**CHEMICAL REACTION AND EQUATION** 

### **PAGE NO:-6**

Q1. Why should a magnesium ribbor	n be cleaned before burning in ai	ir?
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Ans. Magnesium ribbon is exposed in air; a layer of oxide is deposited on its surface. This oxide layer on magnesium hinders the burning of magnesium. Hence this oxide layer is removed by rubbing with sand paper before burning so magnesium ribbon can easily burns.

before burning so magnesium ribbon can easily burns.
Q2. Write the balanced equation for the following chemical reactions.  (1) Hydrogen + Chlorine → Hydrogen Chloride
(2) Barium Chloride + Aluminium Sulphate -> Barium Sulphate + Aluminium chloride
(3) Sodium + water → Sodium Hydroxide + Hydrogen
Ans. (1) Hydrogen + Chlorine → Hydrogen Chloride
This chemical equation can be written in symbolic form as
$H_2$ + $Cl_2$ $\rightarrow$ $HCl$
Hence balanced chemical equation is
$H_2 + Cl_2 \rightarrow 2HCl$
(2) Ba rium Chloride + Aluminium Sulphate → Barium Sulphate + Aluminium chloride
This chemical equation can be written in symbolic form as
$BaCl_{2} + Al_{2}(SO_{4})_{3} \rightarrow BaSO_{4} + AICl_{3}$
Hence balanced chemical equation is
$3BaCl_{2} + Al_{2}(SO_{4})_{3} \rightarrow 3BaSO_{4} + 2AICl_{3}$
(3) Sodium + water → Sodium Hydroxide + Hydrogen
This chemical equation can be written in symbolic form as
Na + $H_2O \rightarrow NaOH + H_2$
Hence balanced chemical equation is
$2Na + 2H_2O \rightarrow 2NaOH + H_2$
Q3. Write a balanced chemical equation with state symbols for the following reactions.
(1) Solution of barium Chloride and sodium sulphate in water react to give insoluble barium sulphate
and the solution of sodium chloride.
(2) Sodium hydroxide solution (in Water) reacts with hydrochloric acid solution (in water) to produc
sodium chloride solution and water.
Ans. (1) Barium chloride + Sodium sulphate → Barium sulphate + Sodium Chloride
(Solution) (Solution) (Insoluble) (Solution)
This chemical equation can be written in symbolic form as
$BaCl_2(aq)$ + $Na_2SO_4(aq)$ $\rightarrow$ $BaSO_4(ppt)$ + $NaCl(aq)$
Hence balanced chemical equation is
$BaCl_2(aq)$ + $Na_2SO_4(aq)$ $\rightarrow$ $BaSO_4(ppt)$ + $2NaCl(aq)$
(2) Sodium Hydroxide + Hydrochloric Acid → Sodium Chloride + Water
(solution) (solution) (solution)
This chemical equation can be written in symbolic form as
NaOH (aq) + HCl (aq) $\rightarrow$ NaCl (aq) + H <sub>2</sub> O (l)
Hence balanced chemical equation is
NaOH (aq) + HCl (aq) $\rightarrow$ NaCl (aq) + H <sub>2</sub> O (l)

