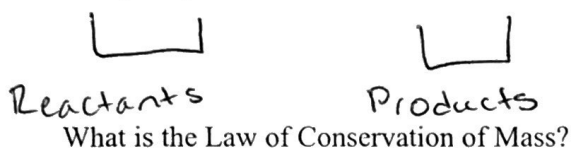


Chemical Reactions and Reaction Stoichiometry

Identify the reactants and products;



Mass is neither created nor destroyed; only changed

What do subscripts and coefficients tell us?

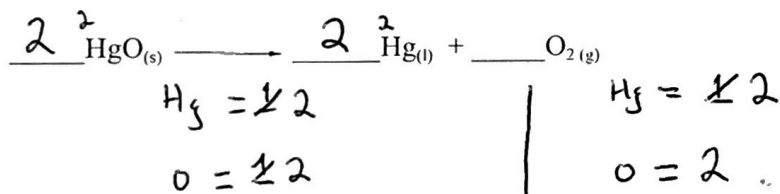
Subscript: Part of the chemical formula + tells how many atoms

↳ If changes → new substance made

Coefficient: Indicate # of molecules

Ex: 2O_2

Balance the following chemical equations:



2 oxygen atoms
per molecule;
4 total atoms

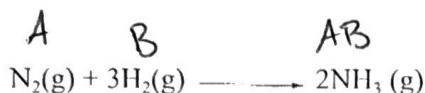


$\text{C} = 2$	$\text{C} = \cancel{1}2$
$\text{H} = 4$	$\text{H} = \cancel{2}4$
$\text{O} = \cancel{2}6$	$\text{O} = \cancel{3}6$

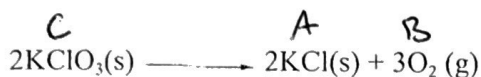


$\text{Fe} = \cancel{1}2$	$\text{Fe} = 2$
$\text{H} = \cancel{2}6$	$\text{H} = \cancel{2}6$
$\text{SO}_4 = \cancel{1}3$	$\text{SO}_4 = 3$

Identify the types of reactions:



Combination / Synthesis

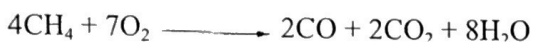


Decomposition / Analysis



Complete Combustion

Formula: Fuel + O₂ → CO₂ + H₂O



Incomplete combustion

Formula: Fuel + O₂ → CO + H₂O

Sometimes CO₂

Calculate the molecular weight of the following compounds:

↳ formula weight or molar mass

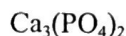


$$C: 6 \times 12.011g = 72.066g$$

$$H: 12 \times 1.008g = 12.096g$$

$$O: 6 \times 15.999g = 95.994g$$

$$72.066g + 12.096g + 95.994g = 180.156g \sim \boxed{180.2g}$$



$$Ca: 3 \times 40.078g = 120.234g$$

$$P: 2 \times 30.974g = 61.948g$$

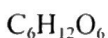
$$O: 8 \times 15.999g = 127.992g$$

$$120.234g + 61.948g + 127.992g = 310.174g \sim \boxed{310.17g}$$

Write the formula for percent composition:

$$\% \text{ Element} = \frac{(\# \text{ of atoms})(\text{atomic weight})}{\text{formula weight of the compound}} \times 100$$

Calculate percent composition of carbon, hydrogen, and oxygen:



$$\% C = \frac{6 \times 12.011g}{180.156g} \times 100 = 40.002\%$$

$$\% H = \frac{12 \times 1.008g}{180.156g} \times 100 = 6.714\%$$

$$\% O = \frac{6 \times 15.999g}{180.156g} \times 100 = 53.284\%$$

100%

$$\frac{\text{Part}}{\text{Whole}} \times 100$$

What is a mole?

A counting term to count atoms

1 mol = amount of particles found in 12g of C-12

How many moles of NaCl are in 735 grams of NaCl? g NaCl $\rightarrow$ moles NaCl

735g NaCl	1 mol NaCl	=	12.6 mol NaCl	MW ^{NaCl} NaCl = 58.443g
	58.443g NaCl			

How many grams is 0.168mol of KMnO_4 ? mol $\text{KMnO}_4 \rightarrow$ g KMnO_4

0.168 mol KMnO_4	158.032g KMnO_4	=	26.5g KMnO_4	MW KMnO_4 = 158.032g
	1 mol KMnO_4			

How many grams of CO_2 will form from 2.7 moles of propane? moles propane $\rightarrow$ g CO_2



$$\text{C} = 3$$

$$\text{H} = 8$$

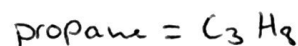
$$\text{O} = 10$$

$$\text{C} = 3$$

$$\text{H} = 8$$

$$\text{O} = 10$$

$$\text{MW CO}_2 = 44.009\text{g}$$



2.7 moles propane	3 mol CO_2	44.009g CO_2	=	356.472g
	1 mol propane	1 mol CO_2		

~ 360

$3.6 \times 10^2 \text{ g CO}_2$