

When 100 g of H₂O is

formed



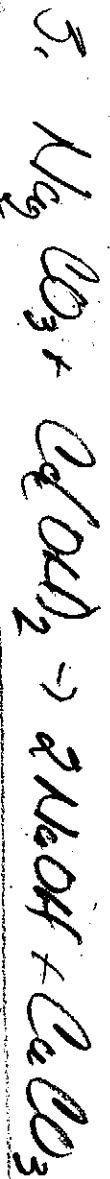
$$\frac{(5 \text{ mol H}_2) \times (2 \text{ mol H}_2\text{O})}{(2 \text{ mol H}_2)} = \underline{15 \text{ mol H}_2\text{O}}$$



$$\frac{(10 \text{ mol O}_2) \times (2 \text{ mol H}_2)}{1 \text{ mol O}_2} = \underline{20 \text{ mol H}_2}$$

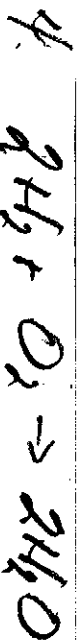
$$\frac{(15 \text{ mol H}_2\text{O}) \times (1 \text{ mol O}_2)}{(2 \text{ mol H}_2\text{O})} = \underline{7.5 \text{ mol O}_2}$$

$$\frac{(15 \text{ mol H}_2\text{O}) \times (18.02 \text{ g})}{\text{mol}} = \underline{1370.3 \text{ g H}_2\text{O}}$$



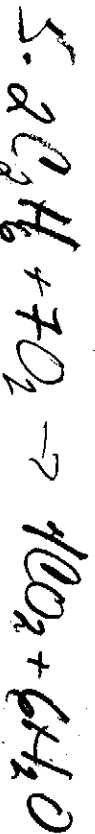
2.2200 g +
(1:12.014) +
(3.16.009)

$$\text{Na}_2\text{CO}_3 = 105.99 \text{ g/mol} \quad \text{Ca(OH)}_2 = 74.10 \text{ g/mol}$$
$$\text{NaOH} = 40.00 \text{ g/mol} \quad \text{CaCO}_3 = 100.09 \text{ g/mol}$$



$$\frac{(5 \text{ mol H}_2) \times (2 \text{ mol H}_2\text{O})}{(2 \text{ mol H}_2)} = \underline{15 \text{ mol H}_2\text{O (needed)}}$$

$$\frac{(5 \text{ mol H}_2\text{O}) \times (1 \text{ mol O}_2)}{2 \text{ mol H}_2\text{O}} = \underline{2.5 \text{ mol O}_2 \text{ (needed)}}$$



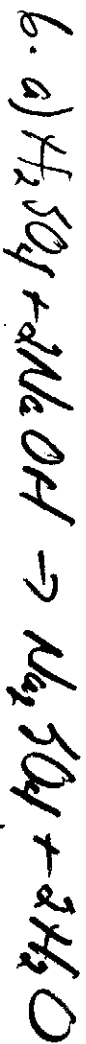
$$\frac{(4.5 \text{ mol C}_2\text{H}_6) \times (7 \text{ mol O}_2)}{(2 \text{ mol C}_2\text{H}_6)} = \underline{15.75 \text{ mol O}_2}$$

$$\frac{(15 \text{ mol C}_2\text{H}_6) \times (4 \text{ mol CO}_2)}{(2 \text{ mol C}_2\text{H}_6)} = \underline{19 \text{ mol CO}_2}$$
$$\frac{(15 \text{ mol C}_2\text{H}_6) \times (6 \text{ mol H}_2\text{O})}{(2 \text{ mol C}_2\text{H}_6)} = \underline{13.5 \text{ mol H}_2\text{O}}$$

Q4 HCl/NaOH tit.

2 H-OH

②



b) $(.75 \text{ mol } NaOH) \left(\frac{1 \text{ mol } H_2SO_4}{2 \text{ mol } NaOH} \right) = .375 \text{ mol } H_2SO_4$

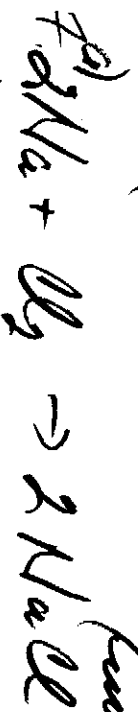
$(.375 \text{ mol } H_2SO_4) (98.08 \text{ g/mol}) = 36.78 \text{ g } H_2SO_4$

c) $(.75 \text{ mol } NaOH) \left(\frac{1 \text{ mol } Na_2SO_4}{2 \text{ mol } NaOH} \right) = .375 \text{ mol } Na_2SO_4$

