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Chemical Reactions & Equations

Conceptual questions

1. A metal 'M' acquires a green colour coating on its surface on exposure to air.
   i. Identify the metal 'M' and name the process responsible for this change.
   ii. Name and write the chemical formula of the green coating formed on the metal.
   iii. List two important methods to prevent the process
2. Why potato chips manufacturers fill the packet of chips with nitrogen gas?
3. A brown substance 'X' on heating in air forms a substance 'Y'. When hydrogen gas is passed over heated 'Y', it again changes back to 'X'.
   i. Name the substances X and Y
   ii. Name the chemical process occuring during the two changes.
   iii. Write the chemical equations
4. Give an example when corrosion is an advantage rather than a disadvantage
5. Which chemical compound is used in white-washing of walls? What happens when we mix it with water? Which reaction take place on the walls after white wash?
6. Why does zinc plate develops holes when placed in $CuSO_4$ solution for few hours or days?
7. Action of water on calcium carbide (CaC_2) is used for the preparation of acetylene (C_2H_2). In this reaction calcium carbide is converted into slaked lime. Write the balanced chemical equation for the reaction.
8. A strip of metal X is dipped in a blue coloured salt solution YSO_4. After some time, a layer of metal Y from the salt solution is formed on the surface of metal strip X. Metal X is used in galvanisation whereas metal Y is used in making electric wires. Metal X and metal Y together form an alloy Z.
   a. Name the metal X and Y.
   b. What type of chemical reaction takes when metal X reacts with salt solution YSO_4? Write the equation of the chemical reaction involved.
   c. Name the alloy Z.
9. When dilute solution of ammonium hydroxide is added to aqueous solution of ferrous sulphate, ferrous hydroxide is formed along with ammonium sulphate. Name the type of this reaction and also write chemical equation involved.
10. A shiny brown coloured element X on heating in air becomes black in colour. Name the element X and the black coloured compound formed.

True/False questions

Mark the statement whether it is true or false. If the statement is false, write the true statement.

1. Phosphate is a divalent ion.
2. Chemical equations are balanced to satisfy the law of conservation of mass.
3. When Mg ribbon is placed in atmosphere of nitrogen, it burns to form magnesium nitride.
4. Photosynthesis is exothermic reaction .
5. Burning of candle is a physical change whereas burning of the candle wax is a chemical change.
6. The correct formula of aluminium sulphate is Al_2SO_4
7. Mg ribbon burns in air with smoky flame.

8. A chemical equation cannot predict the feasibilty of a reaction.
9. The term 'aqueous' represents large excess of water.
10. Reversible reactions can proceed in both the directions.
11. 1 mole of $CaCO_3$ on heating gives 1mole of CaO and 44g of CO_2
12. The action of heat on ferrous sulphate crystals is an example of a decomposition reaction.
13. Silver, if placed in a solution of $Cu(NO_3)_2$, will displace copper from the solution.
14. Silver bromide decomposes in the presence of light.
15. Green crystals of ferrous sulphate become dirty white upon strong heating.
16. In the electrolysis of acidulated water, volume of oxygen collected at cathode is half of the volume of hydrogen collected at anode.
17. Chemical reactions carried in the presence of sunlight are known as photochemical reaction.
18. The decomposition of vegetable matter into compost is an example of endothermic reaction.
19. The chemical formula of marble is $CaCO_3$.
20. Quick lime is used in the manufacture of cement.
21. The reaction $H_2 + Cl_2 \rightarrow 2HCl$ is not an example of redox reaction.
22. Silver articles turns black when kept in the air due to the formation of silver sulphide on its surface.
23. Rust is hydrated ferric oxide ($Fe_2O_3.xH_2O$).
24. The rusting of iron can occur in dry air.
25. Precipitate of silver chloride dissolves in excess of water.
26. An oxidation reaction can proceed only in the company of reduction reaction.
27. Rancidity of eatables is due to oxidation.

