% Yield NOTES

$$\% \text{ YIELD} = \frac{\text{lab result}}{\text{theo (stoich) result}} \times 100$$

The lab reaction: $Fe + CuCl_2 \rightarrow Cu + FeCl_2$

If you started with 3.00 grams of iron nails and excess $CuCl_2$, find the mass of copper metal that you theoretically could produce:

$$3.00\text{g Fe}\left(\frac{1\text{ mol Fe}}{55.85\text{g}}\right)\left(\frac{1\text{ mol Cu}}{1\text{ mol Fe}}\right)\left(\frac{63.55\text{g}}{1\text{ mol Cu}}\right) = 3.41\text{ g Cu (theo)}$$

If you only produced 3.10 grams of Cu in the lab, calculate your percent yield:

$$\%\,y = \frac{3.10\text{g}}{3.41\text{g}} \times 100 = 90.9\%\text{ Yield}$$

Solid lithium hydroxide is used to absorb carbon dioxide released by astronauts in the space station.

EQ: $2LiOH + CO_2 \rightarrow Li_2CO_3 + H_2O$

1) The average human releases 849 g of CO_2 daily. How many molecules of CO_2 is this?

$$849\text{g } CO_2\left(\frac{1\text{ mol } CO_2}{44.01\text{g}}\right)\left(\frac{6.02\times10^{23}\text{ molec}}{1\text{ mol } CO_2}\right) = 1.16\times10^{25}\text{ molecules } CO_2$$

2) How many grams of lithium carbonate are needed to absorb this daily CO_2? (start with molecules)

$$1.16\times10^{25}\text{ molec } CO_2\left(\frac{1\text{ mol } CO_2}{6.02\times10^{23}\text{ molec}}\right)\left(\frac{1\text{ mol } Li_2CO_3}{1\text{ mol } CO_2}\right)\left(\frac{73.89\text{g}}{1\text{ mol } Li_2CO_3}\right) = 1423.8 \approx 1420\text{g } Li_2CO_3$$

3) If you react 849 g of CO_2 and only produce 1400. g of Li_2CO_3, what is your percent yield?

$$\%\,y = \frac{1400.\text{g (lab)}}{1420\text{g (theo)}} \times 100 = 98.6\%\text{ yield}$$