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<u>PAGE NO:-10</u>
Q1. A solution of substance 'X' is used for white washing.
(1) Name the substance 'X' and write its formula.
(2) Write the reaction of substance 'X' named in (1) above with water.
Ans. (1) The substance 'X' is quick lime (Calcium oxide) and its formula is CaO
(2) Calcium oxide react with water to form calcium hydroxide (Slaked lime)
$Cao(s) + H2O(I) \rightarrow Ca(OH)2(aq)$
Calcium oxide Water Calcium hydroxide
Q2. Why the amount of gas collected in one of the test tubes in activity 1.7 double of the amount collected
in the other? Name this gas.
Ans. On electrolysis, water decomposes to give hydrogen and oxygen as shown in equation
$2H_2O(I)$ on passing electric current $2H_2(g) + O_2(g)$
Thus water decomposes to give hydrogen and oxygen in the ratio of 2:1 by volume. The double volume of the
gas collected is hydrogen.
PAGE NO:-13
Q1. Why does the colour of copper sulphate solution change when an iron nail is dipped in it?
Ans. Iron is more reactive than copper so it displace copper from copper sulphate to form iron sulphate
solution.
Fe + CuSO <sub>4</sub> $\rightarrow$ FeSO <sub>4</sub> + Cu
Copper sulphate iron sulphate
(Blue colour solution) (Green colour solution)
Q2. Give an Example of a double displacement reaction other than the one give in activity 1.10
Ans. $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$
Silver Nitrate sodium chloride silver chloride sodium nitrate
Q3. Identify the substances that are oxidized and the substances that are reduced in the following reactions
(1) $4Na(s) + O_2(g) \rightarrow 2Na_2O(s)$
(2) CuO (s) + H <sub>2</sub> (g) $\rightarrow$ Cu (s) + H <sub>2</sub> O (l)
Ans. (1) $4Na(s) + O_2(g) \rightarrow 2Na_2O(s)$
Na has gained oxygen to form Na <sub>2</sub> O. Hence Na has been oxidized to Na <sub>2</sub> O and O <sub>2</sub> has been reduced
(2) CuO (s) + $H_2(g) \rightarrow Cu$ (s) + $H_2O$ (l)
CuO has lost oxygen to form Cu. Hence CuO has been reduced to Cu. And H <sub>2</sub> has gained oxygen to form
H <sub>2</sub> O hence; H <sub>2</sub> has been oxidized to H <sub>2</sub> O.

### **EXERCISES**

Q1. Look in NCERT

Ans. (1) is the correct option

Q2. Look in NCERT

Ans. Option (d) is correct

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Q3. Look	in N	NCERT
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Ans. Option (a) is correct

Hydrogen

### Q4. What is the balanced chemical equation? Why should a chemical equation be balanced?

Ans. A chemical equation has an equal number of atoms of different elements in the reactants and products are said to be balanced chemical equation.

According to law of conservation of mass, the total mass of the reactant side is equal to the total mass of product side it is only possible when the number of atoms are equal in both the side so to full fill the law of conservation of mass equations are balanced.

Q5. Translate the following statements into chemical equations and then balanced them.

(a) Hydrogen gas combines with nitrogen to form ammonia.

Nitrogen

This equation in symbolic form can be re-present as

KOH +

2KOH +

 $H_2O$ 

2H<sub>2</sub>O →

Hence, balanced equation is

- (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) Hydrogen gas combines with nitrogen to form ammonia this statement can be written as in word equation as

→ Ammonia

	This ed	quation	in symb	olic for	m can b	e re-pr	esent as	5					
	$H_2$	+	$N_2$	$\rightarrow$	$NH_3$								
	Hence	, balanc	ed equa	ition is									
	$3H_2$	+	$N_2$	$\rightarrow$	$2NH_3$								
(	b)Hydro	gen sul	phide g	as burn	s in air i	to give v	water a	nd sulph	nur dioxi	de this	staten	nent can be wri	tten as
in wor	d equat	ion as											
	Hydro	gen sulp	hide	+	Oxyger	า		$\rightarrow$	water -	+	sulphu	ır dioxide	
	This ed	quation	in symb	olic for	m can b	e re-pr	esent as	6					
	$H_2S$	+	$O_2$	$\rightarrow$	$H_2O$	+	$SO_2$						
	Hence	, balanc	ed equa	ition is									
	$2H_2S$	+	3O <sub>2</sub>	$\rightarrow$	$2H_2O$	+	$2SO_2$						
((	C)Bariur	n chlori	de react	s with a	alumini	um sulp	hate to	give alu	ıminium	chlorid	de and	a precipitate of	f
bariun	n sulpha	te this	stateme	nt can l	be writt	en as ir	word e	equation	n as				
	Bariun	n chlorid	de	+	Alumir	ium sul	phate	→ Alur	ninium d	chloride	e +	Barium sulpha	ite
	This ed	quation	in symb	olic for	m can b	e re-pr	esent as	5					
	$BaCl_2$	+	Al <sub>2</sub> (SO <sub>4</sub>	ı <b>)</b> 3	$\rightarrow$	AlCl <sub>3</sub>	+	$BaSO_4$					
	Hence	, balanc	ed equa	ition is									
	3BaCl <sub>2</sub>	+	Al <sub>2</sub> (SO <sub>4</sub>	ı <b>)</b> 3	$\rightarrow$	2AICI <sub>3</sub>	+	3BaSO	1				
(1	D) Potas	sium m	etal rea	cts with	water	to give	potassiı	ım hydı	oxide ar	nd hydi	ogen g	gas this stateme	nt can
be wri	tten as i	in word	equation	n as.									
	Potass	ium	+	Water	→ Pota	assium l	hvdroxid	de e	+Hvdros	<sub>zen</sub>			