Fill in the blanks

1. Reaction in which energy is absorbed is known as ..... reaction.
2. The reaction in which heat is given out along with products is known as ..... reaction.
3. $NaCl\ (aq) + \ldots\ldots\ldots\ (aq) \rightarrow NaNO_3(aq) + AgCl(s)$
4. The molecular formula of barium nitrate is .....
5. The substances that take part in a chemical reactions are called.....
6. Balancing of chemical equations is necessory because atoms are neither ..... nor ..... during a chemical reaction.
7. The chemical equation in which the term heat is included are called ..... equations.
8. The reaction $CaCO_3 \xrightarrow{Heat} CaO + CO_2$ is a ..... reaction.
9. Formation of Nitric oxide from nitrogen and oxygen is a ..... reaction.
10. The reacton $2Na + Cl_2 \rightarrow 2NaCl$ is a ..... reaction.
11. The decomposition caused by light is called .....
12. The reaction of copper sulphate solution and iron filings is a ..... reaction.
13. The gas liberated in the decomposition of $KClO_3$ is ..... .
14. The reaction $SO_2 + H_2O \rightarrow H_2SO_3$ is an example of ..... reaction.
15. Neutralisation reaction between an acid and a base is an example of ..... reaction.
16. The gas released during respiration is ..... .
17. The reaction in which oxygen is added to the substance is called ..... reaction
18. Reaction in which hydrogen is added to a substance is called ..... reaction.

19. The process of loss of an electron in known as ..... and the process of gain of an electron is known as ..... .

20. The substance undergoing oxidation acts as a/an ..... agent.

21. The reducing agent undergoes ..... of electrons.

22. The potato chips manufacturers use ..... gas to flush the chips bags to prevent the chips getting oxidised.

23. Digestion of food in our body is an example of ..... reaction.

24. In case of iron, corrosion is known as .....

Objective type questions

In the following questions, four options are given out of which only one is correct.

1. In the balanced equation

$aFe_2O_3 + bH_2 \rightarrow cFe + dH_2O$

The value of a,b,c,d are respectively

(1) 1,1, 2, 3 (2) 1,1,1,1

(3) 1,3, 2,3 (4) 1, 2, 2, 3

2. The equation

$Cu + xHNO_3 \rightarrow Cu(NO_3)_2 + yNO_2 + 2H_2O$

The values of x and y are

(1) 3 and 5 (2) 8 and 6

(3) 4 and 2 (4) 7 and 1

3. Which of the following statements is/are true?

(1) The total mass of the substance remains same in a chemical change.

(2) A chemical change is permanent & irreversible

(3) A physical change is temporary & reversible

(4) All the these.

4. Which of the following statements is correct?

(1) A chemical equation tells us about the substances involved in a reaction.

(2) A chemical equation informs us about the symbols and formulae of the substances involved in a reaction.

(3) A chemical equation tells us about the atoms or molecules of the reactants and products involved in a reaction.

(4) All are correct

5. Which of the following is correct match?

Column -A		**Column -B**	
Compound		**Formula**	
i.	lead nitrate	a.	$BaCl_2$
ii.	Barium sulphate	b.	$Pb(NO_3)_2$
iii.	lead oxide	c.	PbO
iv.	Barium chloride	d.	$BaSO_4$

(1) i-b, ii-c, iii-d, iv-a (2) i-b, ii-d, iii-c, iv-a

(3) i-a, ii-b, iii-c, iv-d (4) i-b, ii-a, iii-c, iv-d

6. Which of the following is correct match?

Column- A		**Column-B**	
Formula		**Common Name**	
i.	CaO	a.	Slaked line
ii.	$Ca(OH)_2$	b.	Green vitriol
iii.	$CaCO_3$	c.	Quick line
iv.	$FeSO_4.7H_2O$	d.	Lime stone