$(.375 \text{ mol } Na_2SO_4) \left(\frac{142.04 \text{ g/mol}}{1 \text{ mol}} \right) = 53.27 \text{ g } Na_2SO_4$

$(.75 \text{ mol } NaOH) \left(\frac{2 \text{ mol } H_2O}{2 \text{ mol } NaOH} \right) = .75 \text{ mol } H_2O$

$(.75 \text{ mol } H_2O) \left(\frac{18.02 \text{ g/mol}}{1 \text{ mol}} \right) = 13.52 \text{ g } H_2O$



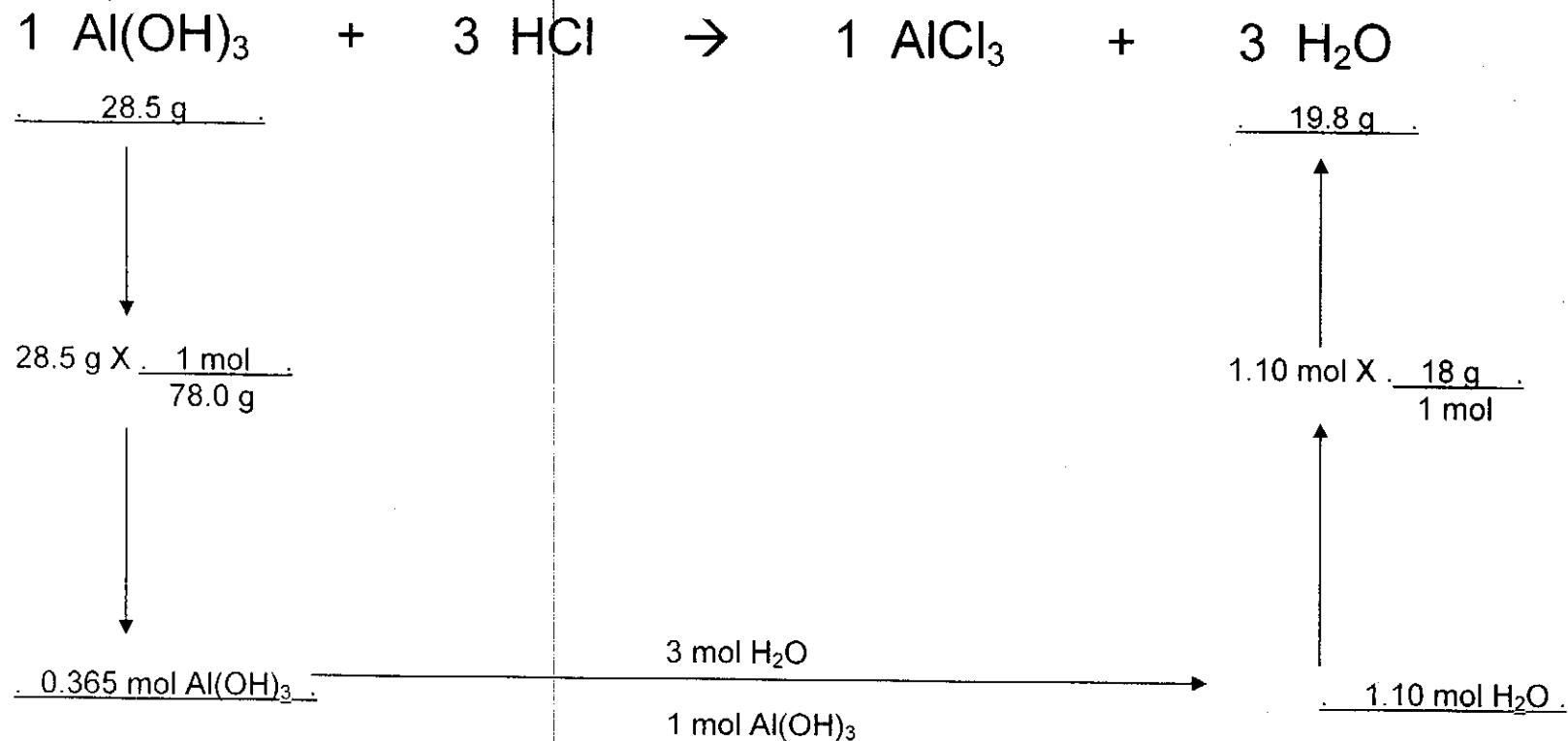
b) $(25 \text{ mol } Na) \left(\frac{2 \text{ mol } Na_2O}{4 \text{ mol } Na} \right) = 25 \text{ mol } Na_2O$

$(25 \text{ mol } Na) \left(\frac{62.99 \text{ g/mol}}{1 \text{ mol}} \right) = 1574.75 \text{ g } Na$

