

Super Short Tricky Chemistry By

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 **Introduction :** In the previous class, you have read about physical and chemical changes. Chemical changes result from chemical reaction taking place between substances. In this chapter we shall deal with the chemical reactions and their representation in the form of chemical equations.

 Chemical Reaction:

A process in which the original substances lose their nature & Identity and form new chemical substances with different properties are called chemical **changes**. The process involving a chemical change is called a chemical Reaction.

Some examples occurring in our day life-

- (i) Cooking of Food. Ex.- Tomato + Potato + Brinjal +... → Sabji formed
- (ii) Digestion of food in our body.
- (iii) Burning of fuels like- petrol, LPG etc. Ex.- Petrol, which is a liquid, burns to form water vapour & CO₂ which are gas.

➤ **Changes : Physical & Chemical changes :**

1. Chemical change – one or more new substances with new physical and chemical properties are formed.

Example: $\text{Fe (s)} + \text{CuSO}_4 \text{ (aq.) Green} \rightarrow \text{FeSO}_4 \text{ (aq.) Blue} + \text{Cu (s)}$

Here, when copper sulphate reacts with iron, two new substances, i.e., ferrous sulphate and copper are formed.

2. Physical change – change in colour or state occurs **but no new substance** is formed.

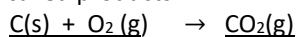
Ex-: Water changes to steam on boiling but no new substance is formed. This involves only a change in state (liquid to vapour).

➤ **What are Reactants & Products ?**

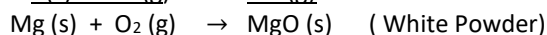
Reactants: The Chemical substances taken originally are called reactants.

Products: and the new chemical substances formed are called products.

Example: (i) Burning of coke in air -



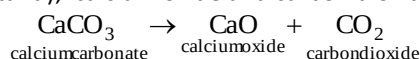
(ii) Burning of Magnesium ribbon in air.



Reactants (L.H.S)

Products(R.H.S)

Similarly, in the breaking up of calcium carbonate (is Reactant); calcium oxide and carbon dioxide are the products.



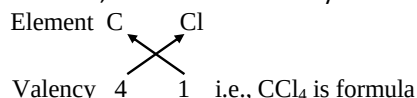
➤ **Tests of Chemical Reaction :** A chemical reaction must satisfy the following :

- There must be either evolution or absorption of heat, i.e., a chemical reaction must be accompanied with change in Temp.
- The reaction must occur between fixed quantities of the reactants.
- There must not be either gain or loss of matter, i.e., a chemical reaction should follow the **law of conservation of mass**.
- The products obtained as a result of chemical reaction must have properties different from those of the reactants.

➤ **Valency :** The number of electrons shared by an atom is called its valency. It is also called the combining capacity of an atom.

Ex.- Cl atom can share one valence electron, its valency is 1, Oxygen can share two valence electrons, its valency is 2. Nitrogen can share 3 valence electrons, its valency is 3, Carbon can share 4 valency electrons, therefore its valency is 4 and so on.

It means if carbon combines with Chlorine, Carbon will share four valence electrons with four chlorine atoms, therefore the molecular formula of the covalent compound will be-



Some Common Mono-atomic ions

+1 Charge	Formula	+2 Charge	Formula	+3 Charge	Formula
Name of ion		Name of ion		Name of ion	
Copper ion (Cuprous ion)	Cu ⁺	Barium ion Cobalt ion	Ba ²⁺ Co ²⁺	Aluminium ion Auric ion	Al ³⁺ Au ³⁺
Potassium ion	K ⁺	Iron (II) ion (Ferrous ion)	Fe ²⁺	Chromium (III) ion	Cr ³⁺
Silver ion	Ag ⁺	*Copper (II) ion	Cu ²⁺	Iron (III) ion (Ferric ion)	Fe ³⁺
Sodium ion	Na ⁺	*Lead (II) ion	Pb ²⁺	Scandium ion	Sc ³⁺
Lithium ion	Li ⁺	Magnesium ion	Mg ²⁺	Arsenic ion	As ³⁺
Aurous	Au ⁺	Manganese (II) ion	Mn ²⁺	Antimony ion	Sb ³⁺
		Zinc ion	Zn ²⁺	Bismuth ion	Bi ³⁺
- 1 Charge	Formula	- 2 Charge	Formula	- 3 Charge	Formula
Name of ion		Name of ion		Name of ion	
Bromide ion	Br ⁻	Oxide ion	O ²⁻	Nitride ion	N ³⁻
Chloride ion	Cl ⁻	Sulphide ion	S ²⁻	Phosphide ion	P ³⁻
Fluoride ion	F ⁻			Boride ion	B ³⁻
Iodide ion	I ⁻				

* These elements show more than one valency.

