Chemical Reaction and Equation

CHEMICAL REACTION & EQUATION IN CONCEPTION

<u>§§</u> <u>INTRODUCTION</u>

• Change is the law of nature. Scientist classify these changes as physical changes and chemical changes. When a chemical change occurs, a chemical reaction is said to have taken place.

Physical change :- A change in which the physical properties of the substance changes but the chemical composition does not change. The substance is restored to its original state as soon as the cause of change is withdrawn.

Chemical change :- In a chemical change, at least one of the reacting substance changes into a new substances with a different composition. The new substances can not be changed back to the original substance even if the cause of change is withdrawn.

Ifference between physical & chemical change :-

S.No.	Physical change	Chemical change
1	The identity of the substance is maintained.	The identity of the original substance is completely lost.
2	The change is temporary, the substance returns to its original state as the cause of. change is withdrawn	The change is permanent.
3	No new substance is produced.	A new substance is always produced.
4	Heat change may or may not occur.	Heat change may occur.
5	Only the physical state or some of the physical properties of the substances are changed	The substance after the change can not come back to its original state even when the cause of change is withdrawn.

<u>Chemical reaction :-</u> The processes, in which a substance or substances undergo a chemical |
 change to produce new substance or substances, with entire new properties, are known as |
 chemical reaction.

The nature and identity of products totally changes from the reactants. Observations which determines whether the chemical reaction has taken place or not.

- (a) Chemical reaction must be associated with change in temperature i.e. Heat should be either evolved or absorbed.
- (b) The reaction must occur between fixed quantities of the reactants.
- (c) The chemical reaction should follow the law of conservation of mass.
- (d) The products obtained must have properties different from those of the reactants.
- **Example –** (i) When potassium nitrate is heated, it gives potassium nitrite and oxygen.
 - (ii) When sodium reacts with water sodium hydroxide is produced and hydrogen gas is liberated.

As description of a chemical reaction in a sentence form is qute long so when it is written in | shorter form by using words and some signs (+ for addition & arrow (\rightarrow) to show the direction), |

VIII - CLASS

CHE	MISTRY Chemical Reaction and Equation
	then it is called Word equation .
 <u>¶¶</u> 	Word equation :- A chemical equation which represents a chemical reaction briefly in words is called word equation.
	Ex. – For the example (ii) the word equation is
 	Sodium + water \rightarrow Sodium hydroxide + Hydrogen
<u>¶¶</u> 	Reactants :- The substance or substances which takes part in a chemical reaction are called reactants.
<u>¶¶</u> 	Products :- The new substance or substances formed as a result of a chemical reaction are called products.
 	In the above reaction sodium & water are reactants and sodium hydroxide & hydrogen are products.
<u>88</u>	RULES FOR WRITING A WORD EQUATION
— 	 (i) The substances taking part in chemical reaction reactants are always written on the left hand side of arrow.
 	(ii) The substances formed after the chemical reaction, products are always written on the right hand side of arrow.
 	(iii) A plus sign (+) is put in between the reactants or between the products. If their number is two or more.
 	(iv) An arrow (\rightarrow) is put between the reactants and products, the arrow shows the direction of the reacton in which the reaction proceeds. The arrow is read as "to yield" or "to form" .
ί <u>Ψ</u> Ι	In the word equation when symbols and chemical formulae of the reactants and products are used then it is called as chemical equation.
	Example – Na + $H_2O \rightarrow NaOH + H_2$
<u>Φ</u> 	i.e. A chemical equation is a statement that describes a chemical reaction in terms of symbols and formulae. In this equation the law of conservation of mass is not obeying. Such chemical equation is called skeletal equation or unbalanced equation.
<u>Φ</u> 	A chemical equation expressed in symbols and formulae, such that the number of atoms of different elements towards the side of the reactants is not equal to the number of atoms of the products is called skeletal equation or unbalanced equation.
<u>Φ</u>	To make this equation meaningfull, this equation is balanced then it is called balanced chemical equation.
i	
ļ	
1	

Chemical Reaction and Equation

		Charge Table	e		
–1 Charge Name of Ion	Formula	-2 Charge Name of ion	Formula	-3 Charge Name of ion	Formula
Bromide ion	Br	Oxide ion	O ^{2–}	Nitride ion	N ³⁻
Chloride ion	СГ	Sulphide ion	S ^{2–}	Phosphide ion	P^{3-}
Fluoride ion	F			Boride ion	B^{3-}
lodide ion	Г				
Hydrogen carbonate or (bisulphate ion)	HCO ₃ ⁻	Carbonate ion	CO3 ²⁻	Phosphate ion	PO4 ^{3–}
Hydrogen sulphate or (bisulphate ion)	$\mathrm{HSO_4}^-$	Manganate ion	MnO ₄ ²⁻	Arsenate ion	AsO4 ³⁻
Hydroxide ion	OH^-	Thiosulphate ion	$S_2O_3^{2-}$	Arsenite ion	AsO3 ³⁻
Nitrate ion	NO ₃ ⁻	Silicate ion	SiO ₃ ²⁻		
Chlorate ion	ClO3 ⁻	Sulphate ion	SO_4^{2-}	Phosphite ion	PO3 ³⁻
Nitrite ion	NO_2^-	Sulphite ion	SO3 ²⁻	Borate ion	BO_3^{3-}
Permanganate ion	MnO_4^-	Chromate ion	CrO4 ²⁻	Ferricyanide ion	[Fe(CN) ₆] ³⁻
Acetate ion	CH ₃ COO ⁻	Dichromate ion Hydrogen Phosphate ion	$Cr_2O_7^{2-}$	ei0 ^{f1}	
Hypophosphite ion	H ₂ PO ₂ ⁻	Oxalate ion	$C_2 O_4^{2-1}$		-4 Charge
Meta aluminate ion	AlO ₂			Carbide ion	C ⁴⁻
	+1 Charge	FOU	2	Ferrocyanide ion	[Fe(CN) ₆] ⁴
Ammonium ion	NH_4^+				

$\underline{\Psi}$ One which contains an equal number of atoms of each element on both sides of the equation.

$\underline{\Phi}$ Balancing chemical equations :-

The simple equations are balanced by **"hit and trial method"**. Which is done in following steps.

<u>Step (i)</u> — Count the no. of atoms of various elements on both sides of the equation

Example – Fe + $H_2O \rightarrow Fe_3O_4 + H_2$

Element	No. of atoms in reactants (LHS)	No. of atoms in products (RHS)
Fe	1	3
Н	2	2
0	1	4

<u>Step (ii)</u> – Start balancing with the compound which contains maximum number of atoms. It may be a reactant or product. In that compound select the element which has maximum number of atoms.

According to this rule Fe₃O₄ has maximum number of atoms & oxygen has 4 atoms so it is selected.

Chemical Reaction and Equation

			· · · ·		
	S.No.	Atoms of oxygen	In reactants	In products	
	1	Initial	1	4	
1	2	To balance	1 ×4	4	
			•		
So the partly balar	nced	equation is			
Fe + 4	H ₂ O	$\rightarrow \mathrm{Fe_3O_4} + \mathrm{H}$	H ₂		
Step (iii) – Fe and H are	e not l	balanced in th	e above reaction	so the above re	eaction repeat the above
process for both i.	e.				
S.I	No.	Atoms of	In reactants	In products	5
		Hydrogen			
i '	1	Initial	8	2	
	2	To balance	8	2×4	
Now the equation	n hor	compe ae			
l Le Le	+ 4H	$I_2O \rightarrow Fe_3O_4$	+ 4H ₂	4.01	
Step (iv) – Balance the	Iron	atoms similar	ly.		
S.1	NO. At	toms of Iron	In reactants	In products	
i 🗕					
	1	Initial	- 60 ^w	3	
	2	l'o balance	1 × 3	3	
Now the equation	is		01-6		
ן סרי	e + 4	$\Pi_2 O \rightarrow Fe_3 O$	4 ⁺ 4 ⁻ 2		
Step (v) – Finally check	the c	orrectness of	the balanced eq	uation by counti	ing the number of atoms
on both sides of th	ie equ	uation.			
İ	Ele	ment N	lo. of atoms in	No. of atom	s in products
		r	eactants (LHS)	(R	HS)
		Fe	3		3
1			8		8
Ì		0	4		4
Step (vi) - To make cher	nical	equation more	e informative phys	sical states of th	e reactants and products
are mentioned as	for so	, blid (s), liquid (l), gas (g) and for	aqueous soluti	on of reactant or product
(aq) is written.					
Now the equation	beco	mes as			
	3Fe(s	s) + 4H ₂ O(a)	→ Fe₂O₄(s) + 4	H ₂ (a)	
Symbol (a) with wa	ater is	s written to sho	by that water is u	sed in the form of	of steam in this equation.
It a gas is evolved	in a r	reaction it can	be shown by the	e symbol (↑) afl	ter the formula i.e. arrow
pointing upwards of	e.g.				
VIII - CLASS					66

2Na(s) + 2H₂O(l)
$$\rightarrow$$
 2 NaOH(aq) + H₂(g) or H₂(\uparrow)

The symbol (\downarrow) or ppt is be written for precipitate.

