mile	2.2 lbs = 1 kg
100 cm = 1 m	1,000 m = 1 km	0.26 gallons = 1 L	365 days = 1 year
1 mile = 1760 yds	2000 lbs = 1 ton	24 hr = 1 day	

9. Find the mass in pounds of a 68 kilogram person

$$68 \text{ Kg} \left| \frac{2.2 \text{ lbs}}{1 \text{kg}} \right. = 149.6 \rightarrow \boxed{150 \text{ lbs}}$$

10. Find the volume in <u>liters</u> of 3 gallons of soda

$$3 \text{ gal} \left| \frac{1 \text{ L}}{0.26 \text{ gal}} \right. = 11.5 \rightarrow \boxed{10 \text{ L}}$$

11. Find the length of a 100-yard football field in <u>kilometers</u>

$$100 \text{ yd} \left| \frac{1 \text{ mi}}{1760 \text{ yds}} \right| \frac{1.6 \text{ km}}{1 \text{ mi}} = 0.091 \rightarrow \boxed{0.09 \text{ km}}$$

12. Calculate the length of a 5-minute passing period in years

$$5 \text{ min} \left| \frac{1 \text{ hr}}{60 \text{ min}} \right| \frac{1 \text{ day}}{24 \text{ hrs}} \left| \frac{1 \text{ yr}}{365 \text{ days}} \right. = \boxed{1 \times 10^{-5} \text{ yrs}}$$

13. The whole number that appears **before** an element or formula in an equation is called a:

   a) subscript   b) superscript   <u>c) coefficient</u>   d) denominator

14. The whole number that appears **next to,** but **smaller** and **slightly below,** an element or formula in an equation is called a:

   <u>a) subscript</u>   b) superscript   c) coefficient   d) denominator

15. How many <u>oxygen atoms</u> would be found in one **formula unit** (molecule) of the following:
   $Al_2(Cr_2O_7)_3$
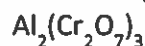
   a. 1   b. 3   c. 7   d. 10   <u>e. 21</u>

16. How many **moles** of oxygen atoms would be found in one **mole** of the following: $Al_2(Cr_2O_7)_3$

   a. 1   b. 3   c. 7   d. 10   <u>e. 21</u>

17. What is the molar mass (gram formula mass) of nitroglycerin? $C_3H_5(NO_3)_3$?

   a. 165 g/mol   <u>b. 227 g/mol</u>   c. 309 g/mol   d. 199 g/mol   e. none

$$3(12.011) + (5 \cdot 1.008) + (3 \cdot 14.007) + (9 \cdot 16.00) = 227.094$$

18. What is the molar mass (gram formula mass) of sodium phosphate, Na_3PO_4? (Include units)

$$3(23) + 30.97 + 4(16.00) = \boxed{163.97 \text{ g/mol}}$$

19. What is the molar mass (gram formula mass) of $FeCl_3 \cdot 5H_2O$? (Hint: need to add the mass of 5 waters to the mass of $FeCl_3$, include units)

$$55.85 + 3(35.45) + 10(1.008) + 5(16) = \boxed{256.26 \text{ g/mol}}$$

20. What is Avogadro's number? What does it describe?

6.022×10^{23} particles → the amount of substance in one mol

21. Lead nitrate, $Pb(NO_3)_4$, is used for match manufacturing and for making explosives. If 45.8 grams of lead (IV) nitrate, $Pb(NO_3)_4$, are required to make one case of matches, how many moles are needed?

$$45.8 \text{ g } Pb(NO_3)_4 \left| \frac{1 \text{ mol } Pb(NO_3)_4}{455.228} \right. = \boxed{0.101 \text{ mol } Pb(NO_3)_4}$$

Answer the following questions regarding the following reaction:

$$Cu + 2\ AgNO_3 \rightarrow Cu(NO_3)_2 + 2\ Ag$$

22. What is the mole ratio of copper, Cu, metal to silver metal, Ag, in the above reaction?

$1 : 2$

23. If 5.0 moles of copper are reacted with excess silver nitrate $AgNO_3$, how many moles of silver are produced?

$$5.0 \text{ mol } Cu \left| \frac{2 \text{ mol } Ag}{1 \text{ mol } Cu} \right. = \boxed{10.\text{ mol } Ag}$$

