CHEMISTRY

CHEMICAL REACTIONS AND EQUATIONS

Some codes are given below from 1 to 6 and a, b. Utilise the given codes to describe the type, nature of the reaction as well as reducing agent and oxidizing agents and coefficients in balanced equation.

1. Type of reaction
   a) Chemical combination
   b) Chemical decomposition
   c) Chemical displacement
   d) Double displacement
2. a) Redox reaction
   b) Non-redox reaction
3. a) Endo thermic
   b) Exothermic
4. Oxidizing agent
5. Reducing agent
6. Coefficients in balanced equation

S.No.	Equation	1	2	3	4	5
1.	$Mg + O_2 \rightarrow 2MgO$ 6_____ (s) (g) (s)	a	a	b	O_2	Mg
2.	$2Pb(NO_3)_2 \xrightarrow{\Delta} 2PbO + 4NO_2 + O_2$ 6_____ (s) (s) (g) (g)					
3.	$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2\uparrow$ 6_____ (s) (aq) (aq) (g)					
4.	$3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2\uparrow$ 6_____ (s) (g) (s) (g)					
5.	$CO + 2H_2 \xrightarrow{300\,atm} CH_3OH$ 6_____ (g) (g) (*l*)					
6.	$6CO_2 + 12H_2O \xrightarrow[chlorophyll]{sunlight} C_6H_{12}O_6 + 6O_2 + 6H_2O$ (aq) (*l*) (aq) (g) (*l*) 6_____					
7.	$H_2 + Cl_2 \xrightarrow{\upsilon} 2HCl$ (g)(g) (g) 6_____					
8.	$3BaCl_2 + Al_2(SO_4)_3 \rightarrow 3BaSO_4 + 2AlCl_3$ (aq) (aq) (s) (aq) 6_____					
9.	$Na + H_2O \rightarrow NaOH + H_2\uparrow$ 6_____ (s) (*l*) (aq) (g)					

S.No	Equation	1	2	3	4	5
10.	$BaCl_2 + Na_2SO_4 \rightarrow BaSO_4\downarrow + 2NaCl$ (aq) (aq) (s) (aq) 6_____					
11.	$NaOH + HCl \rightarrow NaCl + H_2O$ 6_____ (aq) (aq) (aq) (*l*)					
12.	$CaO + H_2O \rightarrow Ca(OH)_2$ 6_____ (s) (*l*) (aq)					
13.	$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 \downarrow + H_2O$ 6_____ (aq) (g) (s) (*l*)					
14.	$C + O_2 \rightarrow CO_2$ 6_____ (s) (g) (g)					
15.	$H_2 + O_2 \rightarrow 2H_2O$ 6_____ (g) (g) (*l*)					
16.	$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ 6_____ (g) (g) (g) (g)					
17.	$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ 6_____ (aq) (aq) (aq) (*l*)					
18.	$2FeSO_4 \xrightarrow{\Delta} Fe_2O_3 + SO_2 + SO_3$ 6_____ (s) (s) (g) (g)					
19.	$CaCO_3 \xrightarrow{\Delta} CaO + CO_2$ 6_____ (s) (s) (g)					
20.	$2H_2O \xrightarrow{Electricity} 2H_2 + O_2$ 6_____ (*l*) (g) (g)					
21.	$2AgCl \xrightarrow{\upsilon} 2Ag + Cl_2$ 6_____ (s) (s) (g)					
22.	$2AgBr \xrightarrow{\upsilon} 2Ag + Br_2$ 6_____ (s) (s) (g)					
23.	$Fe + CuSO_4 \rightarrow FeSO_4 + Cu$ 6_____ (s) (aq) (aq) (s)					
24.	$Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$ 6_____ (s) (aq) (aq) (s)					
25.	$Pb + CuCl_2 \rightarrow PbCl_2 + Cu$ 6_____ (s) (aq) (aq) (s)					
26.	$Pb(NO_3)_2 + 2KI \rightarrow PbI_2\downarrow + 2KNO_3$ 6_____ (aq) (aq) (s) (aq)					

S.No	Equation	1	2	3	4	5
27.	$2Cu + O_2 \rightarrow 2CuO$ 6_____ (s) (g) (s)					
28.	$CuO + H_2 \rightarrow Cu + H_2O$ 6_____ (g) (g) (s) (g)					
29.	$MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$ 6_____ (s) (aq) (aq) (g) (g)					
30.	$2HCl + Fe \rightarrow FeCl_2 + H_2\uparrow$ 6_____ (aq) (s) (aq) (g)					
31.	$3H_2 + N_2 \rightarrow 2NH_3$ 6_____ (g) (g) (g)					
32.	$K + H_2O \rightarrow KOH + H_2\uparrow$ 6_____ (s) (*l*) (aq) (g)					
33.	$HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + H_2O$ 6_____ (aq) (aq) (aq) (*l*)					
34.	$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$ 6_____ (aq) (aq) (aq) (*l*)					
35.	$NaCl + AgNO_3 \rightarrow AgCl\downarrow + NaNO_3$ 6_____ (aq) (aq) (s) (aq)					
36.	$Zn + 2AgNO_3 \rightarrow Zn(NO_3)_2 + 2Ag$ 6_____ (s) (aq) (aq) (s)					
37.	$Mg + 2HCl \rightarrow MgCl_2 + H_2\uparrow$ 6_____ (s) (aq) (aq) (g)					
38.	$Zn / Al / Pb + NaOH \rightarrow Na_2ZnO_2 / NaAlO_2 / Na_2PbO_3 + H_2\uparrow$ (s) (aq) (aq) (g) 6_____					
39.	$Na_2CO_3 / NaHCO_3 + 2HCl \rightarrow NaCl + CO_2\uparrow + H_2O$ (s) (*l*) (aq) (g) (*l*) 6_____					
40.	$CaCO_3 + H_2O + CO_2 \rightarrow Ca(HCO_3)_2$ 6_____ (s) (*l*) (g) (aq)					
41.	$2NaCl + H_2SO_4 \rightarrow Na_2SO_4 + 2HCl$ 6_____ (s) (aq) (aq) (g)					
42.	$2NaCl + 2H_2O \rightarrow 2NaOH + Cl_2 + H_2$ 6_____ (aq) (*l*) (aq) (g) (g)					
43.	$Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$ 6_____ (s) (g) (s) (*l*)					