NaCl + AgNO₃ \rightarrow NaNO₃ + AgCl (\downarrow) or ppt.

Reversible reaction is represented by (\rightleftharpoons) symbol and irreversible reaction by (\rightarrow) symbol.

The heat evolved in chemical reaction is written on the right side by putting positive (+) sign and heat absorbed in the chemical reaction is written on the right hand side by putting negative (-) sign.

 $N_2 + 3H_2 \rightleftharpoons 2NH_3 + 22400$ calorie (Exothermic reaction)

 $N_2 + O_2 \rightleftharpoons 2NO - 43200$ calorie (Endothermic reaction)

Some times the reaction conditions, such as temperature, pressure, catalyst etc. are written above or below the arrow in the equaton e.g.

$$N_2 + 3H_2 \xrightarrow{200 \text{ atmosphere}} 2NH_3 + 22400 \text{ calorie heat}$$

450°C (Fe-Mo)

Exothermic reaction :- The reaction in which heat is liberated (or given out) is called an exothermic reaction

Ex – C(s) + O₂(g)
$$\rightarrow$$
 CO₂(g) + Heat (393 kJ/mol)

Endothermic reaction :- The reaction in which heat is absorbed (or taken in) is called an endothermic reaction

Ex – C(s) + 2S(g) \rightarrow CS₂(g) – Heat (92 kJ/mol)

The reaction with + Heat term on the product side are called exothermic reaction, while those with –Heat term on the product side are called endothermic reactions.

During respiration, the digested food gets oxidised and the energy is released. That is why, it is considered as an exothermic reaction.

<u>¶</u> Balancing of a chemical equation is necessary because no matter (hence, no atom) is lost or gained during a chemical reaction.

ILLUSTRATIONS

Q.1 Translate the following statements into chemical equations and then balance them.

(A) Hydrogen gas combines with nitrogen to form ammonia

(B) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.

(C)Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.

(D)Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

Ans. (A) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

 $(B) 2H_2S + 3O_2 \rightarrow 2H_2O + 2SO_2$ from air $(C)3BaCl_{2}(aq) + Al_{2}(SO_{4})_{3}(aq) \rightarrow 2AlCl_{3}(aq) + 3BaSO_{4}(s)$ White ppt. $(D)2K(s) + 2H_2O(I) \rightarrow 2KOH + H_2(g)$ Q.2 Balance the following chemical equations. (A) $HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + H_2O$ $(B) \text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$ Ans. (A) $2HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + 2H_2O$ (B) 2NaOH + $H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$ **Q.3** Write the balanced chemical equations for the following reactions. (A) Calcium hydroxide + Carbon dioxide \rightarrow Calcium carbonate + water (B) Zinc + Silver nitrate \rightarrow Zinc nitrate + Silver (C)Aluminium + copper chloride \rightarrow Aluminium chloride + Copper (D)Barium chloride + Potassium sulphate \rightarrow Barium sulphate + Potassium chloride. Ans. (A) $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$ calcium carbon calcium carbonate hydroxide dioxide (B) Zn + 2AgNO₃ \rightarrow Zn(NO₃)₂ + 2Ag zinc silver nitrate zinc nitrate silver 2AI + $3CuCl_2 \rightarrow 2AICl_3$ + 3Cu(C) aluminium copper aluminium copper chloride chloride (B) $BaCl_2 + K_2SO_4 \rightarrow BaSO_4 + 2KCl$ barium potassium barium potassium chloride sulphate sulphate chloride Q.4 Write the balanced chemical equation for the following and identify the type of reaction in each case -(A) Potassium bromide(aq) + Barium iodide(aq) \rightarrow Potassium iodide(aq) + Barium bromide(s) (B) Zinc carbonate (s) \rightarrow Zinc oxide (s) + Carbon dioxide(g) (C)Hydrogen(g) + Chlorine(g) \rightarrow Hydrogen chloride(g) (D)Magnesium(s) + Hydrochloridc acid(aq) \rightarrow Magnesium chloride(aq) + Hydrogen(g) **Ans.** (A) $2KBr(aq) + Bal_2(aq) \rightarrow 2KI(aq) + BaBr_2(aq)$ This reaction is a double-displacement reaction. (B) $ZnCO_3(s) \rightarrow ZnO(s) + CO_2(g)$

CHEN	IISTRY Chemical Reaction and Equation
	This reaction is a decomposition reaction
Q.5	Why should a magnesium ribbon be cleaned before burning in air?
Ans. 	Magnesium reacts with the constituent gases of the atmosphere to form various compounds which get deposited over its surface. The ribbon is cleaned before burning to remove the layer of these compounds so that pure magnesium can burn in air.
 	ILLUSTRATIONS-2
 1.	What is the basis of a balanced chemical equation ?
	Or
	State the law on which a balanced chemical equation is based.
	Or
	State the law of conservation of mass.
	Or
	On what basis is a chemical equation balanced ?
Ans. 	The basis of balanced chemical equation is the law of conservation of mass. Mass can neither be created nor destroyed in a chemical reaction.
2.	Would you call digestion of food in our body a chemical change ?
Ans.	Yes. It is a chemical change.
3.	Balance the following chemical equation :
	$FeSO_4 \xrightarrow{Heat} Fe_2SO_3 + SO_2 + SO_3$
Ans.	Balanced chemical equation is
	$2FeSO_4 \xrightarrow{\text{Heat}} Fe_2SO_3 + SO_2 + SO_3$
4 .	Balance the following chemical equation :
	$MnO_2 + HCI \longrightarrow MnCl_2 + Cl_2 + H_2O$
Ans.	Balanced chemical equation is
	$MnO_2 + 4HCI \longrightarrow MnCl_2 + Cl_2 + 2H_2O$
5.	Write a combination reaction in which two gases combine.
Ans.	Hydrogen and chlorine gases combine to form hydrogen chloride
 	$H_2(g) + Cl_2(g) \longrightarrow 2HCl(g)$
6 . 	What change in colour is observed when white silver chloride is left exposed to sunlight ? What type of chemical reaction is this ?
Ans. 	When silver chloride is exposed to sunlight, the white colour of silver chloride changes to grey colour. This is a photochemical decomposition reaction.

 	$2AgCI(s) \xrightarrow{sunlight} 2Ag(s) + Cl_2(g)$
7.	Why do we apply paint on iron articles ?
Ans.	We apply paint on iron articles to protect them from corrosion.
 	How can you help your mother in keeping the fried items so that they do not develop a bad smell and their shelf life is increased ?
Ans. 	Since we cannot pack the fried objects in the atmosphere of nitrogen at home but we can increase their shelf life by keeping them in airtight containers. In this way they do not come in contact with oxygen. Their shelf life can further be increased by keeping them in fridge at low temperature.
9.	A solution of a substance 'X' is used for white washing.
	(i) Name the substance 'X' and write its formula.
ļ	(ii) Write the reaction of the substance 'X' named
	in (i) above with water.
Ans.	(i) Calcium oxide or quick lime, its formula is CaO.
 	(ii) $CaO(s) + H_2O(l) \longrightarrow Ca(OH)_2(aq)$ Quick lime water Slaked lime
10.	Write any two limitations of a chemical equation.
Ans.	A chemical equation does not provide the following informations :-
 	(i) Whether the reaction is fast, slow or instantaneous i.e. the rate of the reaction is not shown by a chemical equation.(ii) Whether the reaction goes to completion or is stopped in between i.e., the extent to which a reaction takes place is not known from a chemical equation.
11.	Balance the following equations :
	(i) $\text{FeCl}_3 + \text{NH}_4\text{OH} \longrightarrow \text{Fe}(\text{OH})_3 + \text{NH}_4\text{Cl}$
į	(ii) $Na_2S_2O_3 + I_2 \longrightarrow Na_2S_4O_6 + 2Nal$
 Ans.	Balanced equations :-
ļ	(i) $FeCl_3 + 3NH_4OH \longrightarrow Fe(OH)_3 + 3NH_4CI$
1	(ii) $2Na_2S_2O_3 + I_2 \longrightarrow Na_2S_4O_6 + 2Nal$
ļ	
ļ	
1	

