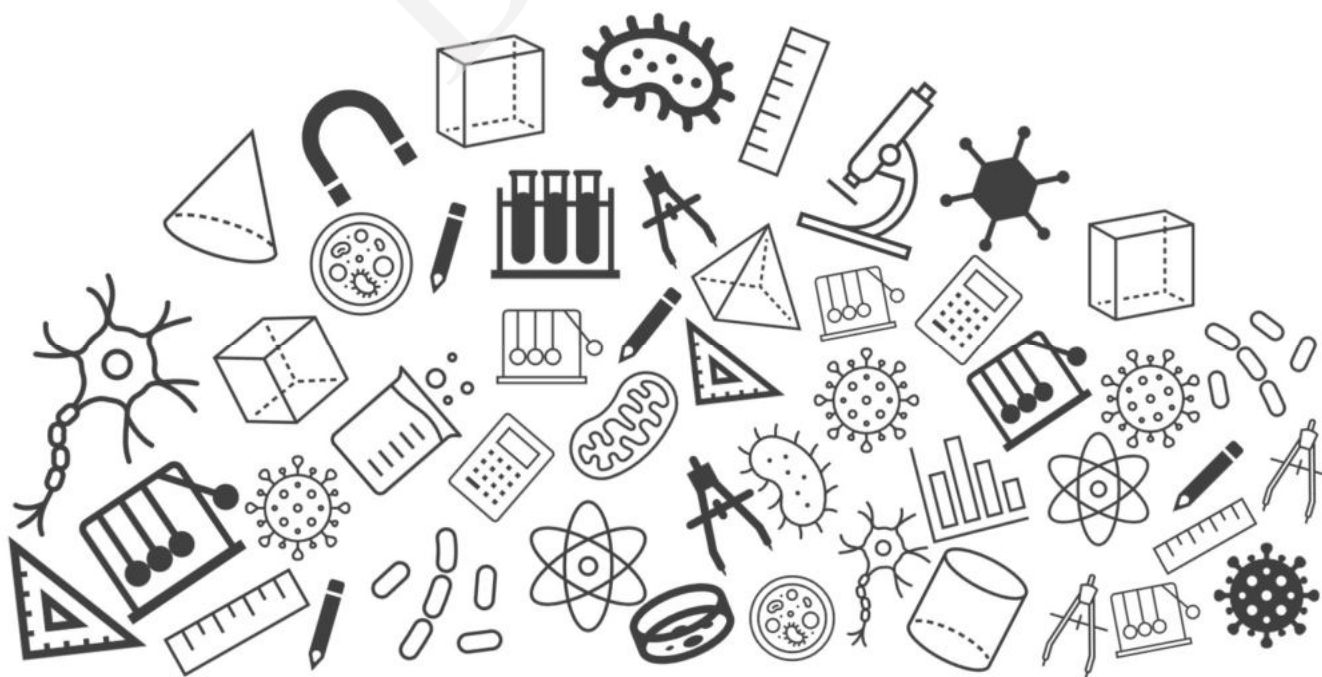




# Grade 10: Science

## Chapter Notes



C H E M I S T R Y

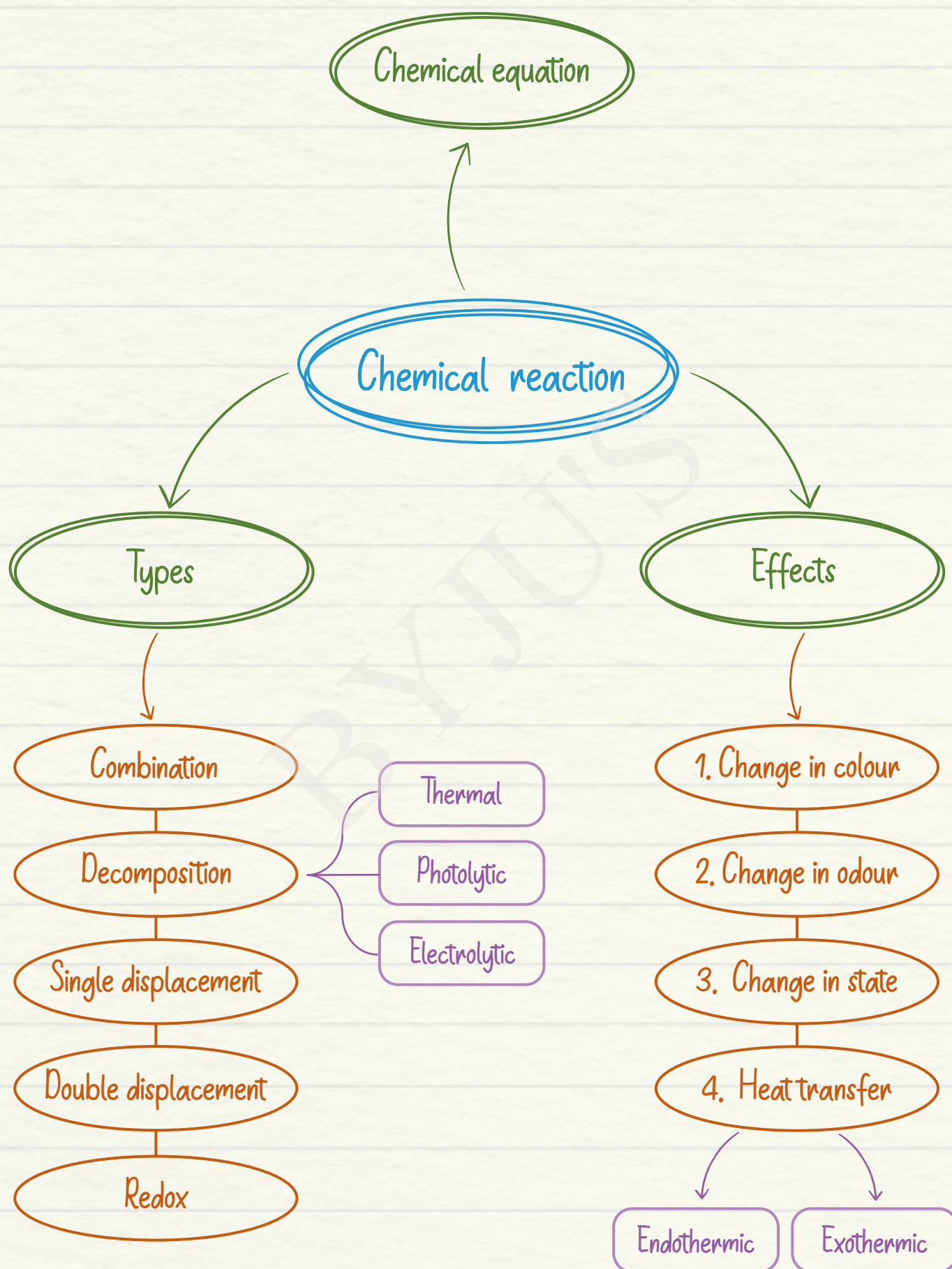


POST CLASS NOTES

# Chemical Reactions and Equations





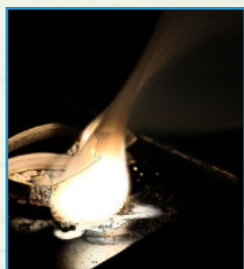


# Chemical Reaction



- One or more participating substances transform to give new substances
- Involves a chemical change

## Examples

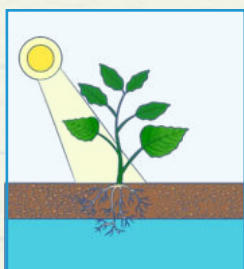


### Burning of magnesium

Magnesium, Oxygen



Magnesium oxide

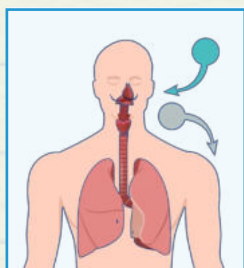


### Photosynthesis

Water, Carbon dioxide



Glucose, Oxygen



### Respiration

Glucose, Oxygen



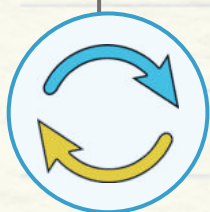
Carbon dioxide, Water



# Effects of Chemical Reaction

Chemical reactions involve one or more of the following:

## 1. Change in Colour

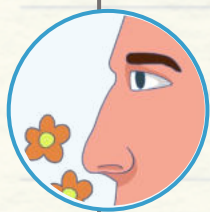


Rusting of iron



Leaves in fall

## 2. Change in Odour

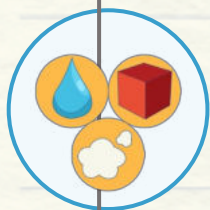


Cooked food



Spoiled fruit

## 3. Change in State



Formation of precipitate

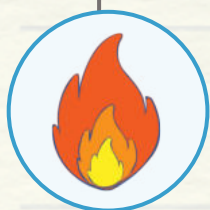
Mixing potassium iodide and lead nitrate



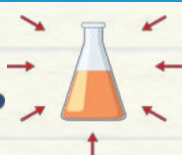
Evolution of gas

Decomposition of lead nitrate on heating

## 4. Heat Transfer



Cooking of food



Endothermic:  
Absorption of heat



Combustion



Exothermic:  
Evolution of heat

# Chemical Equation

## Short-hand representation of a chemical reaction

Reactant 1 + Reactant 2 +...  $\rightarrow$  Product 1 + Product 2 +....