S.No	Equation	1	2	3	4	5
44.	$NaCl + H_2O + CO_2 + NH_3 \rightarrow NH_4Cl + NaHCO_3$ (aq) (*l*) (g) (g) (aq) (aq) 6_____					
45.	$2NaHCO_3 \xrightarrow{Heat} Na_2CO_3 + H_2O + CO_2$ 6_____ (s) (s) (g) (g)					
46.	$4Al + 3O_2 \rightarrow 2Al_2O_3$ 6_____ (s) (g) (s)					
47.	$Al_2O_3 + 2NaOH \rightarrow 2NaAlO_2 + H_2O$ 6_____ (s) (aq) (aq) (*l*)					
48.	$Na_2O + H_2O \rightarrow 2NaOH$ 6_____ (s) (*l*) (aq)					
49.	$K_2O + H_2O \rightarrow 2KOH$ 6_____ (s) (*l*) (aq)					
50.	$2Na + Cl_2 \rightarrow 2NaCl$ 6_____ (g) (g) (s)					
51.	$Mg + Cl_2 \rightarrow MgCl_2$ 6_____ (g) (g) (s)					
52.	$2NaCl \rightarrow 2Na + Cl_2$ 6_____ (*l*) (s) (g)					
53.	$MgO + CO_2 \rightarrow MgCO_3$ 6_____ (s) (g) (s)					
54.	$MgO + H_2O \rightarrow Mg(OH)_2$ 6_____ (s) (g) (s)					
55.	$CuO + CO_2 \rightarrow CuCO_3$ 6_____ (s) (g) (s)					
56.	$CuO + H_2O \rightarrow Cu(OH)_2$ 6_____ (s) (g) (s)					
57.	$4Fe + 3O_2 + H_2O \rightarrow 2Fe_2O_3 . x . H_2O$ 6_____ (s) (g) (g) (s)					
58.	$4Ag + O_2 \rightarrow 2Ag_2O$ 6_____ (s) (g) (s)					
59.	$Ag_2O + H_2S \rightarrow Ag_2S + H_2O$ 6_____ (s) (g) (s)					

Complete the following table.

S.No.	Substance	Colour	Physical state	Physical form
1.	Magnesium	Silvery white	_____	_____
2.	Zinc	Shiny bluish grey	_____	_____
3.	Iron	Silvery grey	_____	_____
4.	Aluminium	Silvery	_____	_____
5.	Silver	Gray	_____	_____
6.	Potassium dichromate ($K_2Cr_2O_7$)	Orange	_____	_____
7.	Potassium permanganate ($KMnO_4$)	Violet	_____	_____
8.	Ferrous sulphate ($FeSO_4.7H_2O$)	Green	_____	_____
9.	Iron sulphide (FeS)	Black	_____	_____
10.	Copper carbonate ($CuCO_3$)	Green	_____	_____
11.	Copper nitrate ($Cu(NO_3)_2$)	Blueish green	_____	_____
12.	Copper sulphate ($CuSO_4.5H_2O$)	Blue	_____	_____
13.	Anhydrous copper sulphate ($CuSO_4$)	White	_____	_____
14.	Copper sulphide (CuS)	Black	_____	_____
15.	Copper oxide (CuO)	Black	_____	_____
16.	Cuprous oxide (Cu_2O)	Red	_____	_____
17.	Copper hydroxide ($Ca(OH)_2$)	Blue	_____	_____
18.	Lead iodide (PbI_2)	Yellow	_____	_____
19.	Lead sulphide (PbS)	Black	_____	_____
20.	Mercuric sulphide (HgS)	Black / Red	_____	_____
21.	Mercuric oxide (HgO)	Orange red	_____	_____
22.	Silver sulphide (Ag_2S)	Black	_____	_____
23.	Silver bromide (AgBr)	Yellow	_____	_____
24.	Silver chloride (AgC*l*)	White	_____	_____
25.	Ferric oxide (Fe_2O_3)	Brown	_____	_____
26.	Aluminium Hydroxide	White	_____	_____
27.	Silver iodide (AgI)	Yellow	_____	_____
28.	Zinc oxide (ZnO)	White-cold	_____	_____
29.	Sulphur	Yellow	_____	_____
30.	Chlorine	Green	_____	_____
31.	Copper	Red / Brown	_____	_____

Note : All sodium, calcium, magnesium and zinc salts are white.

Metal	METAL SALT SOLUTION (CL - Colourless; B-Blue; LG-Light Green)									
	KCl (CL)	$NaNO_3$ (CL)	$CaCl_2$ (CL)	$MgSO_4$ (CL)	$Al_2(SO_4)_3$ (CL)	$ZnSO_4$ (CL)	$FeSO_4$ (LG)	$Pb(NO_3)_2$ (CL)	$CuSO_4$ (B)	$AgNO_3$(CL)
K										
Na										
Ca										
Mg										
Al										
Zn										
Fe										
Sn										
Pb										
(H)										
Cu										
Hg										
Ag										
Au										
Pt										

I. Answer the following queastions :

1. Anil and his neighbour Sunil had got their garden fenced with iron rods. Next day Anil saw that Sunil was painting the iron fence. Sunil suggested Anil to do the same to increae the longevity of the iron rods by preventing corrosion. Anil argued that it is a waste of time and his iron rods were strong enough. After reading the above passage, answer the following questions.
   i) Whose opinion was correct? Justify
   ii) Mention two methods (other than painting) to prevent iron from corrosion.
   iii) Whatis the chemical formula of rust?
   v) Mention the values exhibited by Sunil.
2. Complete the missing component / variable given as X and Yin the following reaction

   $Zn_{(s)} + H_2SO_{4(aq)} \rightarrow ZnSO_4(X) + H_2(Y)$
3. State one example each characterised by the following along with the chemical equation
   i) Change in state **CBSE 2016**
   ii) Evolution of gas
   iii) Change in temperature
4. A metal salt MX when exposed to light, split up to form metal M and a gas X_2. Metal M is used in making Ornaments whereas gas X_2 is used in making bleaching powder. The salt MX is it self used in black and white photography. **CBSE 2018**
   i) Identify metal M and gas X_2.
   ii) Mention the type of chemical reaction involved when salt MX is exposed to light.
5. Decomposition reactions require energy either in the form of heat or light or electricity for breaking down the reactants. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light and electricity. **CBSE 2018**
6. State the type of chemical reactions with chemical equations that take place in the following.
   i) Magnesium wire is burnt in air.
   ii) Electric current is passed through water.
   iii) Ammonia and hydrogen chloride gases are mixed. **CBSE 2016**
7. i) Classify the following reactions into different types:
      a) $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$
      b) $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$
      c) $2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$
      d) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$
   ii) Translate the following statement into a balanced chemical equation. "Barium chloride reacts with aluminium sulphate to give aluminium chloride and barium sulphate." **CBSE 2019**

8. i) A student mixes sodium sulphate powder in barium chloride. What change would the student observe on mixing the two powders. Justify your answer and explain how he can obtaine the desired change? **CBSE 2019**

   ii) a) Arrange the following metals in the increasing order reactivities. Copper, Zinc, Aluminium and iron.

   b) List two observations you would record in your 30 minutes after adding iron filings to copper sulphate solution.