 $H_2$ 

**CHEMICAL REACTION AND EQUATION** 

### Q6. Balanced the following chemical equations

(a) HNO₃ +	Ca(OH)₂	$\rightarrow$	$Ca(NO_3)_2$	+	H <sub>2</sub> O
(b) NaOH +	H <sub>2</sub> SO <sub>4</sub>	$\rightarrow$	Na <sub>2</sub> SO <sub>4</sub>	+	H <sub>2</sub> O
(c) NaCl +	AgNO₃	$\rightarrow$	AgCl	+	NaNO₃
(d) BaCl <sub>2</sub> +	H <sub>2</sub> SO <sub>4</sub>	$\rightarrow$	BaSO₄	+	HCI

### Ans. Balanced chemical equations are

(a) 2HNO <sub>3</sub> +	Ca(OH)₂		→ Ca(	$NO_3)_2$	+ 2H <sub>2</sub> O
(b) 2NaOH+	$H_2SO_4$	$\rightarrow$	$Na_2SO_4$	+	2H <sub>2</sub> O
(c) NaCl +	$AgNO_3$	$\rightarrow$	AgCl	+	NaNO₃
(d) $BaCl_2 +$	$H_2SO_4$	$\rightarrow$	BaSO <sub>4</sub>	+	2HCl

#### Q7. Write the balanced chemical equations for the following reactions

(a) Calcium hydro	oxide + carbo	n dioxide	→ calcium carbo	nate	+ water
(b) Zinc +	silver nitrate 🗦	zinc nitrate	+ silver		
(c) Aluminium	+ copper chlor	ide →	Aluminium chloride	+	copper
(d) Barrium chlor	ide + Potassium su	ılphate 🗦	Barium sulphate	+	potassium chloride
Ans. (a) Ca(OH) <sub>2</sub>	+ CO <sub>2</sub> →	CaCO <sub>3</sub> +	$H_2O$		
(b) Zn +	2AgNO₃ →	$Zn(NO_3)_2$	+ 2Ag		
(c) 2Al +	3CuCl₂ → 2AlCl	₃ + 3Cu			
(d) $BaCl_2 +$	$K_2SO_4 \rightarrow BaSO_4$	+ 2KCl			

### Q8. 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) → Hydrogen chloride (g)
- (d) Magnesium (s) + Hydrochloric Acid (aq) → Magnesium chloride (aq) + Hydrogen (g)

Ans (a) 
$$2KBr(aq)$$
 +  $Bal_2(aq)$   $\rightarrow$   $2KI (aq)$  +  $BaBr_2$   
This is a double displacement reaction

(b) 
$$ZnCo_3(s) \rightarrow ZnO(s) + CO_2(g)$$
  
This is decomposition reaction

(c) 
$$H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$$

This is combination reaction

(d) Mg (s) + 2HCl (aq) 
$$\rightarrow$$
 MgCl<sub>2</sub> (aq) + H<sub>2</sub>(g)

This is displacement reaction

### Q9. What does one mean by exothermic and endothermic reactions? Give examples

Ans **Exothermic Reactions**: - Those chemical reactions in which heat is released are called exothermic reactions. It is indicated by writing '+ Heat on product side'

Example: - when methane burns in air (i.e. combustion) a lot of heat energy is released.