Some Common Polyatomic ions

- 1 Charge	Formula	- 2 Charge	Formula	- 3 Charge	Formula
Name of ion		Name of ion		Name of ion	
Hydrogen carbonate Or bicarbonate ion	HCO ₃ ⁻	Carbonate ion Manganate ion	CO ₃ ²⁻ MnO ₄ ²⁻	Phosphate ion Arsenate ion	PO ₄ ³⁻ AsO ₄ ³⁻
Hydrogen sulphate or (bisulphate ion)	HSO ₄ ⁻	Thiosulphate ion Silicate ion	S ₂ O ₃ ²⁻ SiO ₃ ²⁻	Arsenite ion	AsO ₃ ³⁻
Hydroxide ion	OH ⁻	Sulphate ion	SO ₄ ²⁻	Phosphite ion	PO ₃ ³⁻
Nitrate ion	NO ₃ ⁻	Sulphite ion	SO ₃ ²⁻		
Chlorate ion	ClO ₃ ⁻	Chromate ion	CrO ₄ ²⁻	Borate ion	BO ₃ ³⁻
Nitrite ion	NO ₂ ⁻	Dichromate ion	Cr ₂ O ₇ ²⁻	Ferricyanide ion	[Fe(CN) ₆] ³⁻
Permanganate ion	MnO ₄ ⁻	Hydrogen phosphate ion	HPO ₄ ²⁻		
Acetate ion	CH ₃ COO ⁻	Oxalate ion	C ₂ O ₄ ²⁻		
Cyanide ion	CN ⁻				
Hypophosphite ion	H ₂ PO ₂ ⁻				
Meta aluminate ion	AlO ₂ ⁻				
+1 Charge				- 4 Charge	
Ammonium ion	NH ₄ ⁺			Carbide ion	C ⁴⁻
				Ferrocyanide ion	[Fe(CN) ₆] ⁴⁻

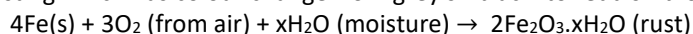
➤ **Chemical Reaction can be observed in the form of -**

A chemical reaction can be determined with the help of any of the following observations:

1) **Change of state :** Some chemical reactions are accompanied (Join in action) by change in state.

for Example: Melting of ice into water. Ice $\rightleftharpoons$ water

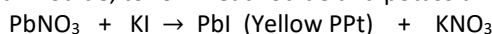
2) **Change in colour :** Iron rusting which has colour change from greyish black to reddish brown.



3) **Formation of a precipitate:** Some chemical reactions are accompanied by the formation of a precipitate.

" Precipitate is a solid substances formed on mixing on two solutions "

when lead nitrate react with potassium iodide, to form lead iodide and potassium nitrate.

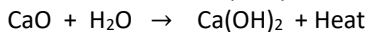


4) Evolution of a gas : Some chemical reactions are accompanied by the evolution of a gas. When Zinc reacts with sulphuric acid, hydrogen gas is evolved. $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2(\text{g})$

5) Change in temperature: Some chemical reactions are accompanied by change in temperature. There are two types of reaction i.e Exothermic (rise of temp.) and Endothermic Reaction (fall of temp.).

Exothermic Reactions: Those reactions in which energy is released in the form of heat are called Exothermic Reactions. (Rise in Temp. are those in which Heat is evolved).

Examples - When water is added into Quick Lime(CaO), taken in a beaker, Slaked Lime, $\text{Ca}(\text{OH})_2$, is formed and the beaker is found to be Quite Hot.



(1) All combustion reactions e.g. $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O} + \text{Heat}$

(2) Termite reactions e.g. $2\text{Al} + \text{Fe}_2\text{O}_3 \rightarrow 2\text{Fe} + \text{Al}_2\text{O}_3 + \text{Heat}$

(3) Respiration e.g. $\text{C}_6\text{H}_{12}\text{O}_6$ (Glucose) + $6\text{O}_2(\text{g}) \rightarrow 6\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{l}) + \text{Energy}$

Combinations reactions are generally exothermic in nature. The decomposition of organic matters into compost is an example of exothermic reaction.

Endothermic Reactions: Those reactions in which energy is absorbed are called Endothermic Reactions. (Fall in Temp. are those in which Heat is absorbed).

Examples - $\text{CaCO}_3 \xrightarrow{\text{Heat}} \text{CaO} + \text{CO}_2$

also, the reaction of **photosynthesis** - $6\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{l}) + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6$ (Glucose) + $6\text{O}_2(\text{g})$

Most of the decomposition reactions are endothermic.

 **Chemical Equation:** The symbolic representation of chemical reaction by using the symbols and formulae is known as Chemical Equation.

➤ **Rules for writing chemical equation :** Certain rules have to be followed while writing a chemical equation.

1. The reactants taking part in the reaction are written in terms of their symbols or molecular formulae on L.H.S of equation.
2. A plus (+) sign is added between the formulae of the reactants.
3. The products of reaction are written in terms of their symbols or molecular formulae on the R.H. S of the equation.
4. A plus (+) sign is added between the formulae of the products.
5. In between the reactants and the products an arrow sign ($\rightarrow$) is inserted to show which way the reaction is occurring.



