

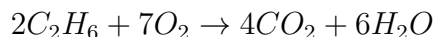
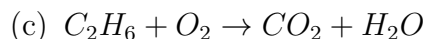
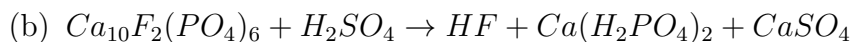
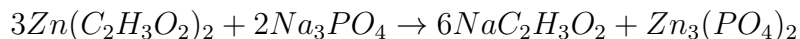
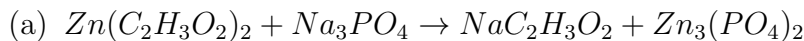
Problem Set Chapter 3, Part 2

Michael Brodskiy

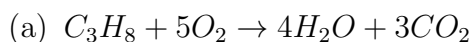
Instructor: Mr. Morgan

September 15, 2020

1. Balance the following:



2. Calculate the number of grams of both products when 17.8[g] of C_3H_8 is combusted.



$$\frac{17.8[\text{g}]}{44[\text{g mol}^{-1}]} = .4[\text{mol}_{C_3H_8}] \rightarrow 2[\text{mol}_{O_2}], 1.6[\text{mol}_{H_2O}], 1.2[\text{mol}_{CO_2}]$$

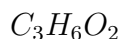
$$1.6[\text{mol}] \cdot 18[\text{g mol}^{-1}] = 28.8[\text{g}]$$

$$1.2[\text{mol}] \cdot 44[\text{g mol}^{-1}] = 52.8[\text{g}]$$

3. A 0.1204[g] sample of carboxylic acid (containing C, O, and H) is burned in oxygen to yield 0.2147[g] of carbon dioxide and 0.0884[g] of water. Calculate the empirical formula.

$$.2147 \cdot \frac{12}{44} = .059[\text{g}_C], .0884 \cdot \frac{2}{18} = .0098[\text{g}_H], .1204 - .0098 - .059 = .0516[\text{g}_O]$$

$$\frac{.059}{12} = .0049[\text{mol}_C], \frac{.0098}{1} = .0098[\text{mol}_H], \frac{.0516}{16} = .0032[\text{mol}_O]$$



4. Phenol contains C, H, and O. Combustion of 2.136[mg] of phenol gives 5.993[mg] of CO_2 and 1.227[mg $_{H_2O}$]. What is the simplest formula?

$$.5993 \cdot \frac{12}{44} = .163[g_C], .1227 \cdot \frac{2}{18} = .0136[g_H], .2136 - .163 - .0136 = .0773[g_O]$$

$$\frac{.163}{12} = .0136[mol_C], \frac{.0136}{1} = .0136[mol_H], \frac{.0773}{16} = .00483[mol_O]$$



5. Kerosene ($C_{14}H_{30}$) has a density of 0.763[g mL $^{-1}$]. How many grams of carbon dioxide are produced by the combustion of 3.785[L] of kerosene?

$$.763[g \text{ mL}^{-1}] = .763[kg \text{ L}^{-1}]$$

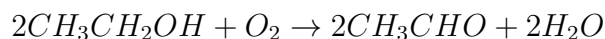
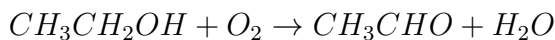
$$.763 \cdot 3.785 = 2.89[kg] = 2890[g]$$

$$2890 \cdot \frac{168}{198} = 2452[g_C]$$

$$\frac{2452}{12} = 204.33[mol_C] \rightarrow 408.66[mol]$$

$$408.66 \cdot 16 = 6538.6[g_O] + 2452[g_C] = 8990.6[g_{CO_2}]$$

6. How many liters of CH_3CH_2OH (density = 0.789[g mL $^{-1}$]) must be consumed to produce 25[L] of CH_3CHO (density = 0.788[g mL $^{-1}$])?



$$.788[g \text{ mL}^{-1}] = .788[kg \text{ L}^{-1}]$$

$$.788 \cdot 25 = 19.7[kg] \rightarrow 19700[g] \cdot \frac{1}{44} = 447.73[mol_{CH_3CHO}] \rightarrow 447.73[mol]$$

$$447.73[mol_{CH_3CH_2OH}] \cdot 46 = 20595[g] = 20.595[kg]$$

$$V = \frac{m}{\rho} = \frac{20.595}{.789} = 26[L]$$