$(25 \text{ mol } Na_2O) \left(\frac{1 \text{ mol } O_2}{2 \text{ mol } Na_2O} \right) = 12.5 \text{ mol } O_2$

$(12.5 \text{ mol } O_2) \left(\frac{30.99 \text{ g/mol}}{1 \text{ mol}} \right) = 386.25 \text{ g } O_2$

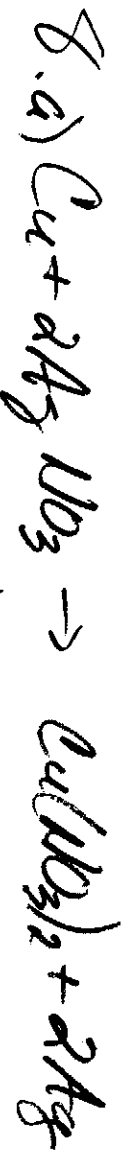
Example: Suppose 28.5 g of aluminum hydroxide reacted with hydrochloric acid. How much water would be produced?



If there is no coefficient on a given substance, then it is considered to be 1. You can make conversions going anywhere you want!!!! Notice how the units cancel as you go from moles Al(OH)₃ to moles H₂O. Use units! It helps.

U4 UO2 (cont)

③



b) $(8.25 \text{ g Ag}) \left(\frac{1 \text{ mol}}{107.87 \text{ g}} \right) = .0765 \text{ mol Ag}$

$$\left(.0765 \text{ mol Ag} \right) \left(\frac{1 \text{ mol Cu}(\text{NO}_3)_2}{2 \text{ mol Ag}} \right) = \boxed{.03825 \text{ mol Cu}(\text{NO}_3)_2}$$

$$\left(.0765 \text{ mol Ag} \right) \left(\frac{1 \text{ mol Cu}}{2 \text{ mol Ag}} \right) = \boxed{.03825 \text{ mol Cu}}$$

$$\left(.03825 \text{ mol Ag} \right) \left(\frac{2 \text{ mol AgNO}_3}{2 \text{ mol Ag}} \right) = \boxed{.03825 \text{ mol AgNO}_3}$$



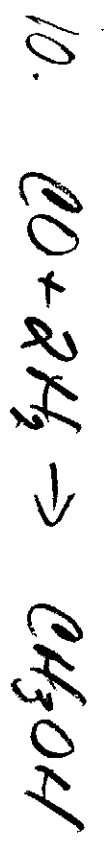
$(4000 \text{ g Fe}_2\text{O}_3) \left(\frac{1 \text{ mol}}{159.70 \text{ g}} \right) = 25.0466 \text{ mol Fe}_2\text{O}_3$

$$\left(25.0466 \text{ mol Fe}_2\text{O}_3 \right) \left(\frac{3 \text{ mol CO}}{1 \text{ mol Fe}_2\text{O}_3} \right) = \boxed{75.14 \text{ mol CO}}$$

$$\left(25.0466 \text{ mol Fe}_2\text{O}_3 \right) \left(\frac{2 \text{ mol Fe}}{1 \text{ mol Fe}_2\text{O}_3} \right) = \boxed{50.09 \text{ mol Fe}}$$

$$\left(25.0466 \text{ mol Fe}_2\text{O}_3 \right) \left(\frac{3 \text{ mol CO}_2}{1 \text{ mol Fe}_2\text{O}_3} \right) = \boxed{75.14 \text{ mol CO}_2}$$

14) $H_2O_2 \rightarrow CO_2$

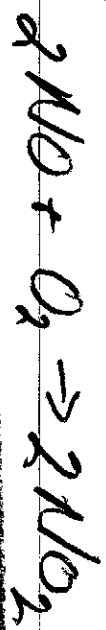


a) $(100 \text{ kg } CH_3OH) \times \frac{1000 \text{ g}}{1 \text{ kg}} = 100,000 \text{ g } CH_3OH$

$(1 \times 10^5 \text{ g } CH_3OH) \times \frac{1 \text{ mol}}{32.05 \text{ g}} = 3120.1248 \text{ mol } CH_3OH$

$(3120.1248 \text{ mol } CH_3OH) \times \frac{1 \text{ mol } CO}{1 \text{ mol } CH_3OH} = 3120.12 \text{ mol } CO$

$(3120.1248 \text{ mol } CH_3OH) \times \frac{2 \text{ mol } H_2}{1 \text{ mol } CH_3OH} = 6240.25 \text{ mol } H_2$



b) $(384 \text{ g } O_2) \times \frac{1 \text{ mol}}{32 \text{ g}} = 12 \text{ mol } O_2$