In this chemical equation, A and B are the reactants, and C and D are the products. The arrow indicates that the reaction proceeds towards the formation of C and D.

➤ **Representation of a chemical equation :** There are two ways of representing a chemical reaction as follows :-

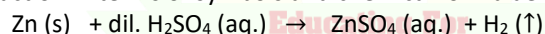
1. In terms of Word equation:

A word equation is a chemical reaction expressed in words rather than chemical formulas. It helps identify the reactants and products in a chemical reaction. For example: Sodium + Chlorine $\rightarrow$ Sodium chloride

The above equation means, "Sodium reacts with chlorine to form sodium chloride."

2. In terms of symbols and formulae (chemical equations):

Representation of a chemical reaction in terms of symbols and chemical formulae of the reactants and products is known as a chemical equation.



 **Note:**

Reactants

Products

1. Physical state of the reactants & the products:

- For solids, the symbol is (s) • For liquids, it is (l) • For gases, it is (g) • For aqueous solutions, it is (aq.)
- For gas produced in the reaction, it is represented by ($\uparrow$) • For precipitate formed in the reaction, it is represented by ($\downarrow$)

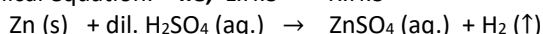
2. Concentration of the Acid: If acid is present as one of the reactants, it may be dilute (dil.) or concentrated (Conc.)

Example- $\text{Cu}(\text{s}) + 4\text{HNO}_3(\text{Conc.}) \rightarrow \text{Cu}(\text{NO}_3)_2(\text{aq.}) + 2\text{NO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l})$

3. Conditions under which the reaction places: The conditions of temperature, Pressure & the presence of catalyst, represented by writing above and/or below the arrow drawn between the reactants and the products. $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \xrightarrow[500^\circ\text{C, 200 atm}]{\text{Fe(C), Mo(p)}} 2\text{NH}_3(\text{g})$

 **Balancing of a Chemical Reaction:**

1. Balanced chemical equation: The chemical equation in which the number of atoms of each element in the reactants side is equal to that of the products side is called a balanced chemical equation. i.e, L.H.S = R.H.S



2. Unbalanced (Skeletal) chemical equation : Such an equation in which the number of atoms of different elements is not equal on the two sides of the equation is called an Unbalanced or Skeletal equation. i.e, L.H.S $\neq$ R.H.S **EX.-** $\text{KClO}_3 \rightarrow \text{KCl} + \text{O}_2$

➤ **Reason of Balancing Equations :** The number of atoms of elements on both sides of a chemical equation should be equal in accordance with the law of conservation of mass.

Law of Conservation of mass: According to the law of conservation of mass, no atoms can be created or destroyed in a chemical reaction, so the number of atoms for each element in the reactants side has to balance the number of atoms that are present in the products side.

In other words,

the total mass of the products is equal to the total mass of the reactants participated in a chemical reaction.

➤ **Steps involved in the balancing of chemical equations:**

Hit & trial method: While balancing the equation, change the coefficients (the numbers in front of the compound or molecule) so that the number of atoms of each element is same on each side of the chemical equation.

Step 1: First of all, write the word equation.

Step 2: To write the skeletal chemical equation.

Step 3: Draw the boxes around each formula.

Step 4: Find out the number of atoms of each element.

Step 5: To select the biggest formula to start balancing: Start to balance the equation with the compound having maximum number of atoms.

Step 6: One by one balance each element on reactant and product side.

Step 7: After balancing number of atoms on both the side of the equation, finally check the correctness of the balanced equation.

Step 8: then write the symbols of the physical state of reactants and products as shown below-

Example: Write the balanced chemical equation for the following reaction: **Steam is passed over heated iron to form magnetic oxide of iron(Fe_3O_4) and hydrogen.**

Step 1: First of all, write the word equation.

Iron + Steam $\rightarrow$ Magnetic oxide of Iron + Hydrogen

Step 2: To write the skeletal chemical equation.

$\text{Fe} + \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + \text{H}_2$



Step 3: Draw the boxes around each formula.

Step 4: Find out the number of atoms of each element.

For Example, on reactant side, 1 for Fe, 2 H, & 1 O and on product side we have, 3 for Fe, 4 for O and 2 for H.

Step 5: Start to balance the equation with the compound having maximum number of atoms.

Step 6: One by one balance each element on reactant and product side. $\text{Fe} + 4 \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4 \text{H}_2$

Step 7: After balancing number of atoms on both the side of the equation, finally check the correctness of the balanced equation.

$3 \text{Fe} + 4 \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4 \text{H}_2$

Step 8: then write the symbols of the physical state of reactants & products as shown - $3\text{Fe(s)} + 4\text{H}_2\text{O(g)} \rightarrow \text{Fe}_3\text{O}_4\text{(s)} + 4\text{H}_2\text{(g)}$

This above equation represents the balanced equation.