(1) i-b, ii-c, iii-d, iv-a (2) i-b, ii-d, iii-c, iv-a

(3) i-c, ii-a, iii-d, iv-b (4) i-b, ii-a, iii-c, iv-d

7. Which of the following is not a chemical reaction?

(1) Souring of milk

(2) Dissolution of sugar in water

(3) Rusting of iron

(4) Digetion of food in our body

8. Reaction of oxygen with magnesium to form magnesium oxide

(1) $Mg + O_2 \rightarrow 2MgO$

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

(3) $Mg_2 + O_2 \rightarrow 2MgO$

(4) $Mg + O_2 \rightarrow MgO_2$

9. The co-efficient of copper sulphate in the balanced equation of $Al + CuSO_4 \rightarrow Al_2(SO_4)_3 + Cu$ is_____

(1) 4 (2) 3

(3) 1 (4) 2

10. Which of the following is not a decomposition reacion?

(1) $CaCO_3 \rightarrow CaO + CO_2$

(2) $2KClO_3 \rightarrow 2KCl + 3O_2$

(3) Digestion of food in the body

(4) $H_2 + Cl_2 \rightarrow 2HCl$

11. Which of the following represent a double displacement reaction?

(1) $2H_2 + O_2 \rightarrow 2H_2O$
(2) $2Mg + O_2 \rightarrow 2MgO$
(3) $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$
(4) $H_2 + Cl_2 \rightarrow 2HCl$

12. Which of the following is a displacement reaction?

(1) $CaCO_3 \rightarrow CaO + CO_2$
(2) $CaO + 2HCl \rightarrow CaCl_2 + H_2O$
(3) $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$
(4) $NaOH + HCl \rightarrow NaCl + H_2O$

13. The reaction $H_2 + Cl_2 \rightarrow 2HCl$ is a

(1) Decomposition reaction
(2) Combination reaction
(3) Double displacement reaction
(4) Displacement reaction

14. Which reaction is metathesis reaction?

(1) $FeCl_3 + 3NaOH \rightarrow Fe(OH)_3 + 3NaCl$
(2) $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$
(3) $2CO + O_2 \rightarrow 2CO_2$
(4) $N_2 + O_2 \rightarrow 2NO$

15. What happens when dil hydrochloric acid is added to iron fillings?

(1) Hydrogen gas and Iron chloride are produced.
(2) Chlorine gas and Iron hydroxide are produced.
(3) No reaction takes place
(4) Iron salt and water are produced.

16. Which of the following is/are a decomposition reaction(s)?

(1) $2HgO \xrightarrow{Heat} 2Hg + O_2$
(2) $CaCO_3 \xrightarrow{Heat} CaO + CO_2$
(3) $2H_2O \xrightarrow{Electrolysis} H_2 + O_2$
(4) All of these

17. Match the following

Column A	**Column B**
Chemical reaction	Chemical equations
(a) Combination	(i) $CaCO_3 \xrightarrow{\Delta} CaO + CO_2$
(b) Decomposition	(ii) $2H_2O \xrightarrow{Electricity} 2H_2 + O_2$
(c) Displacement	(iii) $CaO + CO_2 \rightarrow CaCO_3$
(d) Analysis	(iv) $Fe + CuSO_4(aq.) \rightarrow FeSO_4(aq) + Cu$

(1) a(ii), B(i), C(iv), d(iii)
(2) a(i), b(ii), c(iii), d(iv)
(3) a(iii), b(i), c(iv), d(ii)
(4) a(iii), b(i), c(iii), d(iv)

18. Which of the following reactions is/are double displacement reaction (s) ?

(i) $AgNO_3 + NaBr \longrightarrow NaNO_3 + AgBr$
(ii) $BaCl_2 + H_2SO_4 \longrightarrow BaSO_4 + 2HCl$
(iii) $As_2O_3 + 3H_2S \longrightarrow As_2S_3 + 3H_2O$
(iv) $NaOH + HCl \longrightarrow NaCl + H_2O$

(1) (i) & (ii) (2) only (iii)
(3) only (iv) (4) All of these

19. $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$

Above reaction is a

(1) precipitation reaction
(2) double displacement reaction
(3) combination reaction
(4) both (1) and (2)

20. $Zn + H_2SO_4(dil) \longrightarrow ZnSO_4 + H_2\uparrow$

Above equation is a

(1) Decomposition
(2) Single displacement reaction
(3) Combination reaction
(4) Synthesis reaction

21. Which of the following statements is incorrect?
(1) In oxidation, oxygen in added to a substance.
(2) In reduction, Hydrogen is added to a substance
(3) Oxidizing agent in oxidized.
(4) Reducing agent is oxidized.