24. If 3.10 grams of copper nitrate, $Cu(NO_3)_2$ have been produced, how many grams of silver nitrate, $AgNO_3$, must have reacted?

$$3.10 \text{ g } Cu(NO_3)_2 \left| \frac{1 \text{ mol } Cu(NO_3)_2}{187.56 \text{ g } Cu(NO_3)_2} \right| \frac{2 \text{ mol } AgNO_3}{1 \text{ mol } Cu(NO_3)_2} \left| \frac{169.88 \text{ g } AgNO_3}{1 \text{ mol } AgNO_3} \right. = \boxed{5.62 \text{ g } AgNO_3}$$
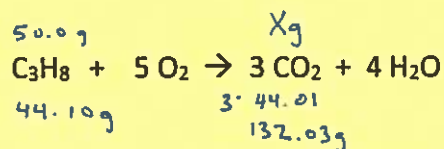
25. If 4.00 grams of silver nitrate, $AgNO_3$, react with excess copper metal, how many **formula units** of copper nitrate, $Cu(NO_3)_2$ are produced?

$$4.00 \text{ g } AgNO_3 \left| \frac{1 \text{ mol}}{169.88 \text{ AgNO}_3} \right| \frac{1 \text{ mol } Cu(NO_3)_2}{2 \text{ mol } Ag(NO_3)} \left| \frac{6.022 \times 10^{23} \text{ FU}}{1 \text{ mol}} \right. = 7.09 \times 10^{21} \ Cu(NO_3)_2$$

a. How many **atoms** of oxygen are produced?

$$7.09 \times 10^{21} \text{ FU } Cu(NO_3)_2 \left| \frac{6 \text{ atoms } O}{1 \text{ FU } Cu(NO_3)_2} \right. = 4.25 \times 10^{22} \text{ atoms } O$$

26. What mass of carbon dioxide, CO_2, will be formed if 50.0g of C_3H_8 (propane) gas are burned in in excess of pure oxygen at STP?

$$\overset{50.0g}{\underset{44.10g}{C_3H_8}} + 5O_2 \rightarrow \overset{Xg}{\underset{\underset{132.03g}{3\cdot44.01}}{3CO_2}} + 4H_2O$$

$$\frac{50.0 \text{ g}}{44.10 \text{ g}} = \frac{X \text{ g } CO_2}{132.03 \text{ g}}$$

$$X = \boxed{150.g \ CO_2}$$

$$\frac{50.0g \ C_3H_8}{} \left| \frac{1 \text{ mol}}{44.10 \text{ g}} \right| \frac{3 \text{ mol } CO_2}{1 \text{ mol } C_3H_8} \left| \frac{44.01g \ CO_2}{1 \text{ mol } CO_2} \right| = \boxed{150g \ CO_2}$$

27. From the above reaction, if the percent yield for carbon dioxide for this reaction is 85.0%, how much carbon dioxide was produced?

$$\% \ yield = \frac{act}{ther.} \cdot 100$$

$$act = \frac{\% \cdot ther}{100} = \frac{85(150)}{100} = \boxed{128g \ CO_2}$$

28. Classify the following reaction types.

a. $2Na + CaF_2 \rightarrow Ca + 2NaF$ SR

b. $2Na + F_2 \rightarrow 2NaF$ SYN

c. $2AgF + CaCl_2 \rightarrow 2AgCl + CaF_2$ DR

d. $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$ comb.

e. $K_2S \rightarrow 2K + S$ Decomp

f. $O_2 + 2Mg \rightarrow 2MgO$ SYN   OR   comb.

g. $3Mg + 2AlBr_3 \rightarrow 3MgBr_2 + 2Al$ SR

h. $2C_2H_6O + 9O_2 \rightarrow 4CO_2 + 12H_2O$ comb.

i. $Li_2SO_4 + MgCl_2 \rightarrow MgSO_4 + 2LiCl$ DR

j. $2KClO_3 \rightarrow 2KCl + 3O_2$ Decomp.