> Balancing of Ionic Equations : In these equations, charge balancing of atoms on both sides of the equation.

Ex.- Initial $\text{Cu}^{2+}(\text{aq.}) + \text{H}_2\text{S} \rightarrow \text{CuS(s)} + \text{H}^+(\text{aq})$ **So,** Balanced equation is- $\text{Cu}^{2+}(\text{aq.}) + \text{H}_2\text{S} \rightarrow \text{CuS(s)} + 2\text{H}^+(\text{aq})$

We have balanced the charges. It was + 2 on L.H.S and we have made + 2 on R.H.S. Number of Hydrogen atoms, Cu and Sulphur atoms are also balanced on both sides.

Compound	Formula	Ions involved
Sodium chloride	NaCl	Na^+ and Cl^-
Magnesium chloride	MgCl_2	Mg^{2+} and Cl^-
Magnesium oxide	MgO	Mg^{2+} and O^{2-}
Calcium chloride	CaCl_2	Ca^{2+} and Cl^-
Calcium oxide	CaO	Ca^{2+} and O^{2-}
Ammonium chloride	NH_4Cl	NH_4^+ and Cl^-
Barium chloride	BaCl_2	Ba^{2+} and Cl^-
Potassium nitrate	KNO_3	K^+ and NO_3^-
Ammonium sulphate	$(\text{NH}_4)_2\text{SO}_4$	NH_4^+ and SO_4^{2-}
Cupric sulphate	CuSO_4	Cu^{2+} and SO_4^{2-}
Cupric chloride	CuCl_2	Cu^{2+} and Cl^-

> Electrovalency : The number of electrons lost or gained by the atom to form an ion, are known as electrovalency. Elements which lose electrons show positive electrovalency & those which gain electrons show negative electrovalency.

For example, in the formation of sodium chloride (Na^+Cl^-), the electrovalency of sodium (Na) is +1, while that of chlorine (Cl) is - 1.

Mono-valent/ univalent elements : lose or gain of $1e^-$:
Like- Na, Cl, F

Divalent elements : lose or gain of $2e^-$: Like- Mg, Ca, Ba, O

Trivalent elements : lose or gain of $3e^-$: Like- Al, B

> Characteristics of Electrovalent or ionic Compounds :

- Electrovalent compounds are made up of positively & negatively charged ions.
For Example- NaCl is made up of Na^+ & Cl^- ions arranged in a definite order in three dimensions to form crystals.
- Electrovalent compounds have high melting and boiling points. This is due to the presence of strong electrostatic forces of attraction between the positive and negative ions.
- Electrovalent compounds are usually soluble in water but insoluble in organic solvents such as benzene, acetone, carbon disulphide and carbon tetrachloride.
- Electrovalent compounds conduct electricity in molten state and in their aqueous solutions.

HOT : In solid electrovalent compounds the ions are held together in fixed positions and cannot move. Hence, such compounds in the solid state **do not conduct electricity**.

> Short-cut Technique for balancing a chemical equation: Example: $a \text{CaCO}_3 + b \text{H}_3\text{PO}_4 \rightarrow c \text{Ca}_3(\text{PO}_4)_2 + d \text{H}_2\text{CO}_3$

Set up a series of simultaneous equations, one for each element.

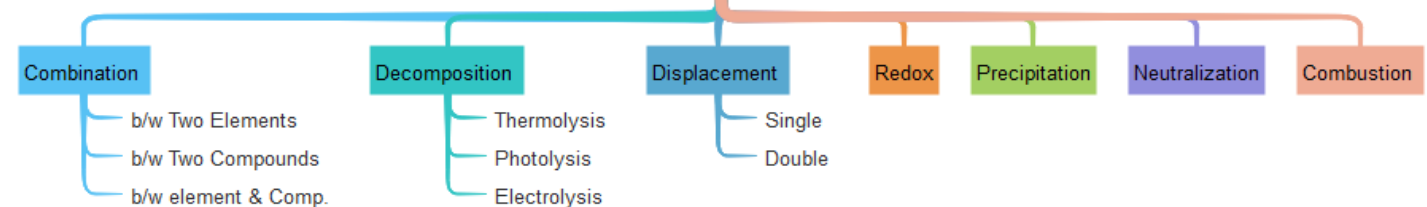
Ca: $a = 3c$ **C:** $a = d$ **O:** $3a + 4b = 8c + 3d$ **H:** $3b = 2d$ **P:** $b = 2c$

Let's set, $c = 1$ Then $a = 3$ and $d = a = 3$ $b = 2c = 2$ So, $a = 3$; $b = 2$; $c = 1$; $d = 3$

