Stoichiometry Walk-Through

Some examples using the mole highway

$N_2 + 3H_2 \rightarrow 2NH_3$

You start with 25.00g of N_2 - How much H_2 do you need?

Grams A → Moles A

Use molar mass A

$$\frac{25.00\text{g } N_2 \mid 1\text{ mol } N_2}{\mid 28.01\text{ g } N_2} = 0.8925\text{mol } N_2$$

Moles A → Moles B

Use mole ratio B/A

$$\frac{0.8925\text{mol } N_2 \mid 3\text{ mol } H_2}{\mid 1\text{ mol } N_2} = 2.678\text{ mol } H_2$$

Grams A → Moles B

Use molar mass A, then mole ratio B/A

$$\frac{25.00\text{g } N_2 \mid 1\text{ mol } N_2 \mid 3\text{ mol } H_2}{\mid 28.01\text{ g } N_2 \mid 1\text{ mol } N_2} = 2.678\text{ mol } H_2$$

Grams A → Grams B

Use molar mass A, then mole ratio B/A, then molar mass B

$$\frac{25.00\text{g } N_2 \mid 1\text{mol } N_2 \mid 3\text{mol } H_2 \mid 2.02\text{g } H_2}{\mid 28.01\text{g } N_2 \mid 1\text{mol } N_2 \mid 1\text{mol } H_2} = 5.409\text{ mol } H_2$$

Grams A → Molecules B

Use molar mass A, then mole ratio B/A, then Avogadro's # B

$$\frac{25.00\text{g } N_2 \mid 1\text{mol } N_2 \mid 3\text{mol } H_2 \mid 6.02\text{x}10^{23}\text{ molec. } H_2}{\mid 28.01\text{g } N_2 \mid 1\text{mol } N_2 \mid 1\text{mol } H_2} = 1.612 \text{ x } 10^{24}\text{ molecules } H_2$$

These are not all the combinations of routes on the mole highway, just some examples of possible routes