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Chemical Reactions and Equations

Key Points

1 Physical changes

A change in which physical properties of a substance changes but the chemical composition do not change.



Melting



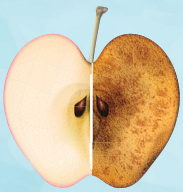
Evaporation



Blowing up a balloon

2 Chemical changes

A change in which one or more substances change into new substances with a different chemical composition.



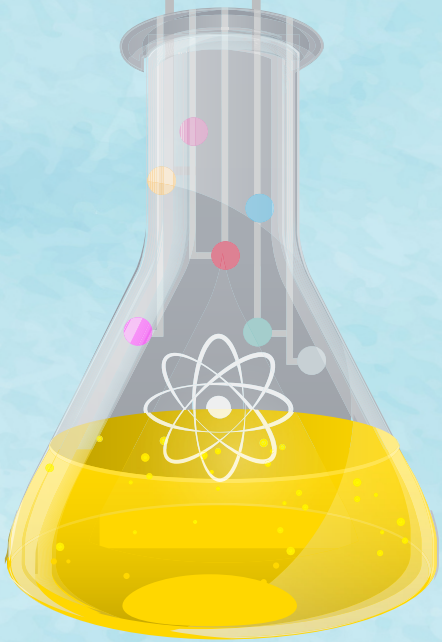
Rotting of fruits



Rusting of iron



Explosion of firework



3

Chemical reaction

The process in which a substance or substances undergo a chemical change to produce new substances, with entirely new properties

4

Characteristics of chemical reactions

- Change in colour
- Change in State
- Evolution of Gas
- change in colour

5

Writing a chemical equation

01 **Word equation**

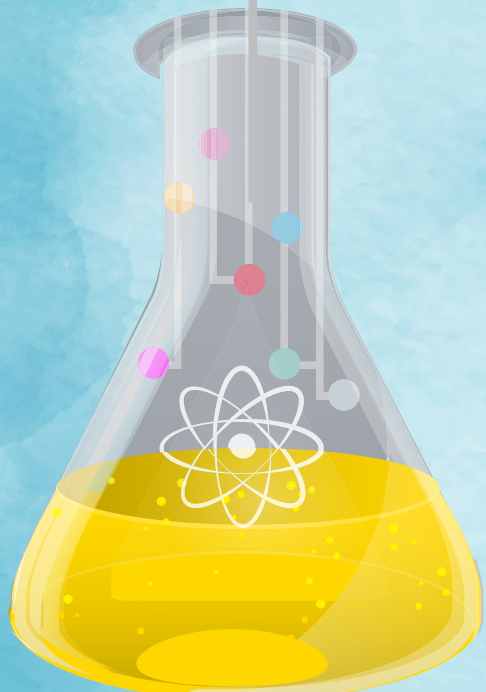
Magnesium + Oxygen ⟶ Magnesium oxide

02 **Chemical equation**

$Mg + O_2 \rightarrow MgO$

6

Balancing of chemical equation



Steps

A Word equation –

Magnesium + Hydrochloric acid ⟶ Magnesium chloride + Hydrogen

B Chemical equation-

$Mg + HCl \longrightarrow MgCl_2 + H_2$

C Enclose all formulae into boxes –

$Mg + HCl \longrightarrow MgCl_2 + H_2$

D Count the number of atoms for all elements.

Elements	Atoms in L.H.S.	Atoms in R.H.S.
Mg	1	1
Cl	1	2
H	1	2

E As the number of atoms is deficient at reactant side, at reactant side HCl is the bigger formula, so we will start with it.

F

- Put coefficient 2 before HCl to make chlorine equal to reactant side.

$$Mg + 2HCl \rightarrow MgCl_2 + H_2$$

- H, automatically gets balanced.

G

- Check the number of atoms of different elements on both sides.
- These are equal. This means that the equation is balanced.

H

- Making chemical equations more informative by writing symbols.
- For solid state -(s)
- For liquid state -(l)
- For gaseous state -(g)
- For aqueous solution -(aq.)
- Formation of gas -(↑)
- Formation of precipitate-(↓)

7 Types of chemical reactions:



Combination Reaction- Two or more substances combine to form a single new substance

$$2H_2 + O_2 \rightarrow 2H_2O$$



Decomposition Reaction- A single compound breaks up into two or more simpler substances

$$H_2CO_3 \rightarrow H_2O + Co_2$$



Displacement reactions - More reactive element displaces a less reactive element from its compounds

$$Zn + 2HCl \rightarrow ZnCl_2 + H_2$$

Activity series of some metals

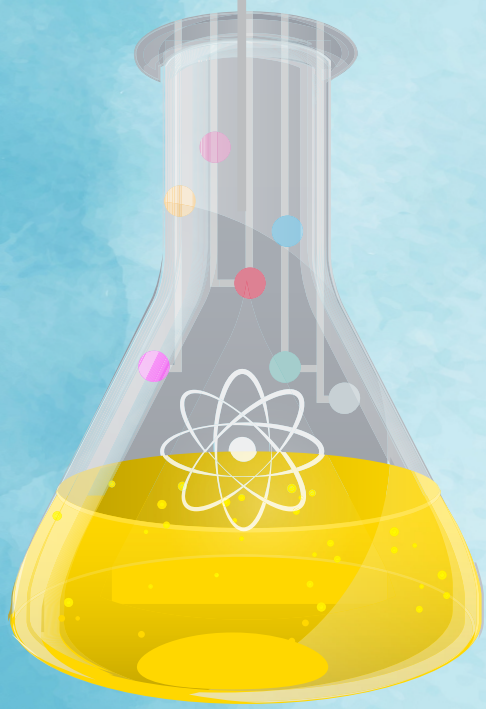
Potassium	K	Most reactive
Sodium	Na	DECREASING REACTIVITY
Calcium	Ca	
Magnesium	Mg	
Aluminium	Al	
Zinc	Zn	
Iron	Fe	
Nickel	Ni	
Tin	Sn	
Lead	Pb	
Hydrogen	H	
Copper	Cu	
Mercury	Hg	
Silver	Ag	
Gold	Au	Least reactive



Double displacement reactions - Two different atoms or groups of atoms are exchanged. also Known as-

- double decomposition reactions
- metathesis reactions

$$AgNO_3 + NaCl \rightarrow NaNO_3 + AgCl$$



Oxidation and reduction reactions-

Oxidation : Addition of oxygen or removal of hydrogen from a substance.

Reduction : Addition of hydrogen or removal of oxygen from a substance.

$$2Mg + O_2 \rightarrow 2MgO$$

8 Corrosion

Electrochemical reaction between a material, usually a metal, and its environment that produces a deterioration of the material.

Rust : Rust is hydrated Iron (III) oxide $[Fe_2O_3.2H_2O]$

Copper reacts with moist carbon dioxide in the air and slowly loses its shiny brown surface and acquires a green coating of basic copper carbonate.



After Corrosion →



Silver articles become black after sometime when exposed to air.



After Corrosion →



Rancidity-

oxidation of oils or fats in food, resulting into a bad taste and bad smell. Oxygen present in air oxidise fats / oil present in food and form volatile substances, which have bad odour.



Prevention of rancidity- Rancidity can be prevented by adding antioxidants to foods, keeping food in refrigerator or air tight containers etc.