9. Name the type of chemical reaction represented by the following equations

   i) $CaCO_3(s) \xrightarrow{Heat} CaO(s) + CO_2(g)$

   ii) $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$

   iii) $Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g)$

10. Identify the substances that are oxidised and that are reduced in the following reactions

   i) $ZnO + C \rightarrow Zn + CO$

   ii) $CuO + H_2 \rightarrow Cu + H_2O$

   iii) $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

ACIDS, BASES AND SALTS

I. Answer the following queastions :

1. Four unkown solutions A, B, C and D are tested with universal indicator and reported the colour as given below.

Solution	A	B	C	D
Colour	Yellow	Violet	Green	Red

   i) What would be the nature of solution of C?

   ii) Arrange them in increasing order of pH values

   iii) Arrange them in decreasing order of acidic strength

   iv) Arrange them in increasing order of H^+ ion concentration

   v) Arrange them in decreasing order of pH values

   vi) Which is most basic?

   vii) What would be the nature of salt solution formed by reaction between A & B?

   viii) Arrange them increasing order of their conduction property.

   ix) What happens to the concentration of H^+ ions, if 'D' is diluted with water?

2. Four unkown solutions A, B, C and D are tested with universal indicator and reported the colour as given below.

Solution	A	B	C	D
pH	5	10	7	2

i) What would be the nature of solution of C?

ii) Arrange them in increasing order of pH values

iii) Arrange them in decreasing order of acidic strength

iv) Arrange them in increasing order of H^+ ion concentration

v) Arrange them in decreasing order of pH values

vi) Which is most basic?

vii) What would be the nature of salt solution formed by reaction between A & B?

vii) Arrange them increasing order of their conduction property.

viii) What happens to the concentration of H^+ ions, if 'D' is diluted with water?

3. A salt 'X' is analysed by dissolving it in distilled water and tested with universal indicator

i) Describe its nature if it produces green colour in universal indicator

ii) From which acid and base, salt 'X' is formed if it produces yellow colour in universal indicator

iii) What could be the nature of 'X' if it is formed from H_2SO_4 and NH_4OH.

4. A compound 'X' liberates a gas 'Y' upon treatment with HC*l*. 'X' is produced by decomposition of another compound 'Z' which is formed when gas 'Y' and another basic gas 'P' is passed through brine solution

i) Identify X, Y, Z and P

ii) What is the use of X and Z?

iii) Describe the identification test for gas 'Y'

iv) Write the balanced chemical equation for decomposition of 'Z'?

v) Write the balanced equation for preparation of 'Z'?

vi) What could be the observation when 'X' (or) 'Z' is allowed to react with ethyl alcohol?

vii) 'Z' and another component is used in bakery products. How can it make food spongy?

viii) Describe the nature of solution of 'X' and 'Z'

ix) What is the nature of gas 'P'?

5. A pale yellow coloured solid powder 'X' can be prepared by passing gas 'Y' which is produced at anode during chlor-alkali process, through another compound 'Z' obtained when quick time is dissolved in water. Then

i) Write the balanced chemical equation involved in the preparation of 'X'

ii) Mention any one use of 'X'

iii) Identify X, Y and Z

iv) Write the balanced chemical equations for formation of 'Z'

v) What is the nature of reaction involved during the formation of 'Z'?

vi) What happens if we pass excess of CO_2 gas through the solution of 'Z' instead of gas 'Y'?

6. An element 'X' belongs to IIA group and VI period its sulphate in hydrated form 'Y' can be used as a fire proof material. 'Y' can be produced by heating of another compound 'Z' of same element 'X' by heating at 373 K. Then

   i) What happens to the 'Z' if it is heated above 373 K

   ii) Write the balanced chemical reactions involved for p) $Y \rightarrow Z$, q) $Z \rightarrow Y$

   iii) Which reaction is involved among 'p' and 'q' during setting of fractured bones by compound 'Y'.

7. i) $HCl + Ca(OH)_2 \rightarrow X + 2H_2O$

   ii) $H_2SO_4 + NaOH \rightarrow Y + H_2O$

   iii) $CH_3COOH + NaOH \rightarrow Z + H_2O$

   Identify X,Y and Z and describe the nature of solution of X, Y and Z respectively.

8. $2NaCl + H_2O \rightarrow 2NaOH + X + H_2$

   $Y + X \rightarrow CaOCl_2 + H_2O$

   Complete the above chemical equations by identifying 'X' and 'Y' and describe what happens when aqueous $NaCl$ is electrolysed

9. $2NaHCO_3 \rightarrow Na_2CO_3 + X(g) + P(l)$

   $Ca(OH)_2 + X(g) \rightarrow Y(s) + P(l)$

   $NaCl + X(g) + P(l) + Z(g) \rightarrow NaHCO_3 + NH_4Cl$

   Complete the above given equations and answer the following questions

   i) What is the effect of 'Z' on moist litmus paper

   ii) How can the solution of 'X' in 'P' affect an olfactory indicator.

   iii) Write the colour of the solution produced in universal indicator if a substance with pH < 3.5 allowed to react with 'Y'

   iv) Name the substance which can produce 'X' upon reaction with $NaHCO_3$ to make cake (or) bakery products more fluffy

   v) Name the products obtained when aqueous $NaCl$ solution is electrolysed

10. A compound 'x' from sea water is used to manufacture compound 'y' which is bitter in taste and is used for softening hard water. When 'y' reacts with dil. HCl, a colourless gas 'z' is evolved which is a non-supporter of combustion. If 'z' is passed n excess through a solution of 'y'. 'w' is formed which is used as antacid. Identify x, y, z, w ?

11. Name the gas liberated in the following conditions and write complete balanced chemical equation for each case

    i) Cu with conc. HNO_3

    ii) Mg with very dil. HNO_3

    iii) Fe with conc. HNO_3

12. A Metal 'X'. Which is present is the middle of the reactivity series. The carbonate of Metal 'X' is used as a remedy for ant bite another Metal 'Y' also present in the middle of the reactivity series whose hydroxide is used as antacid for infants. Then answer following questions
    i) Identify X and Y
    ii) Write the balanced equations when metal X and Y reacts with caustic soda.
    iii) Give another example of metal which can react with caustic soda in similar way and write the product formed.