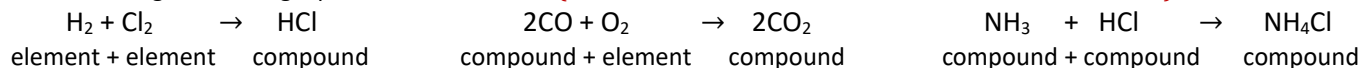
The balanced equation is, $3\text{CaCO}_3(\text{s}) + 2\text{H}_3\text{PO}_4(\text{aq.}) \rightarrow \text{Ca}_3(\text{PO}_4)_2(\text{s}) + 3\text{H}_2\text{CO}_3(\text{aq.})$

Types of Chemical Reactions:

Types of Chemical Reactions



1. Combination reaction: In a combination reaction, two elements or one element and one compound or two compounds combine to give one single product. i.e. $A+B \rightarrow C$ (Oxidation state of both elements in reactant side = 0)



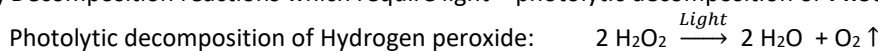
2. Decomposition reaction: A single reactant decomposes on the application of heat or light or electricity to give two or more products. i.e. $AB \rightarrow A + B$

Types of decomposition reactions:

(a.) Decomposition reactions which require heat – thermolytic decomposition or **Thermolysis**.

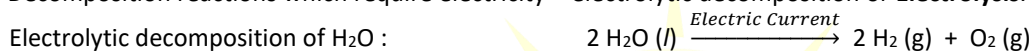


(b.) Decomposition reactions which require light – photolytic decomposition or **Photolysis**.



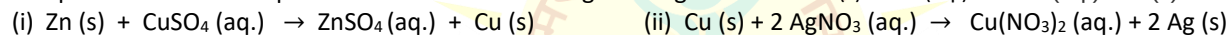
In Presence of light, H_2O_2 decomposes into water & Oxygen. That is why H_2O_2 is kept in coloured bottles so as to cut off light.

(c.) Decomposition reactions which require electricity – electrolytic decomposition or **Electrolysis**.



On testing of gases, Cathode is found to be hydrogen & Anode found to be Oxygen.

3. Displacement reaction: Those reaction in which More reactive element displaces a less reactive element from its compound are called displacement reaction. Exchange of Single atom - $X(s) + YZ(aq.) \rightarrow XZ(aq.) + Y(s)$



(b.) Double displacement reaction: Those reaction in which two different atoms or group are exchange are called double disp. reaction. Exchange of +ve ions to each other of reactants. $A^+B(aq) + C^+D(aq) \rightarrow AD(\downarrow) + CB(s)$

These reaction generally occur between two ionic comp. in the aqueous solution. One of the product is a precipitate.



➤ Relative Reactivities of Metals (Reactivity Series OR Activity Series) :

Arrangement of metals in vertical column in order of their decreasing reactivity from Top to Bottom, is called Activity Series of metals.

Reactivity Series of Metals		
	Potassium	K (Most reactive metal)
	Sodium	Na
	Calcium	Ca
	Magnesium	Mg
These metals are more reactive than hydrogen	Aluminium	Al
	Zinc	Zn
	Iron	Fe
	Tin	Sn
	Lead	Pb
	[Hydrogen]	[H]
These metals are less reactive than hydrogen	Copper	Cu
	Mercury	Hg
	Silver	Ag
	Gold	Au
		(Least reactive metal)

4. Precipitation reaction: An insoluble compound called precipitate forms when two solutions containing soluble salts are combined. $Pb(NO_3)_2(aq.) + 2KI(aq.) \rightarrow 2KNO_3(aq.) + PbI_2(\downarrow)(s)$ (yellow ppt)

5. Redox reaction: Oxidation and reduction take place simultaneously.

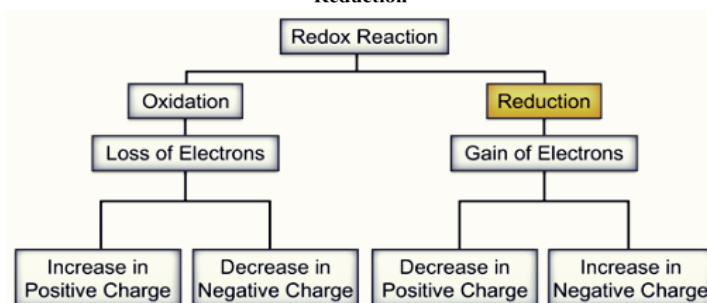
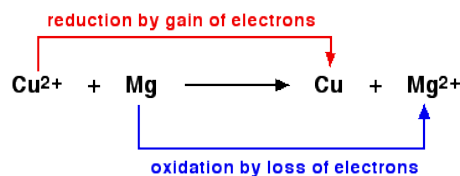
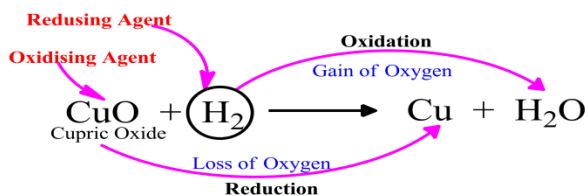
Oxidation: is a process in which involves (i) loses of electrons or (ii) gains of oxygen or (iii) loses of hydrogen.