 <u>PRE</u>	VIOUS YEARS BOARD QUESTIONS :
 1.	What happens chemically when quick lime is added or water ?
 Ans.	Calcium hydroxide (or slaked lime) is formed accompanied by a hissing sound. So much
	heat is evolved during the reaction that the reaction mixture starts boiling. The chemical
	equation for the reaction is :
	$CaO(s) + H_2O(aq) \longrightarrow Ca(OH)_2(s) + heat$
	(Quick lime) (Slaked lime)
2.	What is an oxidation reaction ? Identify in the following reactions :
	(i) the substance oxidised (ii) the substance reduced.
	$ZnO + C \longrightarrow Zn + CO$
Ans.	Oxidation involves the addition of oxygen or the removal of hydrogen in a chemical reaction
	while reduction involves the addition of hydrogen or removal of organ.
	In the given reaction :
	(i) Carbon (C) is oxidised to carbon monoxide (CO).
	(ii) Zinc oxide (ZnO) is reduced to zinc (Zn)
3.	Which gas is evolved when dilute hydrochloric acid reacts with zinc? Write the molecular
	formula of the gas.
Ans.	Hydrogen gas is evolved. Its molecular formula is H ₂ .
4.	State any two observation in an activity which may
	suggest that a chemical reaction has taken
	place. Give examples in support of your answer.
Ans.	(i) In a tube take small amount of solid sodium
	carbonate (Na ₂ CO ₃). To this add a few drops Lime water tums milky
	of hydrocloric acid.
	(ii) A colourless and oduless gas will evolve which shows that a chemical reaction has
 	taken place. The gas will turn lime water milky when passed through it.



CHE	MISTRY		Chemical	Reaction and Equation
9.	Chemical equations a A) Respiration proces	re takes place in s	B) Photosynthes	is
I	C) Preparation of drug	gs	D) solar system	
10.	when carbon and oxy	gen reacts ,the possibl	e products are	
	A) CO	B) CO ₂	C) C_2O_3	D) C ₂ O
11.	Reacion between iron	and oxygen gives		
	A) Haematite	B) Magnatite	C) Dolomite	D) Salt
111.	<u>True or False</u>			
12.	Potassium nitrate deco	mposes on heating to	form potassium nitrite	and oxygen
13.	Respiration process is	the reverse of photosy	Inthesis	
14.	The chemical substant	th water produce hydro	ogen gas. vith upword arrow mar	k in the chemical
15.	reaction are dases		nui upwaru arrow man	
16	An unbalanced equation	n is also called as stor	hiometric equation	
17.	The chemical substan	ces which are shown w	ith downward arrow n	ark in the chemical
	reaction are precipitate			
18.	$2KC\ellO_2 \longrightarrow 2KC\ell +$	- 3O ₂	40	
	The number of 'K' atom	is present in the above	equation in total are 4	
19.	The sign of an arrow(-	$oldsymbol{ ightarrow})$ is read yield	000	
IV.	Odd one out			
20.	respiration , photosyntl	nesis , heating of merc	uric oxide, decomposi	tion of potassium
	nitrate		. 97	
¦ IV.	Matrix Match Type:			
•	This section contains M in two columns which he with statements (p, q, r, bubbled as illustrated i	atrix-Match Type questi we to be matched. Stater s) in Column-II . The an n the following example	ons. Each question cont ments (A, B, C, D) in Col swers to these question e.	ains statements given u mn–I have to be matched s have to be appropriately
	If the correct matches an should be as follows:	e A-p,A-s,B-r,B-r,C-p,C	-q and D-s,then the corr	ect bubbled 4*4 matrix
21.	Column-I	Column-II		
	A) 2 N ₂ + O ₂	1) 2Fe ₂ O ₃ +	4 SO ₂	
	B) H ₂ O ₂	2) 2N ₂ O		
	C) 4 FeS + 70 ₂	3) H ₂ +O ₂		
	D) 4 FeS ₂ + 11 O ₂	4) 2Fe ₂ O ₃ +	8SO ₂	
 		I FARNER'S TA	ISK	
	 ▲ ↓ ↓ 	BEGINNERS (L	<u>_evel-l)</u> ◆∎∎⇒	
I. 4	Single Correct Choic	<u>e Type:</u>		
1.	$re + N_2 \cup> N_2 +$ Balanced Equation	re ₃ O ₄		
VIII	- CLASS			73

2 . 	Sn + HC/ + NO — Balanced Equation	>SnCl ₂ +	NH ₂ OH						
 	$FeSO_4 + H_2SO_4 + H_3O_4$	HNO ₃	->Fe ₂ (SO	₄) ₃ + N(O + H₂O				
 	Skeleton Equation CuSO ₄ + K Balanced Equation	I		_> (Cul + I ₂		+	K ₂ SO ₄	
 	Skeleton Equation CuCl ₂ + H Balanced Equation	₂ 0 + SO ₂ –	>	CuC/	+	HC/	+ H ₂ S(O ₄	
 	$Ca_3(PO_4)_2 + SiO_2 - Balanced Equation$	>P ₂ O ₅	+ CaSiO	3					
7 . 	Al ₂ O ₃ + C ——> A Balanced Equation	N ₄ C ₃ + CO				4			
 	Skeleton Equation $C_2H_4 + O$ Balanced Equation) ₂ —	>	CO ₂	un ^{to}	H ₂ O	0"		
9. 	Skeleton Equation $C_2H_2 + O$ Balanced Equation	2 -	F	CO ₂	-22	H ₂ O			
10. 	Skeleton Equation CH ₄ + C Balanced Equation	2 -	2	CO2	+	H ₂ O			
11. 	Skeleton Equation NH ₃ + N Balanced Equation	a –	>	NaNH	₂ +	H ₂			
12. 	Skeleton Equation Cr(OH) ₃ + N Balanced Equation	a ₂ O ₂ –	>	Na ₂ Cr	O ₄ +	H ₂ O	+ NaC	DH	
13. 	Skeleton Equation Mn(OH) ₂ + N Balanced Equation	a ₂ O ₂ –	>	Na ₂ Mr	nO ₄ +	NaO	Н		
14. 	Skeleton Equation $Al_2(SO_4)_3 + N$ Balanced Equation	aOH –	>	A/(OH) ₃	+	Na ₂ S	O4	
 	Skeleton Equation Kl + H	₂ SO ₄ –	>	KHSO	4 + H ₂ O	+	SO ₂ ·	+ I ₂	

CHEMISTRY

r.

