Ch 11
Wkst Review

1) Stoichiometry - The Study of the amount of Substances consumed & Produced in Chemical Rxn's

2) $3\,Ca(OH)_2 + 2\,H_3PO_4 \rightarrow Ca_3(PO_4)_2 + 6\,H_2O$

? moles 25.9g ?g ?g

A) $\left(\frac{25.9\text{g } H_3PO_4}{1}\right)\left(\frac{1\text{ mole } H_3PO_4}{98.0\text{g } H_3PO_4}\right)\left(\frac{6\text{ mole } H_2O}{2\text{ mole } H_3PO_4}\right)\left(\frac{18.0\text{g } H_2O}{1\text{ mole } H_2O}\right) = \boxed{14.3\text{g } H_2O}$

B) Double Replacement

C) $\left(\frac{25.9\text{g } H_3PO_4}{1}\right)\left(\frac{1\text{ mole } H_3PO_4}{98.0\text{g } H_3PO_4}\right)\left(\frac{3\text{ mole } Ca(OH)_2}{2\text{ mole } H_3PO_4}\right) = \boxed{.396\text{ mole } Ca(OH)_2}$

D) $\left(\frac{25.9\text{g } H_3PO_4}{1}\right)\left(\frac{1\text{ mole } H_3PO_4}{98.0\text{g } H_3PO_4}\right)\left(\frac{1\text{ mole } Ca_3(PO_4)_2}{2\text{ mole } H_3PO_4}\right)\left(\frac{310.3\text{g } Ca_3(PO_4)_2}{1\text{ mole } Ca_3(PO_4)_2}\right)$

$= \boxed{41.0\text{g } Ca_3(PO_4)_2}$

3) $2Al + 3S \rightarrow Al_2S_3$ Limiting?

9.00g 10.0g ?g g excess?

$$\left(\frac{9.00\text{g Al}}{1}\right)\left(\frac{1\text{ mole Al}}{27.0\text{g Al}}\right)\left(\frac{3\text{ mole S}}{2\text{ mole Al}}\right)\left(\frac{32.1\text{g S}}{1\text{ mole S}}\right) = 16.1\text{ g S Needed}$$

only have 10.0g

So S is Limiting
Al is Excess

$$\left(\frac{10.0\text{g S}}{1}\right)\left(\frac{1\text{ mole S}}{32.1\text{g S}}\right)\left(\frac{2\text{ mole Al}}{3\text{ mole S}}\right)\left(\frac{27.0\text{g Al}}{1\text{ mole Al}}\right) = 5.61\text{g Al Needed}$$

9.00 g Al Given
5.61 g Al needed
3.39 g Al Excess

Product? Al_2S_3 * start w/ Limiting

$$\left(\frac{10.0\text{g S}}{1}\right)\left(\frac{1\text{ mole S}}{32.1\text{g S}}\right)\left(\frac{1\text{ mole } Al_2S_3}{3\text{ mole S}}\right)\left(\frac{150.3\text{g } Al_2S_3}{1\text{ mole } Al_2S_3}\right) = 15.6\text{ g } Al_2S_3$$

4) $C_3H_8(g) + 5O_2(g) \xrightarrow{\Delta} 3CO_2(g) + 4H_2O(g)$

24.5g ? mole | 45.0g ? mole | ?g | ?g

Limiting??

$$\left(\frac{24.5\text{g } C_3H_8}{1}\right)\left(\frac{1\text{ mole } C_3H_8}{44.0\text{g } C_3H_8}\right) = .557\text{ mole } C_3H_8$$

$$\left(\frac{45.0\text{g } O_2}{1}\right)\left(\frac{1\text{ mole } O_2}{32.0\text{g } O_2}\right) = 1.41\text{ mole } O_2$$

$$\left(\frac{\text{Have } 45.0\text{g } O_2}{1}\right)\left(\frac{1\text{ mole } O_2}{32.0\text{g } O_2}\right)\left(\frac{1\text{ mole } C_3H_8}{5\text{ mole } O_2}\right)\left(\frac{44.0\text{g } C_3H_8}{1\text{ mole } C_3H_8}\right) = \text{Needed } 12.4\text{g } C_3H_8$$

Have 24.5g C_3H_8, Need 12.4g C_3H_8

So C_3H_8 is Excess
O_2 is Limiting

Products - start w/ Lim. ting

$$\left(\frac{1.41\text{ mole } O_2}{1}\right)\left(\frac{3\text{ mole } CO_2}{5\text{ mole } O_2}\right)\left(\frac{44.0\text{g } CO_2}{1\text{ mole } CO_2}\right) = 37.2\text{g } CO_2$$

$$\left(\frac{1.41\text{ mole } O_2}{1}\right)\left(\frac{4\text{ mole } H_2O}{5\text{ mole } O_2}\right)\left(\frac{18.0\text{g } H_2O}{1\text{ mole } H_2O}\right) = 20.3\text{g } H_2O$$