13. A Metal 'X'. Which is present is the middle of the reactivity series. The carbonate of Metal 'X' is used as a remedy for ant bite another Metal 'Y' also present in the middle of the reactivity series whose hydroxide is used as antacid for infants. Then answer following questions
    i) What happens when 'X' allowed to react with very dilute HNO_3
    ii) Give another example of metals which can show similar reaction with very dilute HNO_3
    iii) What happens when 'Y' allowed react with conc HNO_3

14. $Zn + 2NaOH \rightarrow Na_2ZnO_2 + H_2 \uparrow$ .....(1)

    $ZnO + 2NaOH \rightarrow Na_2ZnO_2 + H_2O$ ..... (2)

    Observe the above two reactions carefully and answer the following
    i) State type and nature of reaction involved in 1 and 2
    ii) Among 1 and 2 which can be placed under Redox reaction
    iii) In reaction 1 H_2 is liberated, in reaction 2 H_2O is formed explain. Why?

15. Dhana is playing in sand with his friends while he is playing ant bited him. So he got severe pain. By seeing him, his friends came up with remedies.
    i) Dhana advised to rub it with vinegar solution.
    ii) Sana advised to rub it with nettle plant leaf.
    iii) Rana advised to rub it with a leaf of dock plant
    iv) Guna advised to rub it with a solution of caustic soda.
    Then whose advise is correct and explain. Why?

16. A compound 'X' is mixed with an unknown natural extract 'Y'. When X and Y mixed together the fragrance from Y was not noticed. Then answer the following Questions
    i) Identify to which category 'X' and 'Y' belongs.
    ii) What type of reaction can be observed when 'X' is allowed to react with HC*l*?
    iii) What is the resultant colour observed when 'X' is added to red cabbage and methyl orange.
    iv) Predict the pH range of 'X' as per universal indicator.
    v) Give the relation between $\left(H^+\right)$ and $\left(OH^-\right)$ in solution of 'X'

17. 2 mL of sodium hydroxide solution is added to a few pieces of granulated zinc metal taken in a test tube. When the contents are warmed, a gas evolves which is bubbled through a soap solution before testing. Write the equation of the chemical reaction involved and the test to detect the gas. Name the gas which will be evolved when the same metal reacts with dilute solution of a strong acid.

CBSE 2018

18. The pH of a salt used to make tasty and crispy pakoras is 14. Identify the salt and write a chemical equation for its formation. List its two uses. **CBSE 2018**

19. What is tooth enamel chemically? State the condition when it starts corroding. What happens when food particles left in the mouth after eating degrades? Why do doctors suggest use of tooth powder / toothpaste to prevent tooth decay? **CBSE2011**

20. i) A chemical compound X is used in glass and soap industry. Identify the compound and give its chemical formula. **CBSE 2015**
    ii) How many molecules of water of crystallisation are present in compound X?
    iii) How will you prepare the above compound starting from sodium chloride? Write all relevant equations involved in the process.

21. During electrolysis of brine, a gas 'G' is liberated at anode. When this gas 'G' is passed through slaked lime, a compound 'e' is formed, which is used for disinfecting drinking water.
    a) Write formula of 'G' and 'C'.
    b) State the chemical equation involved.
    c) What is common name of compound 'C'? Give its chemical name. **CBSE (All India) 2020**

22. Answer the following:
    i) What happens when crystals of washing soda are left open in dry air?
    ii) Name the change that takes place. Which two industries are based on the use of washing soda?
    iii) With the help of balanced chemical equation, state the reaction that takes place when sodium hydrogen carbonate is heated during cooking. **CBSE2012**

23. A chemical compound 'X' is used in the soap and glass industry. It is prepare from brine.
    a) Write the chemical name, common name and chemical formula of 'X'.
    b) Write the equation involved in in its preparation. **CBSE (All India) 2020**
    c) What happens when it is treated with water containing Ca or Mg salts?

24. Identify the acid and base which form sodium hydrogen carbonate. Write chemical equation in support of your answer. State whether this compound acidic, basic or neutral. Also, write its p value. **CBSE 2021**

25. A white powder is used by doctors to support fractured bones.
    i) Write the name and chemical formula of the powder.
    ii) How is this powder prepared?
    iii) When this white powder is mixed with water, a hard solid mass is obtained. write a balanced chemical equation for the change.
    iv) Give one more use of this white powder. **CBSE2019**

26. i) Salt 'P', commonly used in bakery products, on heating gets converted into another salt 'Q' which itself is used for the removal of hardness of water and a gas 'R' is evolved. The gas 'R' when passed through freshly prepared lime water turns milky. Identify 'P', 'Q' and 'R', giving chemical equation for the justification of your answer.
    ii) A solution 'X' gives orange colour when a drop of it falls on pH paper, while another solution 'Y' gives bluish colour when a drop of its falls on pH paper. What is the nature of both the solutions? Determine the pH of solutions 'X' and 'Y'. **CBSE2019**

27. A road tanker carrying an acid was involved in an accident and its contents spilled on the road. At the side of the road, iron drain covers began melting and fizzing as the acid ran over them. A specialist was called to see if the acid actually leaked into the nearby river.
    a) Explain how the specialist could carry out a simple test to see if the river water contains some acid or not.
    b) The word melting is incorrectly used in the report suggest a better name that should have been used.
    c) Explain why drain covers began fizzing as the acid ran over them.

28. Complete the following table based on indicators.

S.No.	Solution	pH	Colour of universal Indicator	Litmus	
				Blue	Red
1.	Concentrated hydrochloric acid	0	Dark red		
2.	Dilute hydrochloric acid	1.0	Red		
3.	Gastric juice (Digestive juices in stomach)	1.4	Red		
4.	Lemon juice	2.5	Orange red		
5.	Vinegar	4.0	Orange		
6.	Tomato juice	4.1	Orange		
7.	Coffee	5.0	Orange yellow		
8.	Soft drinks	6.0	Greenish yellow		
9.	Milk	6.5	Greenish yellow		
10.	Pure water	7.0	Green		
11.	Saliva (before meals)	7.4	Greenish blue		
12.	Saliva (after meals)	5.8	Greenish yellow		
13.	Blood	7.4	Greenish blue		
14.	Eggs	7.8	Greenish blue		
15.	Toothpaste	8.0	Greenish blue		
16.	Baking soda solution	8.5	Blue		
17.	Washing soda solution	9.0	Blue		
18.	Milk of magnesia	10.5	Navy Blue		
19.	Household ammonia	11.6	Purple		
20.	Dilute sodium hydroxide	13.0	Violet		
21.	Concentrated sodium hydroxide	14	Violet		

29. The following are the salts which are attached with a fixed number of water molecules called water of crystallisation. Then write their formula, number of water molecules attached, colour in hydrated form and anhydrous form.

S.No.	Name of the salt	Formula	Water of Crystallisation	Colour	
				hydrated	anhydrous
1.	Sodium carbonate	_____	_____	_____	_____
2.	Copper sulphate	_____	_____	_____	_____
3.	Iron sulphate	_____	_____	_____	_____
4.	Calcium sulphate dihydrate	_____	_____	_____	_____
5.	Calcium sulphate hemihydrate	_____	_____	_____	_____

30. Here are given some important salts and thier formula. Predict the nature of its solution, approximate pH and form which base and acid it is obtained.

