C11 - 2.1 - Conservation of Mass

Conservation of Mass: Mass can neither be created nor destroyed.

$$H_2 + Cl_2 = 2HCl$$

Products Mass			*Reactants Mass*	
$2\,H$	$2\,g$		$2\,H$	$2\,g$
$2\,Cl$	$71\,g$	=	$2\,Cl$	$71\,g$
Total Mass =	$73\,g$		*Total Mass* =	$73\,g$

C11 - 2.2 - Balancing Equations

$\_\_Al + \_\_P \rightarrow \_\_AlP$

$1 - Al - 1$
$1 - P - 1$ ✓

$\_\_H_2 + \_\_Cl_2 \rightarrow \_\_HCl$

$2 - H - 1$
$2 - Cl - 1$

$\_\_H_2 + \_\_Cl_2 \rightarrow \underline{2}\,HCl$

$2 - H - \cancel{1}\ 2$
$2 - Cl - \cancel{1}\ 2$

$\_\_N_2 + \_\_I_2 \rightarrow \_\_NI_3$

$2 - N - 1$
$2 - I - 3$

$\_\_N_2 + \_\_I_2 \rightarrow \underline{2}\,NI_3$

$2 - N - \cancel{1}\ 2$
$2 - I - \cancel{3}\ 6$

$\_\_N_2 + \underline{3}\,I_2 \rightarrow \underline{2}\,NI_3$

$2 - N - \cancel{1}\ 2$
$6\ \ \cancel{2} - I - \cancel{3}\ 6$

$\_\_Fe + \_\_O_2 \rightarrow \_\_FeO$

$1 - Fe - 1$
$2 - O - 1$

$\_\_Fe + \_\_O_2 \rightarrow \underline{2}\,FeO$

$1 - Fe - \cancel{1}\ 2$
$2 - O - \cancel{1}\ 2$

$\underline{2}\,Fe + \_\_O_2 \rightarrow \underline{2}\,FeO$

$2\ \cancel{1} - Fe - \cancel{1}\ 2$
$2 - O - \cancel{1}\ 2$

Write the reactants and products with blanks in front, and an arrow in between.

List the elements below the arrow with dashes on both sides.

Write the number of atoms of each element on the left and right hand side of the dash.

Add numbers in blanks and adjust numbers on both sides of the dash.

Repeat last step until equal number of atoms of each element on both sides.

General Rules:

Complicated compounds first

Single/diatomic elements last.

Sometimes we need to use lowest common multiple "concept".

Double Everything

C11 - 2.3 - Types of Chemical Reactions

Phases

$(s) = solid$ $(l) = liquid$ $(g) = gas$ $(aq) = aqueous$

$$H_2(g) + O_2(g) = 2H_2O(l)$$

Synthesis $Single + Single \rightarrow Compound$

$K + Cl \rightarrow KCl$ $A + B \rightarrow AB$

Decomposition $Compound \rightarrow Single + Single$

$BeS \rightarrow Be + S$ $AB \rightarrow A + B$

Single replacement *One metal steals the other metal's non-metal*

$NaCl + K \rightarrow Na + KCl$ $AB + C \rightarrow AC + B$

Double replacement *They trade the non-metals*

$ZnO + CdSe \rightarrow ZnO + CdSe$ $AB + CD \rightarrow AD + CB$

Combustion $Hydrocarbon + Oxygen \rightarrow Carbon\ Dioxide + Water$

$C_3H_8 + O_2 \rightarrow CO_2 + H_2O$ $C_xH_y + O_2 \rightarrow CO_2 + H_2O$

Neutralization $Acid + Base \rightarrow Salt + Water$

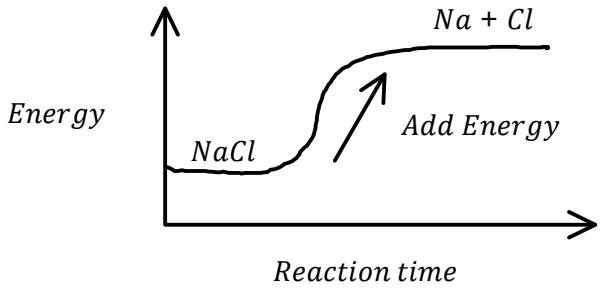
Acid: High concentration of H^+
Base: High concentration of OH^-

$HCl + NaOH \rightarrow NaCl + H_2O$ $HA + BOH \rightarrow AB + H_2O$

C11 - 2.4 - Energy Changes Notes

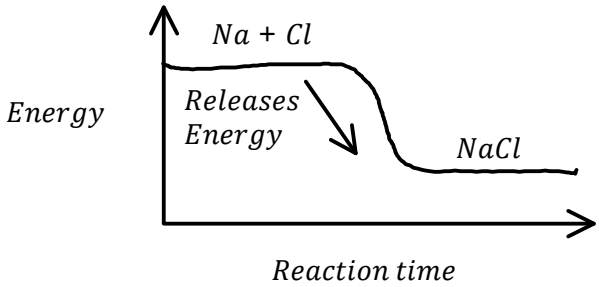
Endothermic Reaction: absorbes heat. Energy is needed to break the bond.

$NaCl + energy \longrightarrow Na + Cl$



Exothermic Reaction: Releases heat.

$NaCl \longrightarrow Na + Cl + energy$



Enthalpy: H, is heat in a system.

ΔH = *change in Enthalpy*

$\Delta H = H_{products} - H_{reactants}$

Endothermic: $\Delta H = +$

Exothermic: $\Delta H = -$