CH<sub>4</sub>(g) + 
$$2 O_2$$
(g)  $\rightarrow$  CO<sub>2</sub>(g) +  $2 H_2 O$ (g) + Heat  
Methane Oxygen Carbon dioxide Water  
(From air) (as steam)

**CHEMICAL REACTION AND EQUATION** 

<u>Endothermic reactions</u>: - Those chemical reactions in which heat is absorbed are called endothermic reactions. It is indicated by writing '+ Heat on Reactant side'

Example: - When nitrogen and oxygen are heated to a very high temperature, they combine to form nitrogen monoxide, and a lot of heat is absorbed in this reaction.

 $N_2(g) + O_2(g) + Heat \rightarrow 2NO(g)$ 

Nitrogen Oxygen Nitrogen monoxide

### Q10. Why is respiration considered an exothermic reaction? Explain.

Ans. During the respiration food is oxidizes to give carbon dioxide and water and heat is released. Such reaction in which heat is released known as exothermic reaction so hence, In respiration heat is released so it is an exothermic reaction.

## Q11. Why are decomposition reactions called the opposite of combination reactions? Write equations for these reactions.

Ans. In decomposition reactions, a single substance is break to give two or more substances while in combination reaction two or more substances combine to give a single substance so hence decomposition reaction is opposite to combination reaction.

Example: - Water on electrolysis decomposes to give hydrogen and oxygen is a decomposition reaction

 $2H_2O$  <u>Electricity</u> >  $2H_2$  +  $O_2$ 

Water Hydrogen Oxygen

Whereas hydrogen and oxygen combine to give water is a combination reaction

 $2H_2 + O_2 \rightarrow 2H_2O$ 

Hydrogen Oxygen Water

## Q12. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity.

#### Ans. Example: - Decomposition by heat

When calcium carbonate is heated, it decomposes to give calcium oxide and carbon dioxide.

CaCO<sub>3</sub> Heat, Decomposes > CaO + CO<sub>2</sub>

Calsium carbonate calcium oxide carbon dioxide

### **Example: - Decomposition by electricity**

When electric current is passed through acidified water, it decomposes to give hydrogen gas and oxygen gas.

 $2H_2O$  Electricity >  $2H_2$  +  $O_2$ 

Water Hydrogen Oxygen

This reaction is known as electrolysis of water.

### **Example: - Decomposition by light**

Silver chloride decomposes in presence of sunlight to give silver and chloride.

Silver chloride turns grey in sunlight

2AgCl(s) sunlight > 2Ag(s) + Cl<sub>2</sub>(g) Silver chloride silver chlorine

(Grey in colour)

**CHEMICAL REACTION AND EQUATION** 

Q13. What is the difference between displacement and double displacement reactions? Write equations for these reactions.

Ans.

Displacement reaction	Double displacement reaction				
1. Those reactions, in which one element takes the	1. Those reaction in which two compound react by an				
place of another element in a compound, are	exchange of ions to form two new compounds are				
known as displacement reactions. A more	called double displacement reactions. These				
reactive element displacement a less reactive	reactions also known as metathesis reactions.				
element from its compound.					
2. In displacement reaction an element and a	2. In double displacement reaction two compounds are				
compound is react.	react				
Example: -When a strip of zinc metal is placed in	Example: 1. When silver nitrate solution is added to				
copper sulphate solution, then zinc sulphate solution	sodium chloride solution, then a white ppt of silver				
and copper are obtained.	chloride is formed along with sodium nitrate solution.				
CuSO <sub>4</sub> (aq) + Zn (s) $\rightarrow$ ZnSO <sub>4</sub> (aq) +	$AgNO_3(aq)$ +NaCl (aq) $\rightarrow$ AgCl (s) +				
Cu (s)	NaNO₃(aq)				
Coppersulphate zinc zinc sulphate copper	Silver Nitrate sodium chloride silver chloride sodium				
(Blue solution)	nitrate				

Q14. In the refining of silver, the recovery of silver from silver nitrate solution involved displacement by copper metal. Write down the reaction involved.