### Examples

1. Burning of magnesium in oxygen is represented as:

Magnesium + Oxygen  $\rightarrow$  Magnesium oxide (Word equation)

$\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$  (Skeleton equation)

2. Photosynthesis is represented as:

Carbon dioxide + Water  $\rightarrow$  Glucose + Oxygen (Word equation)

$\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$  (Skeleton equation)

## Balanced Chemical Equation

Total number of atoms of each element on the reactant side

=

Total number of atoms of each element on the product side

Skeletal Equation	Balanced Equation
$\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$	$2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$
$\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$	$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$



## Skeleton Equation to Chemical Equation



Balance the equation

1



Mention  
physical state  
next to each  
formula

2

solid	(s)
liquid	(l)
gas	(g)
dilute	(dil.)
concentrated	(conc.)
aqueous	(aq.)
precipitate	(↓)
gas evolved	(↑)



Mention reaction conditions  
above/below the arrow

3

Temperature  
Pressure  
Catalyst  
Light/ $h\nu$   
Heat/ $\Delta$



Mention energy transfer

Endothermic:

Heat on reactant side

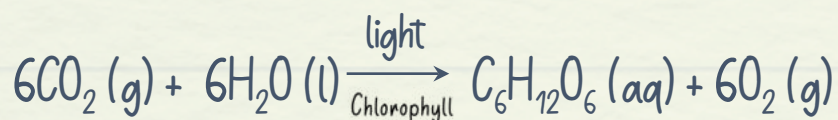
Exothermic:

Heat on product side

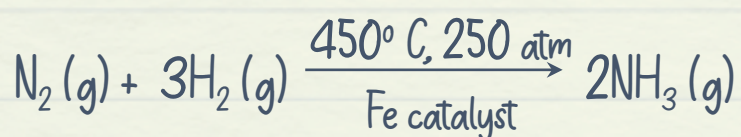
4

### Examples

1. Photosynthesis



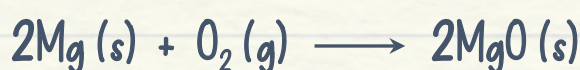
2. Formation of Ammonia



# Types of Chemical Reactions

## 1. Combination Reaction

Two or more reactants give single product

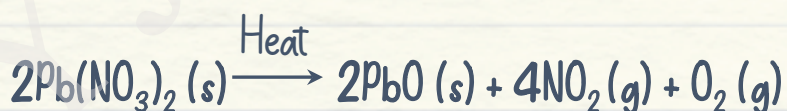


## 2. Decomposition Reaction

Single reactant breaks down into two or more products



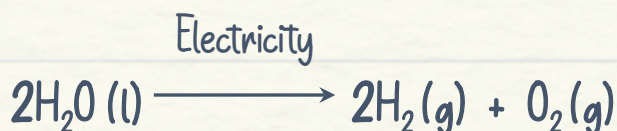
Thermal  
(in presence of heat)



Photolytic  
(in presence of light)

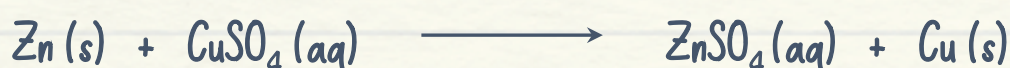


Electrolytic  
(in presence of electricity)



## 3. Single displacement reaction

An element displaces another element from its compound





## 4. Double displacement reaction

Exchange of ions between the reacting compounds



## 5. Redox (Reduction–Oxidation) reaction

**Oxidation:**  
Gain of oxygen, or  
loss of hydrogen

**Reduction:**  
Loss of oxygen, or  
gain of hydrogen

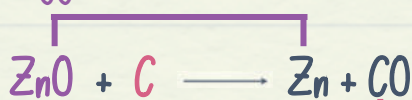
Always occur simultaneously

**Redox**

One reactant undergoes reduction while, the other undergoes oxidation

Examples

Loss of oxygen: Reduction



Gain of oxygen: Oxidation

ZnO is reduced  
C is oxidised

Loss of oxygen: Reduction



Loss of hydrogen: Oxidation

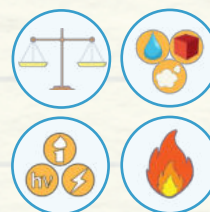
MnO<sub>2</sub> is reduced  
HCl is oxidised



# Mind Map

## Chemical equation

Short-hand representation of chemical reactions using symbols and chemical formulae  
 Reactant  $\rightarrow$  Product



## Chemical reaction

### Types

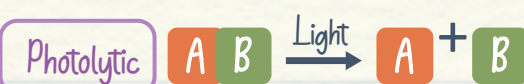
- Formation of new substance
- Involves chemical change

### Effects

#### Combination



#### Decomposition



#### Single displacement



#### Double displacement



#### Redox

One reactant undergoes reduction (addition of H or removal of O) while the other undergoes oxidation (addition of O or removal of H)

#### 1. Change in colour



#### 2. Change in odour



#### 3. Change in state



#### 4. Heat transfer



#### Endothermic



#### Exothermic