Reduction: is a process in which involves (i) gains of electrons or (ii) loses of oxygen or (iii) gains of hydrogen.

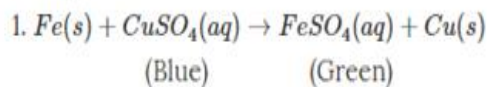
Oxidising agent – is a substance that oxidises another substance and self-gets reduced. (Opposite of Reduction Process)

Reducing agent – is a substance that reduces another substance and self-gets oxidised. (Opposite of Oxidation Process)

It can be explain in two ways : (1) **Classical Concept** - Loss/gain of H_2/O_2 (2) **Electronic Concept** - loss/gain of e-



Examples:



$\text{Fe} \rightarrow \text{Fe}^{+2} + 2e^-$ (oxidation); Fe - reducing agent.

$\text{Cu}^{+2} + 2e^- \rightarrow \text{Cu}(s)$ (reduction); Cu - oxidising agent.

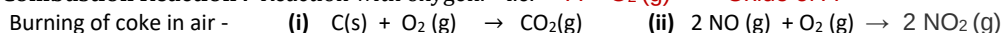
6. Neutralization Reactions : A reaction in which an acid reacts with a base to form salt and water is called Neutralization Reactions.

i.e. Acid + Base $\rightarrow$ Salt + Water

In fact, these reactions are also Double Displacement Reactions.

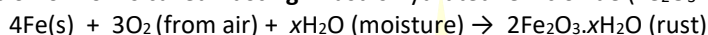


7. Combustion Reaction : Reaction with oxygen. i.e. $\text{A} + \text{O}_2(g) \rightarrow \text{Oxide of A}$



Corrosion: The Process of slowly eating up of the metals due to attack of atmospheric gases such as- O_2 , CO_2 , Water vapour etc, on the surface of metal, is known as Corrosion.

Corrosion of Iron: Corrosion of iron is called **Rusting**. Rust is hydrated ferric oxide ($\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$).



Corrosion of silver: $\text{Ag}(s) + \text{H}_2\text{S}(\text{from air}) \rightarrow \text{Ag}_2\text{S}(\text{Silver sulphide}) + \text{H}_2(g)$

Corrosion of Aluminium : when aluminium is exposed to moist air, its surface is covered with thin layer of aluminium oxide (Al_2O_3). This layer does not allow moist air to come in contact with the metal and hence protect the metal from damage.

Why aluminium does not corrodes ?/Advantages of corrosion: Though corrosion is undesirable, it can be advantageous in case of aluminium which on exposure to air, gets coated with a protective layer of aluminium oxide. This protects the metal underneath from further corrosion and damage.

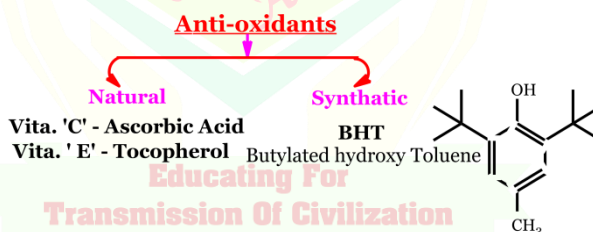
Methods to Prevent Rusting:

(i) By Painting (ii) By greasing and oiling. (iii) By Galvanisation i.e. coating the surface of iron objects with a thin layer of zinc.

Rancidity: The oxidation of fats or oils in food resulting into a foul smell and bad taste is called rancidity. Rancid food causes stomach infection on consumption.

Methods to Prevent Rancidity:

- Use of air-tight containers
- Packaging with nitrogen
- Refrigeration
- Addition of antioxidants or preservatives



आपका परिश्रम + हमारा मार्गदर्शन = निश्चित सफलता



Reaction worksheet

Write balanced equations for the following word equations.

- Potassium chloride + Silver nitrate $\rightarrow$ Potassium nitrate + Silver chloride
- Aluminum hydroxide + Sodium nitrate $\rightarrow$ Aluminum nitrate + Sodium hydroxide
- Iron metal + Copper(II) sulphate $\rightarrow$ Iron(ii) sulphate + copper metal
- Aluminum metal + Copper(II) chloride $\rightarrow$ Aluminum chloride + copper metal
- Potassium bromide $\rightarrow$ Potassium metal + Bromine
- Calcium carbonate $\rightarrow$ Calcium oxide + Carbon dioxide gas
- Zinc metal + Oxygen gas $\rightarrow$ Zinc oxide
- Chlorine gas + Sodium metal $\rightarrow$ Sodium chloride
- Aluminum sulphate + Barium chloride $\rightarrow$ Aluminum chloride + Barium sulphate
- Sodium hydrogen carbonate $\rightarrow$ Sodium carbonate + Carbon dioxide + Water

Question Bank

Very Short answer type questions

- What happens when magnesium ribbon burns in air?
- Name the gas evolved when zinc reacts with dil. HCl.
- What is a chemical equation?
- On what chemical law, balancing of chemical equation is based?
- Represent decomposition of ferrous sulphate with the help of balanced chemical equation.