Ans. Cu (s) +  $2AgNO_3$  (aq)  $\rightarrow$  Cu( $NO_3$ )<sub>2</sub> (aq) + 2Ag (s) Copper Silver nitrate Copper nitrate Silver

Q15. What do you mean by a precipitation reaction? Explain by giving example

Ans. <u>Precipitation Reaction:</u> - precipitation reaction are those reaction in which precipitate (i.e. undissolve substance remain in the solution) is formed

Example: - Barium chloride solution reacts with aluminium sulphate to form aluminium chloride and a ppt of barium sulphate remains in the solution

 $BaCl_2$  +  $Al_2(SO_4)_3$   $\rightarrow$   $AlCl_3$  +  $BaSO_4 \downarrow$  Barium Chloride Aluminium Sulphate Aluminium Chloride Barium Sulphate

Q16. Explain the following in terms of gain or loss of oxygen with two examples each.

(a) Oxidation (b) Reduction

Ans. Oxidation: - It is the process which involves gain of oxygen

Example: - (1) 2Mg (s) +  $O_2$  (g)  $\rightarrow$  2MgO(s)

Mg gained oxygen to form MgO. Hence, Mg has been oxidized to MgO.

(2) CuO (s)  $+ H_2(g) \rightarrow Cu(s) + H_2O(g)$ 

H<sub>2</sub> has gained oxygen to form H<sub>2</sub>O. Hence H<sub>2</sub> has been oxidized to H<sub>2</sub>O.

**Reduction:** - It is the process which involves loss of oxygen.

Example: -(1) ZnO (s) + C (s)  $\rightarrow$  Zn (s) + CO (g)

ZnO has lost oxygen to form Zn. Hence ZnO has been reduced to Zn

(2) CuO (s)  $+ H_2(g) \rightarrow Cu(s) + H_2O(g)$ 

CuO has lost oxygen to form Cu. Hence CuO has been reduced to Cu

### **CHEMICAL REACTION AND EQUATION**

### Q17. A shiny brown coloured element 'X' on heating in air becomes black in colour. Name the element 'X' and black coloured compound formed.

Ans. The shiny brown coloured element is Copper

When copper is heated in air it combine with oxygen to form a black coloured compound copper (II) oxide [CuO]

 $2Cu(s) + O_2(g) \rightarrow 2CuO(s)$ 

#### Q18. Why do we apply paint on iron articles?

Ans. Paint covers the surface of iron articles. Hence, moist air cannot attack iron and prevent rusting.

#### Q19. Oil and fat containing food items are flushed with nitrogen. Why?

Ans. In the presence of oxygen of the air, the fats present in the fatty food are oxidized to copounds which have bad smell (i.e. food is rancid) flushing with nitrogen cuts off oxygen and protects the food from rancidity.

#### Q20. Explain the following terms with one example each.

(a) Corrosion

(b) Rancidity

Ans. <u>Corrosion</u>: - "The eating up of metal by the action of air and moisture on their surface is called corrosion." For example- iron metal corrodes when kept in damp air for a considerable time, and then a red brown substance called rust ( $Fe_2O_3.xH_2O$ ) is formed on its surface. Rust is soft and porous

**Rancidity**: - The oxidation of oils or fats in a food resulting into a bad smell and bad taste is called rancidity Example: - A bad smell coming from food is an example of rancidity