S.No.	Name of the salt	Formula	Nature of solution	pH < 7/7/>7	Base	Acid
1.	Sodium chloride	$NaCl$	_____	_____	_____	_____
2.	Calcium chloride	$CaCl_2$	_____	_____	_____	_____
3.	Magnesium chloride	$MgCl_2$	_____	_____	_____	_____
4.	Zinc chloride	$ZnCl_2$	_____	_____	_____	_____
5.	Sodium sulphate	Na_2SO_4	_____	_____	_____	_____
6.	Potassium sulphate	K_2SO_4	_____	_____	_____	_____
7.	Clacium sulphate	$CaSO_4$	_____	_____	_____	_____
8.	Magnesium sulphate	$MgSO_4$	_____	_____	_____	_____
9.	Aluminium sulphate	$Al_2(SO_4)_3$	_____	_____	_____	_____
10.	Zinc sulphate	$ZnSO_4$	_____	_____	_____	_____
11.	Copper sulphate	$CuSO_4$	_____	_____	_____	_____
12.	Ammonium sulphate	$(NH_4)_2SO_4$	_____	_____	_____	_____
13.	Sodium nitrate	$NaNO_3$	_____	_____	_____	_____
14.	Potassium nitrate	KNO_3	_____	_____	_____	_____
15.	Sodium carbonate	Na_2CO_3	_____	_____	_____	_____
16.	Zinc carbonate	$ZnCO_3$	_____	_____	_____	_____
17.	Sodium acetate	CH_3COONa	_____	_____	_____	_____
18.	Iron sulphate	$FeSO_4$	_____	_____	_____	_____
19.	Ammonium chloride	NH_4Cl	_____	_____	_____	_____
20.	Potassium chloride	KCl	_____	_____	_____	_____

METALS AND NON-METALS

I. Answer the following queastions :

1. Which position is occupied by calcium as per its percentage abundance in earth crust?
2. Name the most abundant non metallic and metallic element in the earth crust
3. "When very dilute HNO_3 is allowed to react with metals like Mg, Mn and Zn, hydrogen gas can be liberated" justify the statement with your explanation.
4. "When conc.HNO_3 is allowed to react with metals like Mg, Mn and Zn, hydrogen gas liberation is not possible" why?
5. "When metals like Na (or) K are allowed to react with very dilute HNO_3, hydrogen gas liberation is not possible" why?
6. "We know that copper is below to the hydrogen in the reactivity series and cannot replace hydrogen from acids, but exceptionally copper can show reaction with HC*l*, H_2SO_4 and HNO_3 under specified conditions. Explain the above with suitable chemical equations.
7. Give reason,
   i) NaC*l* has more melting point than CCl_4
   ii) $CaCl_2$ has more boiling point than $MgCl_2$
   iii) Molten (or) aqueous NaC*l* is a good conductor but not solid NaC*l*
   iv) Most of the ionic compound are solids
   v) $CaCl_2$ is soluble in water but not in kerosene
8. Describe the possible types of reactions involved in the corrosion of
   i) A*l* ii) Fe iii) Cu iv) Mg v) Ag
   and write balanced chemical equation.
9. A metal 'X' acquires a green colour coating on its surface on exposure to air.
   i) Identify the metal 'X' and name the process responsible for this change.
   ii) Name and write chemical formula of the green coating formed on the metal.
   iii) List two important methods to prevent the process.
10. How can you confirm that ZnO is amphoteric in nature?
11. A metal 'X' when dipped in aqueous solution of aluminium sulphate, no reaction is observed whereas when it is dipped in the aqueous solution of ferrous sulphate the pale green solution turns colourless. Identify metal 'X' and justify your answer giving chemical equations for the reaction and no reaction.
12. Given reason
    i) Na cannot liberate H_2 gas with very dilute HNO_3
    ii) Cu cannot react with conc. HC*l* but can react with hot conc.HC*l*
    iii) Reaction of aluminium with NaOH liberates H_2 gas.

13. What happens when
    i) Na reacts with conc. H_2SO_4
    ii) Fe reacts with conc. HNO_3
    iii) Freshly taken A*l* with conc. HNO_3

14. Complete the following equations
    i) $Mg+H_2O(Hot)\rightarrow$ ii) $K+H_2O(Cold)\rightarrow$
    iii) $Fe+H_2O(Steam)\rightarrow$

15. Give reason
    i) K reacts with conc. H_2SO_4 to form SO_2 gas instead of H_2 gas.
    ii) Baking Soda makes food items spongy
    iii) Cu reacts with hot dilute H_2SO_4 but cannot react with dil H_2SO_4

16. Complete the following equations
    i) $Ca+H_2O(Hot)\rightarrow$ ii) $Na+H_2O(Cold)\rightarrow$
    iii) $Al+H_2O(Steam)\rightarrow$

17. Name two metals which react violently with cold water. Write any three observations you would make when such a metal is dropped into water. How would you identify the gas evolved, if any, during the reaction?

18. a) By the transfer of electrons, illustrate the formation of bond in magnesium chloride and identify the ions present in this compound. **CBSE (All India) 2020**
    b) Ionic compounds are solids. Give reasons.
    c) With the help of a labelled diagram show the experimental set up of action of steam on a metal.

19. Zn is more electropositive than Fe. Therefore, it should get corroded faster than Fe. But it does not happen. **CBSE 2007**
    Instead, it is used to galvanise iron. Explain why does it happen so?

20. P, Q and R are 3 elements which undergo chemical reactions according to the following equations : **CBSE2014**
    a) $P_2O_3+2Q\rightarrow Q_2O_3+2P$
    b) $3RSO_4+2Q\rightarrow Q_2(SO_4)_3+3R$
    c) $3RO+2P\rightarrow P_2O_3+3R$
    Answer the following questions
    i) Which element is most reactive?
    ii) Which element is least reactive?
    iii) State the type of reaction listed above.

21. Explain the following **CBSE2019**
    i) Sodium chloride is an ionic compound which does not conduct electricity in solid state whereas it does conduct electricity in molten state as well as in aqueous solution.
    ii) Reactivity of aluminium decrease if it is dipped in nitric acid.
    iii) Metals like calcium and magnesium are never found in their free state in nature.

22. Give reasons for the following **CBSE2014**
    i) Ionic compounds have higher melting and boiling points.
    ii) Sodium is kept immersed in kerosene.
    iii) Reaction of calcium with water is less violent.
    iv) Prior to reduction the metal sulphides and carbonates must be converted into metal oxides for extracting metals.