$(12 \text{ mol } O_2) \times \frac{2 \text{ mol } NO_2}{1 \text{ mol } O_2} = 24 \text{ mol } NO_2$

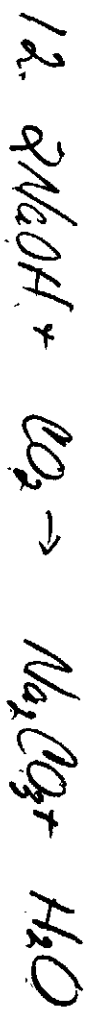
$(24 \text{ mol } NO_2) \times \frac{46.01 \text{ g}}{1 \text{ mol}} = 1104.24 \text{ g } NO_2$

$2\text{HCl} + \text{H}_2\text{O} \rightarrow 2\text{H}_3\text{O}^+ + 2\text{Cl}^-$
 $2\text{H}_2\text{O} + \text{O}_2 \rightarrow 2\text{H}_2\text{O}_2$

(5)

11. a) (2 mol O_2) $\left(\frac{2 \text{ mol NO}}{1 \text{ mol } \text{O}_2} \right) = 2 \text{ mol NO}$

(84 mol NO) $\left(\frac{30.01 \text{ g}}{\text{mol}} \right) = 720.24 \text{ g NO}$

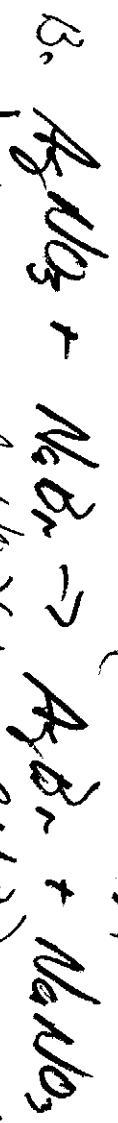


12. a) (925 g CO_2) $\left(\frac{1 \text{ mol}}{44.01 \text{ g}} \right) = 21.01795 \text{ mol } \text{CO}_2$

(21.01795 mol CO_2) $\left(\frac{2 \text{ mol NaOH}}{1 \text{ mol } \text{CO}_2} \right) = 42.04 \text{ mol NaOH}$

b. (21.01795 mol CO_2) $\left(\frac{1 \text{ mol Na}_2\text{CO}_3}{1 \text{ mol } \text{CO}_2} \right) = 21.02 \text{ mol Na}_2\text{CO}_3$

(21.01795 mol CO_2) $\left(\frac{1 \text{ mol H}_2\text{O}}{1 \text{ mol } \text{CO}_2} \right) = 21.02 \text{ mol H}_2\text{O}$



a) (4.5 mol AgNO_3) $\left(\frac{1 \text{ mol NaBr}}{1 \text{ mol } \text{AgNO}_3} \right) = 4.5 \text{ mol NaBr}$

(4.5 mol NaBr) $\left(\frac{102.90 \text{ g}}{\text{mol}} \right) = 463.05 \text{ g NaBr}$

b. (4.5 mol AgNO_3) $\left(\frac{1 \text{ mol AgBr}}{1 \text{ mol } \text{AgNO}_3} \right) = 4.5 \text{ mol AgBr}$

(4.5 mol AgBr) $\left(\frac{187.77 \text{ g}}{\text{mol}} \right) = 845.01 \text{ g AgBr}$

$\frac{107.87}{149.1}$
 $\frac{107.87}{149.1}$
 $\frac{107.87}{149.1}$

$\frac{22.99}{79.91}$
 $\frac{22.99}{79.91}$
 $\frac{22.99}{79.91}$

14. (cont)

(6)



a) $(150g H_2SO_4) \left(\frac{1 \text{ mol}}{98.08g} \right) = 1.52936 \text{ mol } H_2SO_4$

$(1.52936 \text{ mol } H_2SO_4) \left(\frac{2 \text{ mol } NaHCO_3}{1 \text{ mol } H_2SO_4} \right)$

$= 3.05872 \text{ mol } NaHCO_3$
 $= 3.06 \text{ mol } NaHCO_3$

b) $(1.52936 \text{ mol } H_2SO_4) \left(\frac{2 \text{ mol } CO_2}{1 \text{ mol } H_2SO_4} \right)$

$= 3.06 \text{ mol } CO_2$

$(1.52936 \text{ mol } H_2SO_4) \left(\frac{1 \text{ mol } Na_2SO_4}{1 \text{ mol } H_2SO_4} \right)$

$= 1.53 \text{ mol } Na_2SO_4$

$(1.52936 \text{ mol } H_2SO_4) \left(\frac{2 \text{ mol } H_2O}{1 \text{ mol } H_2SO_4} \right)$

$= 3.06 \text{ mol } H_2O$