				•••••				
6.	Skeleton Equation $CuFeS_2 + O_2$ Balanced Equation		_>	Cu ₂ S	S + FeS	+	SO ₂	
17.	Skeleton Equation FeS + O ₂ Balanced Equation			>	FeO		+	SO ₂
18.	Skeleton Equation $Cu_2S + O_2$ Balanced Equation			_>	Cu ₂ O	+	SO ₂	
19.	Skeleton Equation Cu ₂ S + CuS Balanced Equation	60 ₄		_>	Cu		+	SO ₂
20.	Cu ₂ O+ Cu ₂ S Balanced Equation		_>	Cu		+	SO ₂	
21.	may be c unit in chemical cha	defined as an nge.	n aton	n or gr	oup of ato	oms wh	ich beł	naves as a single
	A) compound	B) Molecu	ıle		C) Ion	<i>, </i>	[D) None
22	In a balanced equation	, on						
22.	In a balanced equation A) The number of m	on olecules of t	ooth si	des a	re equal.			
22.	In a balanced equation A) The number of m B) The number of at	on olecules of t oms on both	ooth si n side:	des a s are s	re equal. same			
22.	In a balanced equation A) The number of m B) The number of at C) The diatomic mol	on olecules of t oms on both ecules prese	ooth si h side: ent on	des a s are s both	re equal. same sides are	equal		
22.	In a balanced equation A) The number of m B) The number of at C) The diatomic mol D) Reactants and pr	on olecules of b oms on both ecules prese oducts are s	ooth si n side: ent on same	des a s are s both side	re equal. same sides are	equal		
22. 23.	In a balanced equation A) The number of m B) The number of at C) The diatomic mol D) Reactants and pr A formula has	on olecules of t oms on both ecules prese oducts are s	ooth si n side: ent on same	des a s are s both side	re equal. same sides are	equal		
22. 23.	In a balanced equation A) The number of m B) The number of at C) The diatomic mol D) Reactants and pr A formula has A) qualitative signific C) Both A & B	on olecules of t oms on both ecules prese oducts are s cance only	ooth si h side: ent on same	des a s are s both side	re equal. same sides are B) quanti	equal itative s	ignifica	ance only
22. 23. 24	In a balanced equation A) The number of model B) The number of at C) The diatomic mol D) Reactants and pr A formula has A) qualitative signific C) Both A & B	on olecules of b oms on both ecules prese oducts are s ance only	ooth si n side: ent on same	des a s are s both side	re equal. same sides are B) quanti D) None created r	equal itative s	ignifica	ance only
22. 23. 24.	In a balanced equation A) The number of model B) The number of at C) The diatomic model D) Reactants and pre- A formula has A) qualitative signified C) Both A & B In a chemical reaction A) invented	on olecules of to oms on both ecules prese oducts are s coducts are s cance only on the atoms B) destroy	ooth si n side: ent on same s are n yed	des a s are s both side either	re equal. same sides are B) quanti D) None created r C) both A	equal itative s nor	ignifica	ance only D) None
22. 23. 24. 25.	In a balanced equation A) The number of model B) The number of at C) The diatomic model D) Reactants and pre- A formula has A) qualitative signified C) Both A & B In a chemical reaction A) invented The substance whic	on olecules of to oms on both ecules prese oducts are s coducts are s cance only on the atoms B) destroy h take part i	ooth si n side: ent on same s are n yed n a ch	des a s are s both side either emica	re equal. same sides are B) quanti D) None created r C) both A I reaction	equal itative s nor \ & B are cal	ignifica Ied	ance only D) None
22. 23. 24. 25.	In a balanced equation A) The number of model B) The number of at C) The diatomic model D) Reactants and pre- A formula has A) qualitative signific C) Both A & B In a chemical reaction A) invented The substance which A) reactants	on olecules of k oms on both ecules prese oducts are s ance only on the atoms B) destroy h take part i B) produc	ooth si n side: ent on same s are n yed n a ch	des a s are s both side either emica	re equal. same sides are B) quanti D) None created r C) both A I reaction C) formu	equal itative s nor \ & B are cal ila	ignifica Ied	ance only D) None D) compound
22. 23. 24. 25. 26.	In a balanced equation A) The number of model B) The number of at C) The diatomic model D) Reactants and pre- A formula has A) qualitative signified C) Both A & B In a chemical reaction A) invented The substance which A) reactants The no. of places at	on olecules of t oms on both ecules prese oducts are s cance only on the atoms B) destroy h take part i B) product which an ele	ooth si n sides ent on same s are n yed n a ch ets ement	des a s are s both side either emica	re equal. same sides are B) quanti D) None created r C) both A I reaction C) formu ars in a c	equal itative s nor & & B are cal ila hemical	ignifica Ied Ieactie	ance only D) None D) compound on is called
22. 23. 24. 25. 26.	In a balanced equation A) The number of model B) The number of at C) The diatomic model D) Reactants and pre- A formula has A) qualitative significe C) Both A & B In a chemical reaction A) invented The substance whice A) reactants The no. of places at A) repetition	on olecules of k oms on both ecules prese oducts are s cance only on the atoms B) destroy h take part i B) produc which an ele B) periodi	ooth si n side: ent on same are n yed n a ch ets ement city	des a s are s both side either emica	re equal. same sides are B) quanti D) None created r C) both A I reaction C) formu ars in a cl C) freque	equal itative s nor & B are cal la hemical ency	ignifica led reactio	ance only D) None D) compound on is called D) regularity
22. 23. 24. 25. 26. 27.	In a balanced equation A) The number of model B) The number of at C) The diatomic model D) Reactants and pre- A formula has A) qualitative signified C) Both A & B In a chemical reaction A) invented The substance which A) reactants The no. of places at A) repetition In a metal and non n	on olecules of to oms on both ecules prese oducts are s cance only on the atoms B) destroy h take part i B) product which an ele B) periodi netal have s	ooth si n sides ent on same s are n yed n a ch ets ement city ame fi	des a s are s both side either emica t appe	re equal. same sides are B) quanti D) None created r C) both A I reaction C) formu ars in a cl C) freque	equal itative s nor & & B are cal la hemical ency he elem	ignifica led reactio I nent i.e	ance only D) None D) compound on is called D) regularity . balanced first is
22. 23. 24. 25. 26. 27.	In a balanced equation A) The number of models B) The number of at C) The diatomic models D) Reactants and present A formula has A) qualitative significe C) Both A & B In a chemical reaction A) invented The substance whice A) reactants The no. of places at A) repetition In a metal and non models A) non metal	on olecules of k oms on both ecules prese oducts are s ance only on the atoms B) destroy h take part i B) produc which an ele B) periodi netal have s	ooth si n side: ent on same are n yed n a ch ets ement city ame fi	des a s are s both side either emica t appe	re equal. same sides are B) quanti D) None created r C) both A I reaction C) formu ars in a cl C) freque ncy then t B) metal	equal itative s nor A & B are cal la hemical ency he elem	ignifica led reaction I nent i.e	ance only D) None D) compound on is called D) regularity . balanced first is
22. 23. 24. 25. 26. 27.	In a balanced equation A) The number of models B) The number of at C) The diatomic models D) Reactants and pre- A formula has A) qualitative significe C) Both A & B In a chemical reaction A) invented The substance whice A) reactants The no. of places at A) repetition In a metal and non models A) non metal C) metal if its atomic	on olecules of k oms on both ecules prese oducts are s coducts are s ance only bn the atoms B) destroy h take part i B) produc which an el B) periodi netal have s c mass more	ooth si n side: ent on same s are n yed n a ch ement city ame fi e	des a s are s both side either emica t appe	re equal. same sides are B) quanti D) None created r C) both A I reaction C) formu ars in a cl C) formu ars in a cl C) freque ncy then t B) metal D) non m	equal itative s nor A & B are cal la hemical ency he elem	ignifica led reaction nent i.e ts atom	ance only D) None D) compound on is called D) regularity balanced first is nic number more
22. 23. 24. 25. 26. 27.	In a balanced equation A) The number of models B) The number of at C) The diatomic models D) Reactants and present A formula has A) qualitative significe C) Both A & B In a chemical reaction A) invented The substance whice A) reactants The no. of places at A) repetition In a metal and non models C) metal if its atomice	on olecules of to oms on both ecules prese oducts are s coducts are s co	ooth si ent on same s are n yed n a ch ement city ame fi e HEVF	des a s are s both side either emica t appe requei	re equal. same sides are B) quanti D) None created r C) both A I reaction C) formu ars in a cl C) formu ars in a cl C) freque ncy then t B) metal D) non m	equal itative s nor A & B are cal la hemical ency he elem netal if i	ignifica led reaction nent i.e ts atom	ance only D) None D) compound on is called D) regularity balanced first is nic number more
22. 23. 24. 25. 26. 27.	In a balanced equation A) The number of models B) The number of atto C) The diatomic models D) Reactants and present and formula has A) qualitative signified C) Both A & B In a chemical reaction A) invented The substance which A) reactants The no. of places atto A) repetition In a metal and non models C) metal if its atomice C	on olecules of to oms on both ecules prese roducts are s cance only on the atoms B) destroy h take part i B) product which an ele B) periodi netal have s c mass more c mass more	ooth si ent on same s are n yed n a ch ement city ame fi e HEVE	des a s are s both side either emica t appe requer	re equal. same sides are B) quanti D) None created r C) both A I reaction C) formu ars in a cl C) formu ars in a cl C) freque ncy then t B) metal D) non m	equal itative s nor A & B are cal la hemical ency he elem netal if i	ignifica led reaction nent i.e ts atom ∎-∎ ♦	ance only D) None D) compound on is called D) regularity . balanced first is nic number more
22. 23. 24. 25. 26. 27. <u>Desc</u> 1.	In a balanced equation A) The number of models B) The number of atto C) The diatomic models D) Reactants and pre- A formula has A) qualitative signified C) Both A & B In a chemical reaction A) invented The substance which A) reactants The no. of places atto A) repetition In a metal and non models A) non metal C) metal if its atomic Explain chemical equation	on olecules of k oms on both ecules prese oducts are s ance only on the atoms B) destroy h take part i B) product which an ele B) periodi netal have s c mass more ACH s uation?	ooth si n sides ent on same are n yed n a ch ets ement city ame fi e HIEVE	des a s are s both side either emica t appe requer	re equal. same sides are B) quanti D) None created r C) both A I reaction C) formu ars in a cl C) freque ncy then t B) metal D) non m Level - I	equal itative s nor A & B are cal la hemical ency he elem netal if i	ignifica Ied Ireactio Inent i.e ts atom	ance only D) None D) compound on is called D) regularity . balanced first is nic number more



