# Organic Problems Assignment

1. Write chemical equations for the following:
   a) 2,2-dimethyl-1-propanol reacting with butanoic acid
   b) 2,2,3-trimethyl pentane ( the "octane" in gasoline ) burning completely in air
   c) hydroidic acid reacting with 1-butene
   d) the formation of N-ethyl ethanamide from ethanol and any inorganic reagents (not just one reaction )

2. A sample of liquid consisting of only C, H, and O has a mass of 0.5438g. This sample was burned in pure oxygen with the release of 1.039g of $CO_2$ and 0.639g of $H_2O$. What is the empirical formula of the compound?

3. When 1 mole of a hydrocarbon is burned, the carbon dioxide released has a mass equal to 2.09524 times the mass of the water released. Assuming complete combustion, what is the formula for the hydrocarbon?

4. One mole of NaCN reacts with one mole of bromoethane to form 45g of cyanoethane.
   a) What is the theoretical yield of cyanoethane in grams?
   b) What is the percentage yield of cyanoethane?
   c) Given 8.53g of NaCN and 10.98g of bromoethane and taking into account the percentage yield, find the volume of liquid cyanoethane ($C_2H_5CN$) produced? (d=0.783 g/mL ).

5. When 1.202g of an organic compound with empirical formula $C_3H_6O_2$ is vapourized at 673 ° C and at 2 atm pressure, the gas volume is 630.5 mL.
   a) What is the molecular formula of the compound?
   b) If one mole of the same compound reacts slowly with Zn to yield 0.5 mol of $H_{2(g)}$, what is the compound's name and structural formula? R= 0.08206 $L*atm*k^{-1}*mol^{-1}$

6. Sodium hydroxide reacts with bromoethane to give ethanol. If the percentage yield for this reaction is 72%, what mass of ethanol can be made by reacting $NaOH_{(ag)}$ with 85 g of bromoethane? (bromoethane is the limiting reagent )

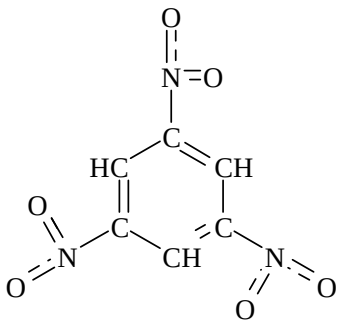
7. 20 mL of a $Br_2$ (solute) solution in $CCl_4$ (solvent ) reacts with 0.23g of 4-methyl-2-heptene. What is the concentration of $Br_2$ solution?

8. The motor of an airplane is equipped with a condenser so that all of the steam formed during the complete combustion of fuel can be used on board while the $CO_2$ is released (into the atmosphere, increasing the $CO_2$ concentration there, thus increasing the greenhouse effect, inevitably destroying all life on earth ). Will the airplane gain or lose mass? Calculate the gain or loss per 50 kg of 2,2,4-trimethylpentane fuel burned.

9. Analysis of an organic compound revealed % O = 36.36, %C = 27.27 , %N = 31.82 and the rest hydrogen. When vapourized a 0.4 g sample of the compound gave 139.13 mL at 100°C and 1 atm pressure. Find the molecular formula of the compound.

10. Name:

a)



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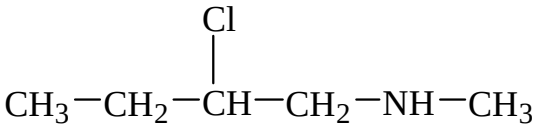

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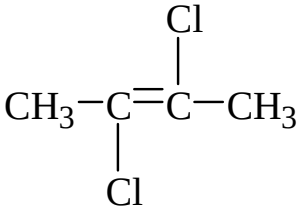
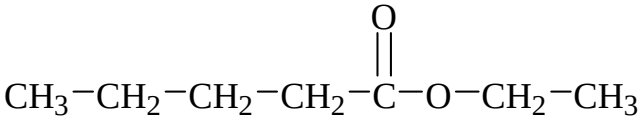


d)



e) Write the equations using structural formula for:

i) 2-hexyne + 1 mole of $H_{2\,(g)}$

ii) benzoic acid + ethanol

iii) oxidation of butanal

iv) 2-pentene + HCl