C11 - 4.2 - Percent Yield/Percent Purity p.136

$$Percent\ Yield = \frac{mass\ of\ product\ obtained}{mass\ of\ product\ expected} \times 100\%$$

If $20\ g\ of\ O_2$ *is reacted with an excess of* H_2 *,*$7.4\ g\ of\ H_2O$ *is formed. What is the percentage yield?*

$$2H_2 + O_2 = 2H_2O$$

$$mass\ H_2O = 20\ g\ O_2 \times \frac{1\ mol\ O_2}{32\ g\ O_2} \times \frac{1 mol H_2O}{1 mol O_2} \times \frac{18\ g\ H_2O}{1\ mol\ H_2O} = 11.25\ g\ H_2O$$

$$Percent\ Yield = \frac{7.4\ g\ H_2O}{11.25\ g\ H_2O} \times 100\% = 65.8\%$$

$$Percent\ Purity = \frac{mass\ of\ pure\ reactant}{mass\ of\ impure\ reactant} \times 100\%$$

If $100.0g\ of\ FeO$ *produces* $12.9\ g\ of\ pure\ Fe$*, what is the % purity of the* FeO *used?*

$$2FeO + 2C + O_2 \rightarrow 2Fe + 2CO_2$$

$$12.9g\ Fe \times \frac{1mol\ Fe}{55.8\ g\ Fe} \times \frac{2\ mol\ FeO}{2\ mol\ Fe} \times \frac{71.8\ g\ FeO}{1\ mol\ FeO} = 16.6\ g\ FeO$$

$$\%\ Purity = \frac{16.6}{100} \times 100\% = 16.6\%$$

$$2Cu_2(OH)_2CO_3 \rightarrow 2CO_2 + 4CuO + 2H_20$$

If $87\%\ Yield$*, find mass of* $3.7\%\ pure\ Cu_2(OH)_2CO_3$ *to produce* $100g\ CuO$*.*

$$100g\ CuO \times \frac{1mol}{79.5g} \times \frac{2\ mol\ Cu_2(OH)_2CO_3}{4\ mol\ CuO} \times \frac{221g}{mol} = 138.9937\ g\ Cu_2(OH)_2CO_3$$

$$\frac{138.99}{x} = 0.037 \qquad x = 3756.5867$$

$$\frac{3756.5867}{x} = 0.87 \qquad x = 4317.91\ g$$

OR

$$\frac{100}{x} = 0.87$$

$$x = 114.9426$$

$$114.9426g\ CuO \times \frac{1mol}{79.5g} \times \frac{2\ mol\ Cu_2(OH)_2CO_3}{4\ mol\ CuO} \times \frac{221g}{mol} = 159.7629\ g\ Cu_2(OH)_2CO_3$$

$$\frac{159.7629}{x} = 0.037$$

$$x = 4317.91$$