- When carbon dioxide is passed through lime water, it turns milky, why?
- A zinc rod is left for nearly 20 minutes in a copper sulphate solution. What change would you observe in zinc rod?
- What type of reaction is this: $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$
- Identify the compound oxidized in the following reaction. $\text{H}_2\text{S} (\text{g}) + \text{Cl}_2 \rightarrow \text{S} (\text{s}) + 2\text{HCl} (\text{g})$
- Why should a magnesium ribbon be cleaned before burning in air?
- Why do we apply paint on iron articles?

Short answer type questions

- An iron knife kept dipped in a blue copper sulphate solution turns the blue solution light green. Why?
- A copper coin is kept in a solution of silver nitrate for some time. What will happen to the coin and the colour of the solution?
- What do you understand by precipitation reaction? Explain with suitable examples.
- What is lime-water test for the detection of carbon dioxide?
- Identify the substances that are oxidised and the substances which are reduced in the following reactions.
(i) $4\text{Na} (\text{s}) + \text{O}_2 (\text{g}) \rightarrow 2\text{Na}_2\text{O} (\text{s})$ (ii) $\text{CuO} (\text{s}) + \text{H}_2 (\text{g}) \rightarrow \text{Cu} (\text{s}) + \text{H}_2\text{O} (\text{l})$
- Why is respiration considered an exothermic reaction? Explain.
- What do you mean by a precipitation reaction? Explain by giving examples.
- In the refining of silver, the recovery of silver from silver nitrate solution involves displacement by copper metal. Write down the reaction involved.

Long answer type questions

- What is corrosion? State the conditions necessary for rusting of iron. How rusting is harmful?
- What is rancidity? Write the common method to prevent it.
- a) Why cannot a chemical change be normally reversed?
b) Why is it always essential to balance a chemical equation?
c) What happens when CO_2 gas is passed through lime water and why does it disappear on passing excess CO_2 ?
d) Can rusting of iron takes place in distilled water?
- Give one Example of a combination reaction in which an element combines with a compound to give you a new compound.
- Balance the following chemical equations :
(a) $\text{HNO}_3 + \text{Ca} (\text{OH})_2 \rightarrow \text{Ca} (\text{NO}_3)_2 + \text{H}_2\text{O}$ (b) $\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$ (c) $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$
- What does one mean by exothermic and endothermic reactions? Give examples.
- What is the difference between displacement and double disp. reactions? Write equations for these reactions.

Anjit Academy

Entrance Exam Corner - NTSE/KVPY/Olympiad

Chemistry

- The colour of the precipitate formed when barium chloride solution is mixed with sodium sulphate solution is-
(a) blue (b) black (c) white (d) green
- Which of the following will be required to identify the gas evolved when dilute hydrochloric acid reacts with zinc metal?
(a) Red litmus paper (b) pH paper (c) Lime water (d) A burning splinter
- When a magnesium ribbon is burnt in air, the ash formed is
(a) black (b) white (c) yellow (d) pink
- Dilute hydrochloric acid is added to granulated zinc taken in a test tube. The following observations are recorded. Point out the correct observation.
(a) The surface of metal becomes shining (b) The reaction mixture turns milky
(c) Odour of a pungent smelling gas is recorded (d) A colourless and odourless gas is evolved
- A dilute ferrous sulphate solution was gradually added to the beaker containing acidified permanganate solution. The light purple colour of the solution fades and finally disappears. Which of the following is the correct explanation for the observation?
(a) KMnO_4 is an oxidising agent, it oxidises FeSO_4 (b) FeSO_4 acts as an oxidising agent and oxidises KMnO_4
(c) The colour disappears due to dilution, no reaction is involved
(d) KMnO_4 is an unstable compound and decomposes in the presence of FeSO_4 to a colourless compound
- When crystals of lead nitrate are heated strongly in a dry test tube
(a) crystals immediately melt (b) a brown residue is left
(c) white fumes appear in the test tube (d) a yellow residue is left
- $\text{Fe}_2\text{O}_3 + 2\text{Al} \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$ The above reaction is an example of a-
(a). Combination reaction (b). Double displacement reaction
(c). Decomposition reaction (d). Displacement reaction
- What happens when dilute hydrochloric acid is added to iron fillings? Tick the correct answer.
(a.) Hydrogen gas and iron chloride are produced (b) Chlorine gas and iron hydroxide are produced
(c.) No reaction takes place (d) Iron salt and water are produced
- $2\text{PbO} (\text{s}) + \text{C} (\text{s}) \rightarrow 2\text{Pb} (\text{s}) + \text{CO}_2 (\text{g})$
(a.) Lead is getting reduced (b.) Carbon dioxide is getting oxidised
(c.) Carbon is getting oxidised (d.) Lead oxide is getting reduced
(i) (a) and (b) (ii) (a) and (c) (iii) (a), (b) and (c) (iv) all
- What happens when dilute hydrochloric acid is added to iron filings? Tick the correct answer :
(a) Hydrogen gas and iron chloride are produced. (b) Chlorine gas and iron hydroxide are produced.
(c) No reaction takes place. (d) Iron salt and water are produced.

