Tutorial 3

1. There are three naturally occurring isotopes of neon. Their percent abundances are: neon-20 (90.51%), neon-21 (0.27%), neon-22 (9.22%). Calculate weighted average atomic mass of neon. (20.19 g/mol)
2. The atomic masses of $^{6}_{3}Li$ and $^{7}_{3}Li$ are 6.0151 amu and 7.0160 amu, respectively. Calculate the neutral abundances of these two isotopes. The average atomic mass of Li is 6.941 amu. (92.5%, 7.5%)
3. Calculate the formula masses of:
   a) Li_2O b) $BaCl_2$ c) $Mg(NO_3)_2$ d) Al_2Br_6 e) $K_2Cr_2O_7$ f) Ba(OH) g)$NaHCO_3$ h)$CaSO_4.2H_2O$
4. Calculate
   (a) the mass, in gram, of 0.155 mol C_3H_8
   (b) the mass, in milligrams, of 2.45 x 10-4 mol of ethane, C_2H_6
   (c) the number of moles of C_4H_{10} in a 165 kg sample
   (d) the number of moles of phosphoric acid in a 760 mg sample.
5. Calculate
   a) The number of moles of aluminum in cube of the metal 5.5 cm an edge (d = 2.70 g/cm^3)
   b) The volume occupied by 1.38 mol carbon tetrachloride, a liquid with a density of 1.59 g/mL
6. Phenol has composition 76.57% C, 6.43% H and 17.00% O. Determine its empirical formula.
7. Resorcinol, used in manufacturing resins drugs and other products, is 65.44% C, 5.49% H, and 29.06% O by mass. Its molecular mass is 110 g/mol. What is its molecular formula?
8. Balance the following equation:
   a) PCl_5 (s) + H_2O (l) → H_3PO_4 (aq) + HCl (aq)
   b) PbO (s) + NH_3 (g) → Pb (s) + N_2 (g) + H_2O (l)
   c) Mg_3N_2 (s) + H_2O (l) → $Mg(OH)_2$ (s) + NH_3 (g)
   d) Fe (s) + O_2 (g) (s) → Fe_2O_3 (s)
9. All Alkali metals react with water to produce hydrogen gas and the corresponding alkali metal hydroxide. A typical reaction is that between lithium and water.
   Li (s) + H_2O(l) → LiOH(aq) + H_2(g) (not balanced)
   a) How many moles of H_2 will be formed by the complete reaction of 6.23 moles of Li with water?
   b) How many grams of H_2 will be formed by the complete reaction of 80.57 g of Li with water?
   c) How many grams of LiOH will be formed by the complete reaction of 80.57 g of Li with water?
10. Urea [$(NH_2)_2CO$] is prepares by reacting ammonia with carbon dioxide:
    NH_3 + CO_2 → $(NH_2)_2CO$ + H_2O (not balanced)
    In one process 637.2 g of NH_3 are allowed to react with 1142 g of CO_2.
    a) Which of the reactants is limiting reagent?
    b) Calculate, the mass of $(NH_2)_2CO$ formed? And excess reagent (in grams) is left at the end of the reaction?
11. What is the molarity of an 85.0 mL ethanol (C_2H_5OH) solution containing 1.77 g of ethanol?
12. The label of a stock bottle of aqueous ammonia indicates that the solution 28% NH_3 by mass and has density of 0.898 g/mL. Calculate the molarity of solution.
13. Describe how you would prepare 5.00 x 10^2 mL of 1.75 M H_2SO_4 solution starting with an 8.61 M stock solution of H_2SO_4
14. How many milliliter of a 0.610 M NaOH solution are needed to neutralize 20.0 mL of a H_2SO_4 solution?
    NaOH + H_2SO_4 → Na_2SO_4 + H_2O (not balanced)