23. Give reasons for the following **CBSE 2014**
    i) Generally no hydrogen gas is evolved when metals react with dilute nitric acid.
    ii) Sodium hydroxide solution cannot be kept in aluminium containers.
    iii) Silver metal does not combine easily with oxygen but silver jewellery tarnishes after some time.
    iv) Sodium is obtained by the electrolysis of its molten chloride and not from its aqueous solution.
    v) Aluminium reacts with dilute hydrochloric acid slowly in the beginning.

24. i) Write chemical equations for the following reactions: **CBSE 2019**
    a) Calcium metal reacts with water.
    b) Cinnabar is heated in the presence of air.
    c) Manganese dioxide is heated with aluminium powder.
    ii) What are alloys ? List two properties of alloys.

25. i) Write the steps involved in the extraction of pure metals in the middle of the activity series from their carbonate ores. **CBSE 2018**
    ii) How is copper extracted from its sulphide ore? Explain the various steps supported by chemical equations. Draw labeled diagram for the electrolytic refining of copper.

26. Two ores X and Y were taken. On heating these ores, it was observed that **CBSE (All India) 2020**
    a) Ore X gives CO_2 gas, and b) Ore Y gives SO_2 gas.
    Write steps to convert these ores into metals, giving chemical equations of the reactions that take place.

27. a) With the help of a diagram explain the method of refining of copper by electrolysis.
    b) How are broken railway tracks joined? Give the name of the process and the chemical equation of the reaction involved. **CBSE (All India) 2020**

28. i) An ore, on heating in air, give sulphur dioxide gas. Name the method in each metallurgical step, that will be required to extract this metal from its ore.
    ii) State which of the following reactions will take place or which will not, giving suitable reason for each?
    $Zn(s) + CuSO_4(aq) \rightarrow ZnSO_4(aq) + Cu(s)$; $Fe(s) + ZnSO_4(aq) \rightarrow FeSO_4(aq) + Zn(s)$

CARBON AND ITS COMPOUNDS

I. Answer the following queastions :

1. Write the relative comparision between the properties of allotropes and isotopes of carbon
2. "Eventhough diamond, graphite and Fullerenes are made up of carbon they differ in physical properties" why?
3. State the reason for existance of isotopes for an element?
4. How can you differentiate diamond, graphite and fullerenes, as per
   i) Hybridisation of carbon
   ii) Structural arrangement
   iii) Conduction
   iv) Chemical properties
5. Draw the possible chain isomers for (Normal, iso, neo)
   i) n - Butane
   ii) n - Pentane
   iii) n - Hexane
   iv) n - Heptane
   v) n - Octane
6. Convert the following compounds into cyclic structure.
   i) $H_2C = CH - CH_3$
   ii) $HC \equiv C - CH_3$
   iii) $H_2C = CH - CH_2 - CH_3$
   iv) $CH \equiv C - CH_2 - CH_3$
   v) $H_2C = CH - CH_2 - CH_2 - CH_3$
   vi) $HC \equiv C - CH_2 - CH_2 - CH_3$
   vii) $H_2C = CH - CH_2 - CH_2 - CH_2 - CH_3$
   viii) $HC \equiv C - CH_2 - CH_2 - CH_2 - CH_3$
7. Draw the structural formula of the following as per the homologous series
   i) 3rd member in alkanes
   ii) 2nd member in alkenes
   iii) 5th member in alkynes
   iv) 7th member in Alkane
   v) 4th member in Alkane
   vi) 6th member in Alkyne
   vii) 3rd member in Alkene
   viii) 5th member in Alkane
   ix) 3rd member in Alkyne
   x) 5th member in Alkene
8. How are covalent bonds are formed? **CBSE (All India 2020)**
9. Compound 'X' on heating with excess conc. sulphuric acid at 443K gives an unsaturated compound 'Y'. 'X' also reacts with sodium metal to evolve a colourless gas 'Z'. Identify 'X', 'Y' and 'Z'. Write the equation of the chemical reaction for the formation of 'Y' and also write the role of sulphuric acid in the reaction. Compound 'X' reacts with excess of cone. H_2SO_4 at temperature of 443 K to form unsaturated compound 'Y'. Thus, compound 'X is alcohol. **CBSE 2018**

10. The table shows the electronic structures of four elements.

Element	Electronic Structure
P	2, 6
Q	2, 8, 1
R	2, 8, 7
S	2, 8, 8

i) Identify which element(s) will form covalent bonds with carbon.

ii) "Carbon reacts with an element in the above table to form several compounds."

Give suitable reason.

11. Give a test that can be used to confirm the presence of carbon in a compound. With a valency of 4, how is carbon able to attain noble gas configuration in its compounds?

CBSE SQP 2020-21

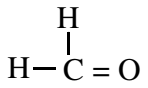
12. The number of carbon compounds is more than those formed by all other elements put together. Justify the statement by giving two reasons. **CBSE SQP 2020-21**

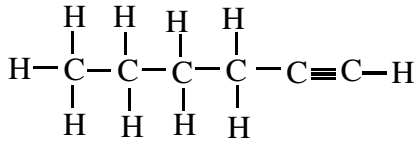
13. i) How many isomers are possible for the compound with the molecular formula C_4H_8? Draw the electron dot structure of branched chain isomer.

ii) How will you prove that C_4H_8 and C_5H_{10} are homologues?

14. Name the following compounds :

i) $CH_3 - CH_2 - Br$

ii)


iii)


15. Consider the molecular formula of the carbon compounds (i) and (ii) given below

i) C_3H_8O

ii) $C_3H_6O_2$

a) Identify the functional groups in (i) and (ii) and write their structures.

b) Are (i) and (ii) isomers? Give reason.

c) What happens when alkaline $KMnO_4$ is added, drop by drop, into a test tube containing warm propanol? Write the chemical equation for the reaction and state the role of alkaline $KMnO_4$ in this reaction. **CBSE (All India) 2020**

16. An aldehyde as well as a ketone can be represented by the same molecular formula, say C_3H_6O. Write their structures and name them. State the relation between the two in the language of science.

CBSE 2016

17. a) Define isomerism. Draw all possible isomers of butane.

b) "A compound 'X' on combustion gives a yellow flame with lots of smoke." What inference would you draw from this statement?

c) State the role of alkaline $KMnO_4$ in the reaction involving conversion of an alcohol to corresponding carboxylic acid. **CBSE (All India) 2020**

18. Carry out the following conversions: **CBSE (All India) 2020**

a) i) Ethanol to ethene ii) Ethanol to ethanoic acid

b) Differentiate between addition reaction and substitution reaction. Give one example of each.