	2) $Ca(OH)_2 + CO_2 \longrightarrow CaCO_3 + H_2O$ 3) $2H_2S + SO_2 \longrightarrow 2H_2O + 3S$
4.	Which of the following is correct balanced equation?
 	1) $Na_2CO_3 + 2HC\ell \longrightarrow 2NaC\ell + CO_2 + H_2O$
, ,	2) $Ca(OH)_2 + CO_2 \longrightarrow CaCO_3 + H_2O$
	$3) 2H_2S + SO_2 \longrightarrow 2H_2O + 3S$
 	4) $4NH_3 + 5O_2 \longrightarrow 4NO + 6H_2O$
 .	True or false
5. 	The chemical equation is a statement that describes a chemical change interms of reactants and products
6.	In a chemical reaction the atoms are neither created nor destroyed.
7.	The substances which take part in a chemical reaction are called products.
8.	I he substances formed as a result of chemical change during a chemical reaction
9.	A Chemical equation in which number of atoms of each element is not same on the side of reactants and products is called balanced equation
 10.	A Chemical equation in which number of atoms of each element is not same on the side of
	reactants and products is called unbalanced equation.
III.	Reasoning Type:
*	This section contains certain number of questions. Each question contains Statement – 1 (Assertion) and Statement – 2 (Reason). Each question has 4 choices (A), (B), (C) and (D) out of which ONLY ONE is correct Choose the correct option.
11.	Statement I : A balanced chemical equation does not tell about the all physical conditions
	of a reaction.
	light heat energy and pressure but not of catalyst of a reactions
	1) Both statement I and statement II are correct
	2) Both statement I and statement II are incorrect
	3) Statement I is correct and statement II is incorrect.
	4) Statement I is incorrect and statement II is correct
12.	Statement I : $Mg + 2HC\ell \rightarrow MgC\ell_2 + H_2$ is a balanced equation
	Statement II : I he number of atoms in the reactants is equal to the number of atoms in the products
	1) Both statement Land statement II are correct
	2) Both statement I and statement II are incorrect
	3) Statement I is correct and statement II is incorrect.
	Statement I is incorrect and statement II is correct
IV.	Comprehension Type:
•	This section contains paragraph. Based upon each paragraph multiple choice questions have to be answered. Each question has 4 choices (A) , (B) ,(C) and (D) out of which ONLY ONE i s correct. Choose the correct option.
	A chemical equation in which number of atoms of each element is same on the side
	of reactants and products is called balanced equation.
13.	Which of the following is true regarding the amount of substances involved and formed in the following reaction?

 	Ca	$CO_3 \xrightarrow{\Lambda} CaO + CO_2$		
		CaCO ₃	CaO	CO ₂
	1)	50g	20g	22g
	2)	100g	28g	22g
	3)	100g	56g	22g
	4)	100g	56g	44g
14.	Whi	ch of the following is true	e about the follow	ing reaction?
		$N_2 + 3H_2 \rightarrow 2NH_3$		
	1) 8	atoms of reactants read	ct to give 8 atoms	of products.
	2) 4	molecules of reactants	react to give two	molecules of product.
1	3) 3	4 grams of reactants rea	act to give 34 gra	ms of products.
į	4) A	ll the above.		
15.	Whi	ch of the following is pra	ctically incorrect a	about the following equation:
1		$2CO + O_2 \longrightarrow 2CO$	D ₂	
l	1)2	molecules of CO react	With 1 molecule of the semiclastic contraction of the semiclastic contractic c	if O_2 to form 2 molecules of O_2 .
	2) II 3) 5	find the contract of CO_2 is formed for the c	i by the compination	to form 88 grams of CO
	Δ)Δ	ll of these	nul 32 grants of C	V_2 to form of grains of CO_2 .
16	Whi	ch of the following is not	t true for a balanc	ed chemical equation?
	1) A	balanced chemical equ	ation gives inform	ation about physical states of all reacting
	sub	stances.	EP' of	
	2) A	balanced equation give	s information abo	[▶] ut the number of atoms of all substances
1	invo	lved in the reaction.		
İ	3) B	oth 1 and 2.	4) None o	f these.
17.	N_2 -	$+3H_2 \rightarrow 2NH_3$		
	Whi	ch of the following state	ments is not true	?
į	1) C	ne molecule of nitrogen	and three molec	ules of hydrogen combine to form two
	mole	ecules of ammonia at sa	ame conditions of	temperature and pressure.
	2) Z	o grams of nitrogen and	d three grams of l	by drogen combine to form two grams of
ļ	amn	nonia	d thee grains of	lydrogen combine to form two grains of
	4) B	oth 1 and 2.		
18.	2Mg	$1 + O_2 \longrightarrow 2MgO$	Which of the fol	lowing statements is not true?
ļ	1) 0	ne molecule of magnes	ium and two mole	cules of oxygen combine to form two molecules
	of m	agnesium oxide.		
İ	2) 2	8 grams of magnesium	and 6 grams of o	xygen combine to form 34 grams of
	mag	inesium oxide.		
	3) 4	8 grams of magnesium	and 32 grams of	oxygen combine to form 80 grams of
VIII -	· CLA	SS		78
I				

magnesium oxide. 4) Both 1 and 2 V. Matrix Match Type: This section contains Matrix-Match Type questions. Each question contains statements given 4 in two columns which have to be matched. Statements (A, B, C, D) in **Column-I** have to be matched with statements (p, q, r, s) in **Column–II**. The answers to these questions have to be appropriately bubbled as illustrated in the following example. If the correct matches are A-p,A-s,B-r,B-r,C-p,C-q and D-s,then the correct bubbled 4*4 matrix should be as follows: 19. Column-I Column-II The substance which take part 1) Products a) in chemical reaction b) The substance formed as a result of 2) **Balanced** equation chemical reaction A chemical equation in which number 3) CaCl, + H,O c) of atoms of each element is same on the side of reactants and products 4) Reactants $Ca(OH)_2 + 2HC\ell$ 5) $CaCl_2 + H_2O + CO_2$ d) Column-I 20. Column-II 1) MgO + Ca) Mg + 2HC ℓ 2) CaC ℓ_2 + H₂O b) $2Mg + CO_2$ c) Ca(OH)₂ + 2HC ℓ 3) $CaC\ell_2 + H_2O + CO_2$ d) CaCO₃ + 2HC ℓ 4) MgC ℓ_2 + H₂ 5) MgO + HC/ **RESEARCHERES** (Level - IV) VI Higher Order Thinking(H.O.T) 1. Balance the following equations H₃AsO₄----->As₂O₅+H₂O Balanced Equation 2. H_3PO_4 +HCl----> PCl_5 + H_2O Balanced Equation 3. I₂+HNO₃-----> HIO₃+NO₂+H₂ **Balanced Equation** $Ca (PO_{4})_{2} + SiO_{2} - ----> P_{4}O_{10} + CaSiO_{3}$ 4. Balanced Equation 5. $(NH_{4})_{2}Cr_{2}O_{7}$ -----> $Cr_{2}O_{3} + N_{2} + H_{2}O_{3}$ 6. What is the balanced equation for : SnO₂ + -----> .Sn + H₂O Balance FeSO₄+ Na₂S -----> FeS + Na₂SO₄ l 7. **Additional Practice Bits**

