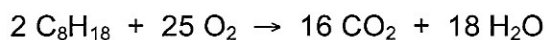


Name: Key
Date: 3/26/19

Chemistry Stoichiometry WS 2

I. Complete the following stoichiometric calculations, balancing equations where necessary.

1. Consider the combustion of octane (C_8H_{18}):



a. How many grams of CO_2 are produced when 191.6 g of octane are burned?

$$\frac{191.6g C_8H_{18}}{1} \times \frac{1 mol C_8H_{18}}{114.232g C_8H_{18}} \times \frac{16 mol CO_2}{2 mol C_8H_{18}} \times \frac{44.05g CO_2}{1 mol CO_2} = \boxed{591.1g CO_2}$$

b. How many grams of oxygen gas are required to burn 47.03 g of octane?

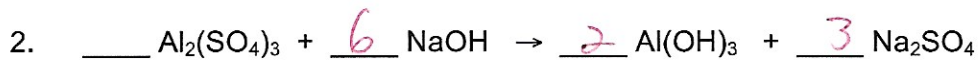
$$\frac{47.03g C_8H_{18}}{1} \times \frac{1 mol C_8H_{18}}{114.232g C_8H_{18}} \times \frac{25 mol O_2}{2 mol C_8H_{18}} \times \frac{31.998g O_2}{1 mol O_2} = \boxed{164.7g O_2}$$

c. How many grams of H_2O are produced when 91.2 g oxygen gas are consumed?

$$\frac{91.2g O_2}{1} \times \frac{1 mol O_2}{31.998g O_2} \times \frac{18 mol H_2O}{25 mol O_2} \times \frac{18.015g H_2O}{1 mol H_2O} = \boxed{37.0g H_2O}$$

d. How many liters of CO_2 are produced at STP when the reaction yields 5.05 g H_2O ?

$$\frac{5.05g H_2O}{1} \times \frac{1 mol H_2O}{18.015g H_2O} \times \frac{16 mol CO_2}{18 mol H_2O} \times \frac{22.4L CO_2}{1 mol CO_2} = \boxed{5.58L CO_2}$$

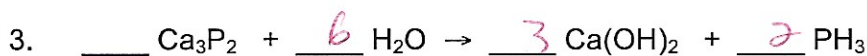


a. How many grams of NaOH are needed to completely react with 2.33 g $\text{Al}_2(\text{SO}_4)_3$?

$$\frac{2.33 \text{ g Al}_2(\text{SO}_4)_3}{1} \times \frac{1 \text{ mol Al}_2(\text{SO}_4)_3}{342.15 \text{ g Al}_2(\text{SO}_4)_3} \times \frac{6 \text{ mol NaOH}}{1 \text{ mol Al}_2(\text{SO}_4)_3} \times \frac{39.97 \text{ g NaOH}}{1 \text{ mol NaOH}} = \boxed{1.63 \text{ g NaOH}}$$

b. If 87.3 g of $\text{Al}(\text{OH})_3$ are formed, how many grams of Na_2SO_4 will be produced?

$$\frac{87.3 \text{ g Al}(\text{OH})_3}{1} \times \frac{1 \text{ mol Al}(\text{OH})_3}{78.003 \text{ g Al}(\text{OH})_3} \times \frac{3 \text{ mol Na}_2\text{SO}_4}{2 \text{ mol Al}(\text{OH})_3} \times \frac{142.04 \text{ g Na}_2\text{SO}_4}{1 \text{ mol Na}_2\text{SO}_4} = \boxed{238.5 \text{ g Na}_2\text{SO}_4}$$



a. How many grams of water are needed to react with 33.9 g of Ca_3P_2 ?

$$\frac{33.9 \text{ g Ca}_3\text{P}_2}{1} \times \frac{1 \text{ mol Ca}_3\text{P}_2}{182.102 \text{ g Ca}_3\text{P}_2} \times \frac{6 \text{ mol H}_2\text{O}}{1 \text{ mol Ca}_3\text{P}_2} \times \frac{18.015 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = \boxed{20.1 \text{ g H}_2\text{O}}$$

b. How many grams of PH_3 are produced when the above reaction takes place?

$$\frac{33.9 \text{ g Ca}_3\text{P}_2}{1} \times \frac{1 \text{ mol Ca}_3\text{P}_2}{182.102 \text{ g Ca}_3\text{P}_2} \times \frac{2 \text{ mol PH}_3}{1 \text{ mol Ca}_3\text{P}_2} \times \frac{33.998 \text{ g PH}_3}{1 \text{ mol PH}_3} = \boxed{12.65 \text{ g PH}_3}$$

c. How many grams of H_2O will be needed to produce 715 g $\text{Ca}(\text{OH})_2$?

$$\frac{715 \text{ g Ca}(\text{OH})_2}{1} \times \frac{1 \text{ mol Ca}(\text{OH})_2}{74.092 \text{ g Ca}(\text{OH})_2} \times \frac{6 \text{ mol H}_2\text{O}}{3 \text{ mol Ca}(\text{OH})_2} \times \frac{18.015 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = \boxed{347.7 \text{ g H}_2\text{O}}$$