22. Which is a combustion reaction?
(1) Boiling of water
(2) Melting of wax
(3) Burning of petrol
(4) None of these

23. Which of the following is a redox reaction?
(1) $CaCO_3 \rightarrow CaO + CO_2$
(2) $H_2 + Cl_2 \rightarrow 2HCl$
(3) $CaO + 2HCl \rightarrow CaCl_2 + H_2O$
(4) $NaOH + HCl \rightarrow NaCl + H_2O$

24. Which statement is correct about the following reaction?

$ZnO + CO \rightarrow Zn + CO_2$

(1) ZnO is being oxidized
(2) CO is being reduced
(3) CO_2 is being oxidized
(4) ZnO is being reduced

25. The reaction $C + O_2 \rightarrow CO_2$ + Heat is a
(1) Combination reaction
(2) Oxidation reaction
(3) Exothermic reaction
(4) All of the above

26. In reaction $SO_2 + 2H_2S \rightarrow 2H_2O + 3S$ the reducing agent is
(1) SO_2 (2) H_2S
(3) H_2O (4) S

27. In the reaction $Mg + Cl_2 \rightarrow MgCl_2$
Chlorine may be regarded as
(1) an oxidising agent
(2) a reducing agent
(3) a catalyst
(4) providing an inert medium

28. $CuO + H_2 \rightarrow H_2O + Cu$, reaction is an example of
(1) redox reaction (2) synthesis reaction
(3) neutralisation (4) analysis reaction

29. Which of the following is an example of oxidation reaction?
(1) $Sn^{+2} - 2e^-$ Sn^{+4}
(2) $Fe^{+3} + e^- \rightarrow Fe^{+2}$
(3) $Cl_2 + 2e^- \rightarrow 2Cl^-$
(4) None of these

30. In the process of burning of magnesium in air, magnesium undergoes
(1) reduction (2) sublimation
(3) oxidation (4) all of these

31. In the reaction $PbO + C \rightarrow Pb + CO$
(1) PbO is oxidized
(2) C acts as oxidising agent.
(3) C acts as a reducing agent.
(4) This reaction does not represent a redox reaction.

32. A redox reaction is one in which
(1) both the substances are reduced.
(2) both the substances are oxidised.
(3) an acid is neutralised by the base.
(4) one substance is oxidised, while the other is reduced.

33. $Fe_2O_3 + 2Al$ $Al_2O_3 + 2Fe$ This reaction is an example of
(1) Combination reaction
(2) Double displacement reaction
(3) Decomposition reaction
(4) Displacement reaction

34. When the gases sulphur dioxide and hydrogen sulphide react, the reaction is

$SO_2 + 2H_2S \rightarrow 2H_2O + 3S$

Here hydrogen sulphide is acting as
(1) an oxidising agent
(2) a reducing agent
(3) a dehydrating agent
(4) a catalyst

35. Which of the following statements is/are false for oxidation reaction?
(1) Gain or addition of electronegative radical
(2) Removal of hydrogen atom.
(3) Removal or loss of electropositive radical or element
(4) None of these

36. A substance which oxidises itself and reduces other is known as
(1) an oxidising agent (2) a reducing agent
(3) both of these (4) none of these

37. Oxidation is a process which involves
(1) addition of oxygen
(2) removal of hydrogen
(3) loss of electrons
(4) All are correct

38. Which of the following is a decomposition reaction?
(1) $NaOH + HCl \quad NaCl + H_2O$
(2) $NH_4CNO \rightarrow H_2NCONH_2$
(3) $2KClO_3 \rightarrow 2KCl + 3O_2$
(4) $H_2 + I_2 \rightarrow 2HI$

39. Conversion of $CaCO_3$ in to CaO as per following reaction is an example of –

$CaCO_3 \rightarrow CaO + CO_2$

(1) Decomposition reaction
(2) Reduction reaction
(3) Oxidation reaction
(4) None of these