CHEMISTRY **Chemical Reaction and Equation** ___> C6H12O6 + 1. CO2 + H2OH2O balencing the equation. 2. $Cu_{o}S + CuSO_{i}$ ---> Cu SO₂ balencing the equation. + 3. Write the chemical reaction involving in the process of rusting. 4. $Ca(OH)_2 + HCl \rightarrow CaCl_2 + H_2O$ balencing the equation. $C_{3}H_{8} + O_{2} ----> CO_{2} + H_{2}O$ balencing the equation. CaOC l_{2} + NH₃ ----> CaC l_{2} + H₂O + N₂ balencing the equation. 5. 6. | 7. NH3+O2——>NO+H2O balencing the equation. $Al_2(SO_4)_3$ +NaOH ----> Al(OH)₃ $+Na_{2}SO_{4}$ balencing the eqn. 18. $BaCl_2+Na_3PO_4 \longrightarrow Ba_3(PO_4)_2+NaCl balencing the equation.$ Ag NO₃+ H₂S → Ag₂S+HNO₃ balencing the equation. 9. | 10. **ARCHIVES** Balance the following equations 1)Al + O₂ -----> Al₂O₃ 2) Xe + F₂-----> XeF₆ 3) O₂----> O₃ 4) C +H₂O---->CO +H₂ 5) $AI(OH)_3 + H_2SO_4 - A_{12}(SO_4)_3 + H_2O_4$ 6) P₄ +O₂----> P₂O₅ undation 7) K₂₀ +H₂O----> KOH 8) Mg +N₂----> Mg₃N₂ 9) Hg+ O₂ -----> HgO 10) SiO₂ + HF-----> SiF₄+ H₂O **KEY** $\Phi\Phi$ TEACHING TASK : 7HC/O₃ 3Mg(C/O₃)₂ + 3Mg $3H_{2}O + HC/$ 1. + 2Fe₂O₃ 2. 4FeS₂ + 110, + 8SO 3. 3NaBrO + NH₂CONH₂ $3NaBr + CO_2 + 2H_2O + N_2$ $(NH_4)_3 PO_4$ 4. $3NH_3 + H_2O + HPO_3$ 5 3CaOC/, + 2NH₃ $3CaC_{1}+3H_{2}O + N_{2}$ 6.A 7-A 8-A | ||. 9-A,B,C,D 10-A,B 11-A,B 12-T 13-T 14-T 15-T 16-F 17-T 18-T 19-T III. 1 IV. 21-2,3,1,4 $\Phi\Phi$ LEARNER'STASK : **BEGINNERS**: $\begin{array}{ccc} 4N_{2}O & \longrightarrow \\ 6HC/ + 2NO & \longrightarrow \\ 3H_{2}SO_{4} + 2HNO_{3} & \longrightarrow \\ 4KI & \longrightarrow \end{array}$ 1. 3Fe + $4N_2 + Fe_3O_4$ 2. $3SnCl_2 + 2NH_2OH$ 3Sn + 6FeSO₄ + $3Fe_{2}(SO_{4})_{3} + 2NO + 4H_{2}O$ 3. $Cu_{2}I_{2} + 2I_{2} + 2K_{2}SO_{4}$ 4. 2CuSO₄ + ____> 2CuC/+3HC/ + 2H₂SO₄ 5. 2CuCl₂ + H₂O + 2SO₂ ____> 6. $Ca_{3}(PO_{4})_{2} +$ 3SiO₂ + 5C $3CaSiO_3 + 2P + 5CO$ 7. 2A/₂O₃ 6C ___> $AI_4C_3 + 6CO$ + ___> 2CO,+2H,O 8. C₂H₄ + 3O₂ ____> 2CO₂ 2H₂O 9. C₂H₂ + 30, + ____> 20₂ CO_2 10. CH₄ + + $2H_{2}O$ VIII - CLASS 80

11.	2NH ₃	+	Na		>	NaNH ₂	+	2H ₂
 12.	2Cr(OH) ₃	+	3Na₂O	2	>	2Na ₂ CrO ₄ +	⊦2NaOH	+2H ₂ O
13.	Mn(OH) ₂	+	2Na ₂ O	2	>	Na ₂ MnO ₄	+	2NaOH
14.	$Al_2(SO_4)_3$	+	6NaOł	4	>	2A/(OH) ₃	+	3Na ₂ SO ₄
15.	2KI	+	3H ₂ SC) ₄	>	2KHSO ₄ +	2H ₂ O+SO ₂	2 + 1 ₂
, 16.	$2CuFeS_2$	+	0 ₂		>	$Cu_2S + 2F$	eS+SO ₂	ĺ
17.	2FeS	+	30 ₂		>	2FeO	+	2SO ₂
18.	Cu_2S	+	2CuO		>	4Cu	+	SO ₂
<mark> </mark> 19.	Cu ₂ S	+	CuSO	4	>	3Cu	+	2SO ₂
20.	2Cu ₂ O	+	Cu_2S		>	6Cu	+	SO ₂
 21-B	22-B 2	3-A	24-B	25-A	26-C	27-B		
Ì□ I	EXPLORERS	;						l
. u	1-1,2,3,4	ст	2-1,4	3-1,2	.,3, 	4-1,2,3,4	10 T	
II. II.	ว-า 11-3	0-1 12-1	I	(-F	0-F	9-F	10-1	
IV.	13-4	14-4	1	15-4	16-2	17-3	18-4	
V. 	19-4,1,2,3		2	20-4,1,3,2				
į				<u> </u>	<u>Workshe</u>	<u>eet-2</u>		
 । ¶¶	Types of c	hemi	cal reac	tions :- C	hemical rea	ction occurs	s as a resul	 t of breaking and making
	of bonds resulting in redistribution of atoms among various reacting species in different ways.							
Ì	Accordingly the reactions are classified in different types. They are -							
	(1) Combination reaction or synthesis reaction							
1	(2) Decom	iposit	tion rea	ction/Ana	lysis reacti	on		
Ì	(4) Double displacement reaction/Methasis reaction							
1	(4) Double displacement reaction/methasis reaction							
	Combinat	ion r		- The rea	etion in whi	ch two or	\langle	Realizer
22	<u>combinat</u>	<u>.</u>		<u>. </u>				Deaker
İ	more subs	stance	es comb	oine to forn	n a single n	ew		Water
	substance	are c	alled co	mbination	or synthesis	s reaction.		
i	C(s) + O ₂	(g) —	CO ₂ (g))			Paga a	Calcium oxide
	Combinat	ion re	actions	s are of th	ree commo	on types :-	Formation	of slaked lime
	(i) Combir	nation	of two e	elements to	o form a		quicklime	e with water
i	Compo (a)	und e H ₋ (a	:g.) + Cl.(c	$1 \xrightarrow{\text{Light}} 2$	PHCI(a)			Ĭ
	(b)	2H ₂ (9	$g) + O_{2}(g)$	$(g) \rightarrow 2H_2$	O(<i>I</i>)			
1	(ii) Combir	nation	of an el	lement and	d a compou	nd to form a	new comp	ound.
i	(a)	2SO	₂ (g) + O	$P_2(g) \rightarrow 23$	SO ₃ (g)			
ļ	(iii) Combir	nation	of two of	compound	s to form a	new compo	und :–	l
1	()		$a \rightarrow \pm \Box C$	านสา งเปป	1 1/01			

