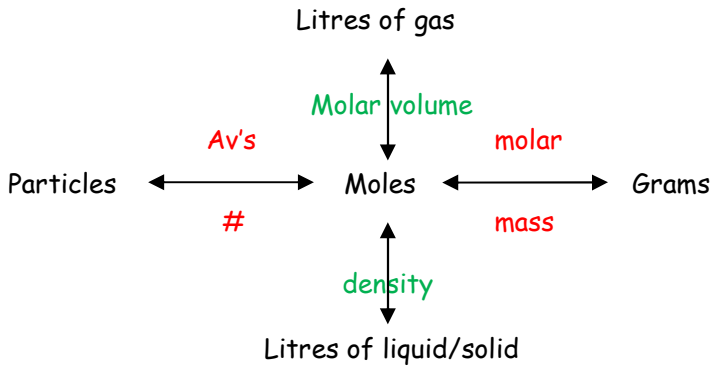
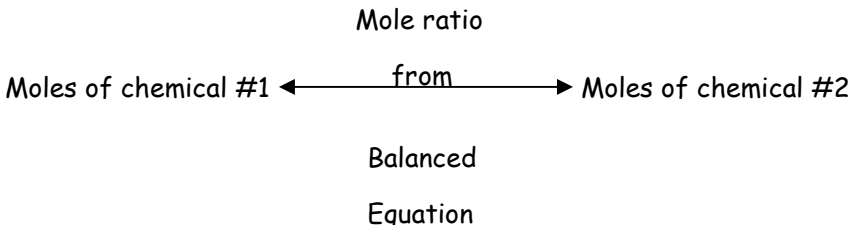
Stoichiometry – Moles, Mass, Molecules and Volume

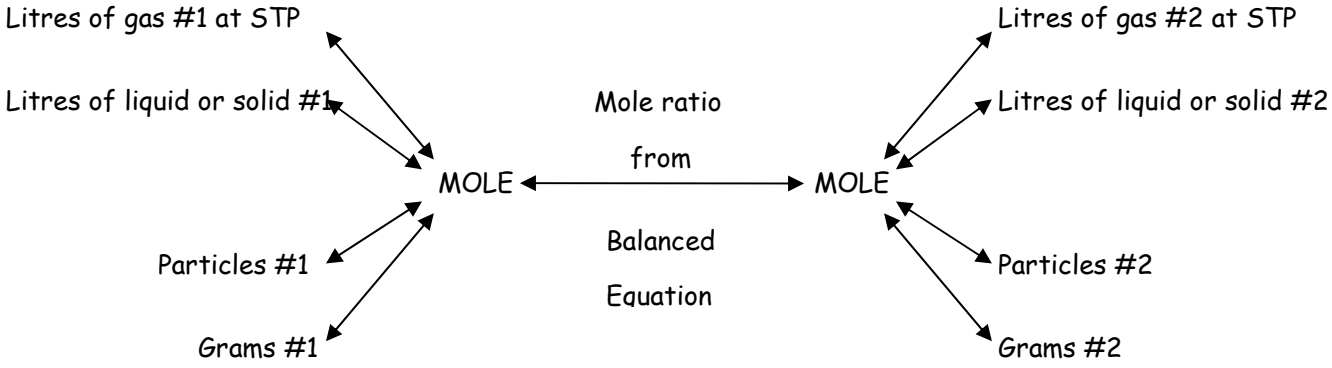
- In the chapter on moles we had . . . .



- Now we know . . .



- So we can . . . .



- Let's practice.

$$C_3H_{8\,(g)} + 5\,O_{2\,(g)} \rightarrow 3\,CO_{2\,(g)} + 4\,H_2O_{(g)}$$

a.) What mass of CO_2 is produced by reacting $2.00\ moles$ of O_2?

Answer – $2.00\ mol\ O_2 \times \frac{3\ mol\ CO_2}{5\ mol\ O_2} \times \frac{44.01\ g\ CO_2}{1\ mol\ CO_2} = 52.8\ g\ CO_2$

b.) What mass of C_3H_8 is required to produce $100.0\ g$ of H_2O?

Answer – $100.0\ g\ H_2O \times \frac{1\ mol\ H_2O}{18.02\ g\ H_2O} \times \frac{1\ mol\ C_3H_8}{4\ mol\ H_2O} \times \frac{44.11\ g\ C_3H_8}{1\ mol\ C_3H_8} = 61.20\ g\ C_3H_8$

c.) What mass of H_2O is produced if $50.0\ L$ of CO_2 is produced at STP?

Answer – $50.0\ L\ CO_2 \times \frac{1\ mol\ CO_2}{22.4\ L\ CO_2} \times \frac{4\ mol\ H_2O}{3\ mol\ CO_2} \times \frac{18.02\ g\ H_2O}{1\ mol\ H_2O} = 53.6\ g\ H_2O$

d.) What volume of $O_{2\,(g)}$ at STP is consumed from the air if $10.0\ L$ of $CO_{2\,(g)}$ at STP is produced?

Answer – $10.0\ L\ CO_2 \times \frac{1\ mol\ CO_2}{22.4\ L\ CO_2} \times \frac{5\ mol\ O_2}{3\ mol\ CO_2} \times \frac{22.4\ L\ O_2}{1\ mol\ O_2} = 16.7\ L\ O_2$

e.) A sample of rock is crushed and $1.35 \times 10^{-6}\ g\ C_3H_{8\,(g)}$ is extracted. How many molecules of CO_2 are produced if the gas is burned in excess $O_{2\,(g)}$?

means all C_3H_8 is used due to lots of O_2

Answer – $1.35 \times 10^{-6}\ g\ C_3H_8 \times \frac{1\ mol\ C_3H_8}{44.11\ g\ C_3H_8} \times \frac{3\ mol\ CO_2}{1\ mol\ C_3H_8} \times \frac{6.022 \times 10^{23}\ molec\ CO_2}{1\ mol\ CO_2} = 5.53 \times 10^{16}\ molec\ CO_2$

Practice – Worksheet – Stoichiometry & Moles, Mass, Molecules & Volume

Stoichiometry & Moles, Mass, Molecules and Volume - Answers

Practice – Lab – Analysis of a Burning Candle Analysis of a Burning Candle - KEY