19. On dropping a small piece of sodium in a test tube containing carbon compound X with molecular formula C_2H_6O , a brisk effervescence is observed and a gas Y produced. On bringing a burning splinter at the mouth of the test tube the gal evolved burns with a pop sound. Identify X and Y. Also write the chemical equation for the reaction. Write the name and structure of the product formed, when you heat X with excess concentrated sulphuric acid. **CBSE 2016**

20. What happens, when 5% alkaline Potassium permanganate solution is added drop by drop to warm propyl alcohol (propanol) taken in a test tube? Explain with the help of a chemical equation. **CBSE2019**

21. State the reason why carbon can neither form C^{+4} cations nor C^{-4} anions but forms covalent compounds? **CBSE 2014**

22. In three test tubes A, B and C are three different liquids namely, distilled water underground water and distilled water it which a pinch of calcium sulphate is dissolved, respectively are taken. Equal amount of soap solution is added to each test tube and the contents are shaken. In which test tube will the length of the foam (lather) be longest? Justify you **CBSE 2019**

23. What are soaps chemically? How do they differ from synthetic detergents? Also, mention their uses? **CBSE 2019**

24. What is methane? Draw its electron dot structure. Name the type of bonds formed in this compound. Why are such compounds

i) Poor conductors of electricity? ii) Have low melting and boiling points?

What happens, when this compound burns in oxygen? **CBSE 2019**

25. i) Distinguish between esterification and saponification reactions with the help of chemical equations for each. **CBSE 2019**

ii) With a labelled diagram describe in brief an activity to show the formation of an ester.

26. **Complete the following table based on homologous series of alkanes, alkenes and alkynes.**

a)

Name	Carbon Atoms	Hydrogen Atoms	Number of bonds	Chemical formula	Structural formula
Methane	1	4	4	CH_4	
Ethane	2	6	7		
Propane	3				
Butane	4				
Pentane	5				

b)

Name	Carbon Atoms	Hydrogen Atoms	Number of bonds	Chemical formula	Structural formula
Ethene	2	4	6	C_2H_4	
Propene	3				
Butene	4				
Pentene	5				
hexene	6				

c)

Name	Carbon Atoms	Hydrogen Atoms	Number of bonds	Chemical formula	Structural formula
Ethyne	2	2	5	C_2H_2	
Propyne	3				
Butyne	4				
Pentyne	5				
hexyne	6				

Dfferentiate between the properties of diamond, graphite and fullerenes

(OR)

Discuss on relative comparision of properties of crystalline allotropes of carbon

(OR)

Tabulate the important properties of diamond, graphite and fullerenes

I. Multipule choice questions :

1. A dilute solution of sodium carbonate was added to two test tubes - one containing dil. HC*l* (A) and the other containing dilute NaOH (B). The correct observation was [ ]
   a) A brown coloured gas liberated in test tube A
   b) A brown coloured gas liberated in test tube B
   c) A coloureless gas liberated in test tube A
   d) A colourless gas liberated in test tube B.

2. While preparing 20% aqueous sodium hydroxide solution in a beaker certain observatios are recorded. Which of the following statements are correct? [ ]
   I) Sodium hydroxide is in the form of pellets/flakes.
   II) It dissolves in water readily.
   III) The beaker appears cold when touched from outside immediately after adding sodium hydroxide to water.
   IV) When red litmus paper is dipped into the solution, it turns blue.
   a) I, II and III b) II, III and IV c) III, IV and I d) I, II and IV

3.

List - I (Solution)		List - II (pH)	
P)	Vinegar	1)	6.8
Q)	Milk	2)	7.4
R)	Human blood	3)	2.4 - 3.4
S)	Lime water	4)	10.5

a) P – 4, Q – 1, R – 2, S – 3 b) P – 1, Q – 2, R – 3, S – 4 [ ]
c) P – 3, Q – 1, R – 2, S – 4 d) P – 3, Q – 4, R – 1, S – 2

4. A few chemical properties of three metals X, Yand Z are summarised in the given table.

Metal	Chemical properties
X	Reacts with hot water and starts floating on the surface of water
Y	Reacts with steam
Z	Does not react with dilute acids as well as steam

The methods which can be used to extract X, Y and Z from their ores are respectively
a) Electrolysis, reduction with carbon and heating alone [ ]
b) Heating with carbon, aluminothermy and electrolysis
c) Calcination, aluminothermy and roasting
d) Heating the metal oxide, heating with carbon and electrolysis.

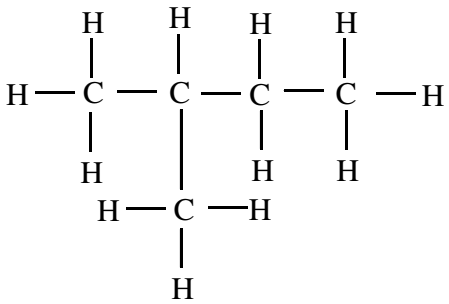
5. The table shows the formulae of three organic compounds that belong to the same homologous series.

First member of the homologous series	$CH_3 – O – CH_3$
Second member of the homologous series	$CH_3CH_2 – O – CH_3$
Third member of the homologous series	$CH_3CH_2CH_2 – O – CH_3$
What is the general formula of this ?	

[ ]

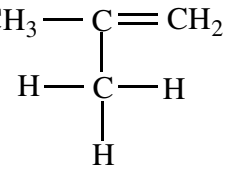
a) $C_nH_{2n}O$ b) $C_nH_{2n+2}O$ c) $C_nH_{2n}OH$ d) $C_nH_{2n+2}OH$

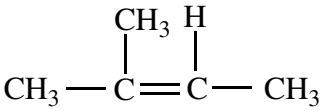
6. Hydrogenation of an alkene, Q, produces the organic compound, T. The structural formula of T is shown below

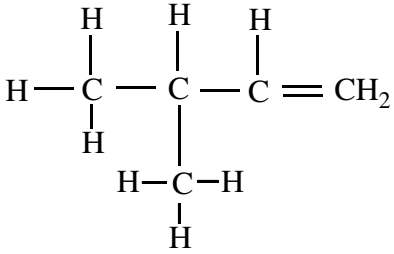


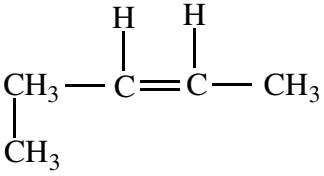
Compound T

What is Q? [ ]

a) 

b) 

c) 

d) 

7. Which of the following organic compounds does not have the same chemical properties as methanol? [ ]
   a) C_2H_6O b) $C_5H_{10}O$ c) $C_4H_{10}O$ d) $C_7H_{16}O$