<u>§§</u>	Decomposition reaction :- The reaction in which a single
l	compound breaks up into two or more simpler substances
 	are known as decomposition reaction. The decomposition
İ	reaction generally takes place when energy in some forms
	such as heat, electricity or light is supplied to the reactants.
	(a) Decomposition reactions by heat (Thermal decomposition)
 	(i) $CaCO_{3(s)} \xrightarrow{Heat} CaO_{(s)} + CO_{2(g)}$ (Lime stone) (Quick lime)
 	(iii) $2\text{FeSO}_{4(s)} \xrightarrow{\text{Heat}} \text{Fe}_2\text{O}_{3(s)} + \text{SO}_{2(g)} + \text{SO}_{3g)}$ (Ferrous sulphate) (ferric oxide)
 	(iv) $2Pb(NO_3)_{2(s)} \rightarrow 2PbO + 4NO_{2(g)} + O_{2(g)}$ (Lead nitrate) (Lead oxide) (Nitrogen dioxide)
 	(b) Decomoposition by electricity (Electrical decomposition or Electrolysis)
	(i) $2H_2O_{(I)} \xrightarrow{\text{Electric current}} 2H_{2(g)} + O_{2(g)}$
 	(c) Decomposition by sunlight (Photochemical decomposition)
	(i) $2 \operatorname{AgCl}_{(s)} \xrightarrow{\operatorname{Sunlight}} 2\operatorname{Ag}_{(s)} + \operatorname{Cl}_{2(g)}$
1	(silver chloride) (Silver) (chlorine)
	(white) (Grey in colour)
 	(ii) $2AgBr(s) \xrightarrow{Sunlight} 2Ag_{(s)} + Br_{2(g)}$ (silver bromide) (Silver) (Bromine)
ĺ	The decomposition of a compound with light is called
 	photolysis.
1	Note :- All the decomposition reaction requires
	reactions. These reactions are used in
	extractions of metals.
	Decomposition reaction is called opposite of
	combination reaction. This can be supported
	by the following reactions:
	combination reaction $2H_2(g) + O_2(g) \xrightarrow{\text{occurrent}} 2H_2O(I)$
l	Decomposition reaction : $2H_2O(I) \xrightarrow{\text{electrolysis}} 2H_2(g) + O_2(g)$
	water hydrogen oxygen
İ	

Chemical Reaction and Equation





Example

called oxidising agent and the substance which gains oxygen during reaction is said to be oxidised.

Reducing agent :- The substance which gives hydrogen or removes oxygen for reduction is called reducing agent. The substance which gains, hydrogen during reaction is said to be reduced.

Those reactions in which oxidation and reduction (both) occurs simultaneously are called **redox** reactions.

In the name Redox the term 'red' stands for reduction and 'ox' stands for oxidation.

 Φ . SO₂ is reduced to sulphur, so it is oxidising agent.

 $\Phi.~{\rm H_2S}$ is oxidised to sulphur, so it is reducing agent.

It should be noted that substance which undergoes oxidation acts as reducing agent where as the substance undergoes reduction act as oxidising agent.

There is an another concept of oxidation and reduction in terms of metals and nonmetals. This is as follows –

(i) The addition of nonmetallic element (or removal of metallic element) is called oxidation.

- (ii) The addiition of metallic element (or removal of nonmetallic element) is called reduction.
- **Q.7** A shiny brown coloured element 'X' on heating in air becomes black in colour. Name the element 'X' and the black coloured compound formed.
- **Ans.** An element on heating in air changes in its oxide. The brownish element which forms black oxide is copper. So,

Name of the element Copper (Cu)

Name of black compound: Copper(II) oxide, (CuO)

 $\begin{array}{cccc} \mbox{Reaction} & 2\mbox{Cu}(s) & + & \mbox{O}_2(g) & \xrightarrow{\mbox{Heat}} & 2\mbox{CuO}(s) \\ \mbox{copper (brown)} & \mbox{from air} & \mbox{copper(II) oxide (black)} \end{array}$

<u>§§</u> ELECTRONIC CONCEPT FOR OXIDATION AND REDUCTION

Oxidation – The loss of an electron by atoms or ions is called oxidation.

Atom \rightarrow Cation + electrons

$$A \rightarrow A^{n+} + ne^{-}$$

Atom 'A' loses n electrons to become a positively changed ion A^{n+} . It is called cation

Reduction :- The gain of an electron by an atom or ion is called reduction.

water

(c)

(b)

VIII - CLASS

calcium chloride

(a)

(b) Presence of water (or moisture) It has been observed that

- (a) Presence of impurities in he metal speed up the rusting process. Pure iron does not rust.
- (b) Presence of electrolytes in water also speeds up the process of rusting
- (c) The position of the metal in the electrochemical series determines the extent of corrosion. More the reactivity of the metal, there will be more possibility of the metal getting corroded. Other examples of corrosion are –
- (i) Coppper reacts with moist carbon dioxide in the air and slowly loses its shiny

brown surface and acquires a green coating of basic copper carbonate.

(ii) Silver articles become black after sometime when exposed to air because it

reacts with sulphur to form a coating of silver sulphide.

(iii)Lead or stainless steel lose their lusture due to corrosion.

(iv)Unreactive metals such as gold, platinum, palladium, titanium etc. do not corrode.

Rancidity :- Fresh foods containing fats and oils smell and taste pleasant but when it remains exposed in air for a long time it's smell and taste changes to unpleasant. It is said that the food has become rancid.

It is due to the oxidation of fats and oils, butter, ghee, boiled rice etc, after prolonged exposure to air i.e. The condition produced by the aerial oxidation of fats and oils in foods marked by unpleasant smell and taste is called rancidity.

- **D** Prevention of rancidity :-
 - (i) Rancidity can be prevented by adding antioxidants to foods containing fats and oils. Antioxidants are reducing agents so when they are added to food it do not get oxidised easily and hence do not turn rancid. The two common anti oxidants are –

(a) BHA (Butylated Hydroxy Anisole)

(b) BHT (Butylated Hydroxy Toluene)

Vitamin-E and vitamin-C (ascorbic acid) are the two antioxidants occuring in natural fats.

- (ii) Rancidity can be prevented by packaging fat and oil containing foods in nitrogen gas.
- (iii) It can be retarted by keeping food in refrigerator.
- (iv) It can also be retarded by storing food in air tight containers.

(v) It can be retarded by storing foods away from light.

$\Phi \Phi$	ROUND UP
ſ	When one or more substance (elements or compounds) undergo a chemical change, with the
	absorption or release of energy, so as to form one or more products, the changes taking place collectively is called chemical reaction .
	A chemical equation which represents a chemical reaction briefly in words is called word equation.
ŕ	The substance / substances wihich take part in a chemical reaction are called reactants.
þ	The new substance / substances formed as a result of chemical reaction are called products .
ι 	A statement that describes a chemical reaction in terms of symbols and formulae is called chemical equation.
▶ 	A chemical equation expressed in symbols and formulae, such that the number of atoms of different elements towards the side of reactants is not equal to number of atoms of same elements towards the side of products is called skeletal equation .
ſ	A chemical equation in which number of atoms of each element is same on the sides of reactants and products is called balanced chemical equation .
 	A balanced chemical equation which symbolically represents the physical state of reactants and products is called complete chemical equation .
r 	When two elements or compounds react chemically, to form a single new compounds, then chemical reaction is called chemical combination reaction .
	A chemical reaction which proceeds with the release of heat energy is called exothermic reaction .
r 	When a chemical compound decomposes on heating or absorbing some kind of energy, so as to form two or more substances (elements or compounds), then the chemical reaction which takes place is called chemical decomposition reaction.
	When a chemical compound decomposes on heating, so as to form two or more substance (elements or compounds), then the reaction is called thermal decomposition reaction .
•	Chemical reaction which proceeds with the absorption of heat energy is called endothermic reaction .
 	Chemical reaction in which a compound decomposes into simpler substances on the absorption of light energy is called photo-decomposition reaction .
• 	A decomposition reaction which takes place with the absorption of electric energy is called electrochemical reaction.
r I	When a more active element displaces less active element from its aqueous ionic compound, the reaction which takes place is called chemical displacement reaction .
 	A chemical reaction in which two ionic compounds in their aqueous solutions, react by exchanging their ions/radicals, to form two new compounds is called chemical double displacement reaction .
• 	When the aqueous solutions of two ionic compounds react by exchanging their ions/radicals, to form two or more new compounds, such that one of the product formed is an insoluble salt, and hence forms precipitate is said to precipitation reaction .
	When an aqueous solution of an acid reacts with a base (alkali) by exchanging their ions/radicals - CLASS