Sample Paper

Short Tricky Chemistry By
Er. Jitendra Gupta Sir

Class 10th Science

Chemical Reactions & Equations

Marks = 35

(FA) FORMATIVE ASSESSMENT- II

Time = 60 Min.

Instructions :

- Questions : 1 to 5 – 1 Mark each
- Questions : 6 to 10 – 2 Marks each
- Questions : 11 to 15 – 3 Marks each
- Question 16 – 5 Marks

1. What happens chemically when quick lime is added to water?
2. How will you test for the gas which is liberated when HCL reacts with an active metal?
3. What is an oxidation reaction? Is it exothermic or endothermic? Give one example of oxidation Reaction.
4. Give an example of photochemical reaction.
5. Give an example of a decomposition reaction. Describe any activity to illustrate such a reaction by heating.
6. Why is respiration considered as exothermic process?
7. Balance the following chemical equation. (a) $\text{Fe(s)} + \text{H}_2\text{O(g)} \rightarrow \text{Fe}_3\text{O}_4 + \text{H}_2\text{(g)}$ (b) $\text{MnO}_2 + \text{HCL} \rightarrow \text{MnCl}_2 + \text{Cl}_2 + \text{H}_2\text{O}$
8. On what basis is a chemical equation balanced?
9. State any two observations in an activity suggesting the occurrence of a chemical reaction.
10. Name a reducing agent which may be used to obtain manganese from manganese dioxide.
11. What change in colour is observed when silver chloride is left exposed to sunlight ? Also mention the type of chemical reaction.
12. Define a combination reaction. Give one example of an exothermic combination reaction.
13. What is observed when a solution of potassium iodide is added to lead nitrate solution?
What type of reaction is this? Write a balanced chemical equation for this reaction.
14. Distinguish between an exothermic and an endothermic reaction.
15. Distinguish between a displacement and a double displacement reaction.
16. Identify the type of reaction in the following: (a) $\text{Fe} + \text{CuSO}_4\text{(aq)} \rightarrow \text{FeSO}_4\text{(aq)} + \text{Cu(s)}$ (b) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

High Order Thinking (HOT) Questions(This Section for Home Work **ONLY**)

1. What is a redox reaction?
2. What is corrosion? Explain its advantage and disadvantage.
3. What is rancidity? How can we reduce the problem of rancidity?
4. How is corrosion different from rusting?
5. What is meant by endothermic and exothermic reactions? Give suitable example for each.
6. Define different types of chemical reaction and give examples for each.
7. Why is photosynthesis considered as an endothermic reaction?
8. In electrolysis of water, why is the volume of gas collected over one electrode double that of the other electrode?
9. What happens when water is added to solid calcium oxide taken in a container? Write a chemical formula for the same.
10. Give one use of quick lime.
11. Give three types of decomposition reaction.
12. Name the compound used for testing CO_2 gas.

*** With Best Wishes ***

**Answer Key of Entrance Exam Corner - NTSE/KVPY/Olympiad**

1. (c) 2. (d) 3. (b) 4. (d) 5. (a) 6. (b) 7. (d) 8. (a) 9. (i) 10. (a)

- Q. 1. Ans: (c)** This is an example of a double disp. reaction and a white precipitate of barium sulphate is formed.
- Q. 2. Ans: (d)** On reacting with dil. HCl, zinc metal forms zinc chloride and hydrogen gas is evolved. Presence of hydrogen gas can be checked by a burning splinter because H_2 gas burnt in a splinter with a pop sound.
- Q. 3. Ans: (b)** When a Mg ribbon is burnt in air, the ash formed is of magnesium oxide which is white in colour.
- Q. 4. Ans: (d)** Zinc metal reacts with dil. HCl to form zinc chloride and bubbles of colourless and odourless hydrogen gas evolved.
- Q. 5. Ans: (a)** Potassium permanganate (KMnO_4) in the presence of dil. H_2SO_4 , i.e. in acidic medium, acts as a strong oxidising agent. In acidic medium, KMnO_4 oxidises ferrous sulphate to ferric sulphate.
- Q. 6. Ans: (b)** Pungent smelling, brown fumes are evolved due to NO_2 gas and brown coloured residue of lead oxide (PbO) is left.
- Q. 7. Ans: (d)** Displacement reaction
- Q. 8. Ans: (a)** Hydrogen gas and iron chloride are produced