40. When Iron nails are added to an aquous solution of copper sulphate, a chemical change occurs, which of the following is not true about this reaction?
(1) Blue colour of the solution fades.
(2) Iron nails becomes brownish in colour.
(3) It is a displacement reaction
(4) Iron nails dissolves completly

41. Which of the following equations is representing combination of two elements?
(1) $CaO + CO_2 \rightarrow CaCO_3$
(2) $4Na + O_2 \rightarrow 2Na_2O$
(3) $SO_2 + 1/2O_2 \rightarrow SO_3$
(4) $2Na + 2H_2O \rightarrow 2NaOH + H_2$

42. Which of the following equations is not an example of single displacement reaction?
(1) $2Al + Fe_2O_3 \rightarrow Al_2O_3 + 23Fe$
(2) $Ca + CO_2 \rightarrow CaCl_2$
(3) $2KI + Cl_2 \rightarrow 2KCl + I_2$
(4) $2Na + 2H_2O \rightarrow 2NaOH + H_2$

EXERCISE-1 OF SYNOPSIS

(5) a. $Ba(OH)_2(aq) + 2HBr(aq) \rightarrow BaBr_2(aq) + 2H_2O(l)$

b. $2KCN(aq) + H_2SO_4(aq) \rightarrow K_2SO_4(aq) + 2HCN(g)$

c. $2Al(s) + 6HCl(aq) \rightarrow 2AlCl_3(aq) + 3H_2(g)$

EXERCISE-2 OF SYNOPSIS

(1) (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

EXERCISE-3 OF SYNOPSIS

(5) MnO_2 is oxidizing agent.

HCl is reducing agent.

CONCEPTUAL QUESTIONS

(1) i. M–Cu, Process - corrosion

ii. Green coating - basic copper carbonate $CuCO_3.Cu(OH)_2$

iii. Painting, oiling, greasing

(3) i. X–Cu Y–CuO

ii. Change to Cu into CuO is oxidation whereas change of CuO back into Cu is reduction

iii. $2Cu + O_2 \rightarrow 2CuO$

$CuO + H_2 \rightarrow Cu + H_2O$

(8) a. X is Zn, Y is Cu.

b. Displacement reaction

$CuSO_4(aq) + Zn(s) \rightarrow ZnSO_4(aq) + Cu(s)$

c. Z is brass

(9) It is a double decomposition reaction.

$FeSO_{4(aq)} + 2NH_4OH_{(aq)} \rightarrow Fe(OH)_{2(s)} + (NH_4)_2 SO_{4(aq)}$

True/False (T/F)

(1) F (2) T

(3) T (4) F

(5) T (6) F

(7) F (8) T

(9) T (10). T

(11) T (12) T

(13) F (14) T

(15) F (16) F

(17) T (18) F

(19) T (20) T

(21) F (22) T

(23) T (24) F

(25) F (26) T

(27) T

Fill in the blanks

(1) Endothermic

(2) Exothermic

(3) $AgNO_3$

(4) $Ba(NO_3)_2$

(5) reactants

(6) created, destroyed

(7) thermochemical

(8) Decomposition

(9) combination

(10) Combination

(11) Photochemical reaction

(12) Displacement

(13) Oxygen

(14) Combination

(15) Double displacement

(16) CO_2

(17) Oxidation

(18) Reduction

(19) Oxidation, reduction

(20) Reducing

(21) loss

(22) Nitrogen

(23) Combustion

(24) rusting

Objective Questions

1.	(3)	15.	(1)	29.	(1)
2.	(3)	16.	(4)	30.	(3)
3.	(4)	17.	(3)	31.	(3)
4.	(4)	18.	(4)	32.	(4)
5.	(2)	19.	(4)	33.	(4)
6.	(3)	20.	(2)	34.	(2)
7.	(2)	21.	(3)	35.	(4)
8.	(2)	22.	(3)	36.	(2)
9.	(2)	23.	(2)	37.	(4)
10.	(4)	24.	(4)	38.	(3)
11.	(3)	25.	(4)	39.	(1)
12.	(3)	26.	(2)	40.	(4)
13.	(2)	27.	(1)	41.	(2)
14.	(1)	28.	(1)	42.	(2)