CHE	MISTRY Chemical Reaction and Equation
4.	What is an oxidation reaction ? Give an example of oxidation reaction. Is oxidation an exothermic
1	or an endothermic reaction ?
Ans.	Reactions involving addition of oxygen are classified as oxidation reactions. For example
	magnesium reacts with oxygen to form magnesium oxide.
1	$2Mg + O_2 \longrightarrow 2MgO$
į	Oxidation reactions are generally exothermic in nature.
5.	What is a redox reaction ? When a magnesium ribbon burnsin air with a dazzling flame and forms a white ash, is magnesium oxidised or reduced ? Why ?
Ans.	Those reactions in which oxidation and reduction reactions occur simultaneously, are called redox reactions. In these reactions one substance is oxidised and another substance gets reduced.
 	When a magnesium ribbon burns to form a white ash, magnesium metal is oxidised in this reaction because it combined with oxygen to form magnesium oxide.
ļ	$2Mg(s) + O_2(g) \longrightarrow 2MgO(s)$
6.	In the reaction :
	$MnO_{2}(s) + 4HCI(aq) \longrightarrow MnCl_{2}(aq) + Cl_{2}(g) + 2H_{2}O(l)$
ļ	Identify the oxidising and reducing agents.
Ans.	MnO ₂ loses oxygen, therefore it is reduced, thus it acts as an oxidizing agent.
i	HCl loses hydrogen. It itself is oxidized, thus it acts as a reducing agent.
	In the above reaction
	MnO ₂ is oxidizing agent.
	HCl is reducing agent.
7 .	Give an example of a decomposition reaction. Describe an activity to illustrate such a reaction
i	by heating.
Ans.	Calcium carbonate decomposes on heating and forms calcium oxide and carbon dioxide.
	$CaCO_3 \xrightarrow{Heat} CaO + CO_2$
 β. 	Define a combination reaction. Give one example of a combination reaction which is also exothermic.
Ans. 	Reactions in which two or more substances combine to form a new compound are called combination reactions. An example of this type of reactions is the combustion of magnesium in air, where magnesium combines with oxygen to form magnesium oxide, it is an exothermic reaction also.
i	$2Mg(s) + O_2(g) \longrightarrow 2MgO(s) + heat$
9 .	Dilute solution of ammonium hydroxide is added to aqueous solution of ferrous sulphate. Ferrous
	hydroxide is formed. What is the type of this reaction ? Write chemical equation.
ANS.	It is a double decomposition reaction. E_{PSO} (ag) + 2NH OH (ag)
	- CLASS 901
1	

	(A) Boiling of water (B) Malting of way	(C) Burning of potrol (D) None of these				
	(A) boiling of water (B) Melting of wax					
	(A) CaCO - CaCo - CO					
	(A) $CaCO_3 \rightarrow CaO + CO_2$	(B) $H_2 + CI_2 \rightarrow 2HCI$				
	(C) CaO + 2HCl \rightarrow CaCl ₂ + H ₂ O	(D) NaOH + HCI \rightarrow NaCI + H ₂ O				
	Which statement is correct about the following reaction?					
	$ZnO + CO \rightarrow Zn + CO_2$					
	(A) ZnO is being oxidized	(B) CO is being reduced				
	(C) CO_2 is being oxidized	(D) ZnO is being reduced				
).	The reaction $C + O_2 \rightarrow CO_2$ + Heat is a					
	(A) Combination reaction	(B) Oxidation reaction				
	(C) Exothermic reaction	(D) All of the above				
•	Conversion of $CaCO_3$ in to CaO as per to	pllowing reaction is an example of –				
	$CaCO_3 \rightarrow CaO + CO_2$					
	(A) Decomposition reaction	(B) Reduction reaction				
,	(C) Oxidation reaction $Fe_0\Omega_0 + 2\Delta I \rightarrow \Delta I_0\Omega_0 + 2Fe$ This reaction	(D) Note of these a_{1}				
••	(A) Combination reaction	(B) Double displacement reaction				
	(C) Decomposition reaction	(D) Displacement reaction				
3.	In reaction SO ₂ + 2H ₂ S \rightarrow 2H ₂ O + 3S the	e reducing agent is -				
	(A) SO_2 (B) H_2S	(C) H ₂ O (D) S				
I.	Which of the following reaction is metathe	sis reaction?				
	(A) FeCl ₂ + 3NaOH \rightarrow Fe(OH) ₂ + 3NaCl (B) Zn + H ₂ SO ₄ \rightarrow ZnSO ₄ + H ₂					
	(C) $2CO + O_2 \rightarrow 2CO_2$	(D) N ₂ + O ₂ \rightarrow 2NO				
5.	What happens when dil hydrochloric acid	is added to iron fillings?				
	(A) Hydrogen gas and Iron chloride are pro	oduced				
	(B) Chlorine gas and Iron hydroxide are produced					
	(C) NO reaction takes place					
	(D) Iron salt and water are produced					
ŝ	When Iron nails are added to an aquous solu	ition of conner sulphate, a chemical change occurs				
	which of the following is not true about thi	s reaction?				
	(A) Blue colour of the solution fades	(B) Iron nails becomes brownish in colour				
	(C) It is a displacement reaction	(D) Iron nails dissolves completly				
2		(D) non hais dissolves completiy.				
'	$\frac{\text{FILL IN THE BLAINKS}}{\text{The reaction CoCO}}$	is a reaction				
	The reaction is which every in added to					
	The reaction in which bydrogen is added to					
	Reaction in which hydrogen is added to a	substance is called reaction.				
	i he process of loss of an electron in known	as and the process of gain of an electro				
	IS KNOWN AS					
	The species undergoing oxidation acts as					
	The reducing agent undergoes of	electrons.				
	Formation of Nitric oxide from nitrogen and	d oxygen is a reaction.				
	The potato chips manufacturers uses	gas to flush the chips bags to prevent the chip				
	getting oxidised.					
	Reaction in which energy is absorbed is k	nown as reaction.				

CHEMISTRY **Chemical Reaction and Equation** 10. The reaction in which heat is given out along with products is known as reaction. 41. Digestion of food in our body is an example of reaction. (C) **VERY SHORT ANSWER QUESTIONS** Is it possible to have combustion without oxygen? 1. Can a double displacement reaction be a redox reaction? ρ. Β. What happens when a strip of zinc is dipped in a copper sulphate solution? 4 Is copper more reactive than iron? Give a reaction in support of your answer -5. In which type of reaction does an exchange of partner takes place? 6. (Based on activities) Why a dilute acid is added to water during electrolysis of water? Name the product obtained on cathode during electrolysis of water 7. 8. Is the volume of gases produced during electrolysis of water is same? If not than what is the ratio in between them? What will happen if silver bromide is kept for some time in sunlight? 10. Write names of three metals which do not corrode? Name two antioxidants which are usually added to fat and oil containing foods to prevent rancidity. 11. MATCH THE FOLLOWING (D) 1 Column-A Column-B **Chemical equation** Types of chemical reaction (A) Combination reactoin (i) $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$ (ii) $2H_2O \xrightarrow{\text{Electricity}} 2H_2 + O_2$ (B) Oxidation & reduction reaction (iii) CaO + CO₂ \rightarrow CaCO₃ (C) Decomposition reaction (iv) $H_2 + Cl_2 \rightarrow 2HCl$ (D) Displacement reaction (v) $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4^- + NaCl_2$ (E) Double displacement reaction LEARNER'S TASK SHORT ANSWER QUESTIONS :-(E) What do you mean by a precipitation reaction? 1. Why should a magnesium ribbon be cleaned before burning in air? 2. 3. Write a balanced chemical equation with symbols for the following reactions -(i) Solutions of barium chloride and sodium sulphate in water react to give insoluble barium sulphate and the solution of sodium chloride. (ii) Sodium hydroxide solution (in water) reacts with hydrochloric acid solution (in water) to produce sodium chloride solution and water. 4. Write the balanced equation for the following chemical reactions. (i) Hydrogen + chlorine \rightarrow Hydrogen chloride. (ii) Barium chloride + Aluminium Sulphate \rightarrow Barium sulphate + Aluminium chloride. (iii) Sodium + water \rightarrow Sodium hydroxide + Hydrogen. 5. How can you say that respiration is an exothermic process? Name two biochemical reaction which are exothermic. 6. Why blue colour of copper sulphate solution becomes faded when iron fillings are added to it? 7. What happens when copper turnings are added to silver nitrate solution? Why the solution of silver nitrate becomes blue in colour after some time when copper turnings 8. VIII - CLASS 93 j