8. Compound X decolourises acidified potassium dichromate to produce an acid with a pH value of 4.5. Which of the following could be the structure of X? [ ]
   a) CH_3CH_2COOH b) $CH_3CH_2CH_2OH$
   c) $CH_2 = CH - CH_3$ d) $CH_3CH_2CH_3$

9. Hydrogen gas is not evolved when a metal reacts with nitric acid. It is because HNO_3 is a strong oxidizing agent. It oxidizes the H_2 produced to water and itself gets reduced to any of the nitrogen oxides (N_2O, NO, NO_2). But _____ and _____ react with very dilute HNO_3 to evolve H_2 gas.
   a) Pb, Cu b) Na, K c) Mg, Mn d) A*l*, Zn [ ]

10. 1f third member of alcohol family (homologous series) undergoes esterification reaction with second member of carboxylic acid family then, the name of ester formed and its formula will be respectively
    a) Ethyl propanoate, $CH_3CH_2COOCH_2CH_3$ [ ]
    b) Propyl ethanoate, $CH_3COOCH_2CH_2CH_3$
    c) Ethyl butanoate, $CH_3CH_2CH_2COOCH_2CH_3$
    d) Ethyl ethanoate, $CH_3COOCH_2CH_3$

11. C_2H_5OH on oxidation with acidified $K_2Cr_2O_7$ gives CH_3COOH. Which of the following statements is/are correct regarding these two compounds? [ ]
    I) They both react with sodium metal to evolve a combustible gas.
    II) They both react with $NaHCO_3$ to evolve a gas which turns lime water milky.
    III) They both turn blue litmus red.
    a) I and II only b) II only c) I only d) I, II and III

II. ASSERTION AND REASON TYPE QUESTIONS :

a) Both A and R are true, and R is correct explanation of the assertion.
b) Both A and R are true, but R is not the correct explanation of the assertion.
c) A is true, but R is false. d) A is false, but R is true.

1. **Assertion (A) :** $Zn_{(s)} + H_2SO_{4(aq)} \rightarrow ZnSO_{4(aq)} + H_{2(g)}$ equation is more informative because it tells us the physical states of the various substances involved [ ]
   Reason (R) : It tells us that zinc is in the solid state, sulphuric acid is in the form of an aqueous solution, zinc sulphate is also an aqueous solution but hydrogen is in gaseous state.

2. **Assertion (A) :** The burning of carbon in oxygen is an exothermic reaction [ ]
   Reason (R) : An exothermic reaction is indicated by writing "+ Heat" or "+ Heat energy" or just "+ Energy" on the products' side of an equation

3. **Assertion (A) :** The decomposition of calcium carbonate into calcium oxide and carbon dioxide is an example of thermal decomposition [ ]
   Reason (R) : When a decomposition reaction is carried out by heating, it is called 'thermal decomposition

4. **Assertion (A) :** The dilution of a concentrated acid should always be done by adding concentrated acid to water gradually with stirring and *not* by adding water to concentrated acid.
   Reason (R) : Heat changes some of the water to steam explosively which can splash the acid on our face or clothes and cause acid burns [ ]

5. **Assertion (A) :** Ionic bond is also called electrovalent bond. [ ]
   Reason (R) : Electrical charges on the atoms involved in the bond formation.

6. **Assertion (A) :** Sodium chloride is an ionic compound [ ]
   Reason (R) : In the formation of ionic bonds, the reacting atoms achieve the inert gas electron configuration by the transfer of electrons.

7. **Assertion (A) :** The piece of calcium metal starts floating in water [ ]
   Reason (R) : The bubbles of hydrogen gas formed during the reaction stick to its surface.

8. **Assertion (A) :** The piece of calcium metal starts floating in water [ ]
   Reason (R) : The reaction of calcium metal with water is less violent.

9. **Assertion (A) :** Metals like aluminium, zinc and iron do not react with either cold water or hot water. [ ]
   Reason (R) : The intensity of reaction of a metal with water depends on its chemical reactivity.

10. **Assertion (A) :** The metals like copper and silver which are less reactive than hydrogen, do not displace hydrogen from dilute acids. [ ]
    Reason (R) : Because they do not give out electrons required for the reduction of hydrogen ions present in acids.

11. **Assertion (A) :** If someone is suffering from the problem of acidity after overeating, we can suggest taking baking soda solution as remedy. [ ]
    Reason (R) : baking soda is sodium hydrogencarbonate which reacts with excess hydrochloric acid in the stomach and *neutralises*

12. **Assertion (A) :** If concentrated sulphuric acid falls accidently on skin, clothes or wood, it causes severe burns on the skin, it cuts holes in the clothes, and burns the wood producing black spots on its surface [ ]
Reason (R) : The mineral acids cause severe burns on the skin and attack and eat up materials

13. **Assertion (A) :** Dry HC*l* gas does not change the colour of dry blue litmus paper [ ]
Reason (R) : Dry HC*l* gas does not contain any hydrogen ions in it,

14. **Assertion (A) :** The pH of a solution is inversely proportional to the concentration of hydrogen ions in it [ ]
Reason (R) : A solution having a high concentration of hydrogen ions has a low pH value

15. **Assertion (A) :** The aluminium and silicon oxides are amphoteric in nature. [ ]
Reason (R) : Aluminium and Silicon oxides shows both acidic and basic character

16. **Assertion (A) :** Silver metal is the best conductor of heat. [ ]
Reason (R) : Heat conductivity (or thermal conductivity) is a characteristic property of metals

17. **Assertion (A) :** Metals are good conductors of heat and electricity [ ]
Reason (R) : Silver metal is the best conductor of electricity.

18. **Assertion (A) :** Potassium metal and sodium metal are stored under kerosene oil [ ]
Reason (R) : Potassium and sodium metals are so reactive that they react vigorously with the oxygen

19. **Assertion (A) :** Most of the metal oxides are insoluble in water [ ]
Reason (R) : Sodium oxide and potassium oxide are the two metal oxides which are soluble in water

20. **Assertion (A) :** Aluminium oxide and zinc oxide are amphoteric in nature [ ]
Reason (R) : Metal oxides which show basic as well as acidic behaviour are known as amphoteric oxides.

21. **Assertion (A) :** Aluminium oxide is amphoteric in nature [ ]
Reason (R) : Aluminium oxide behaves as a basic oxide

22. **Assertion (A) :** Some metals react even with cold water, some react with hot water, some react only with steam whereas others do not react even with steam [ ]
Reason (R) : The intensity of reaction of a metal with water depends on its chemical reactivity.

23. **Assertion (A) :** Diamond and graphite, have entirely different physical properties. [ ]
Reason (R) : Difference in the physical properties of diamond and graphite is due to the difference in their structures.

24. **Assertion (A) :** Since there are 'no free electrons' in a diamond crystal, it does not conduct electricity.
Reason (R) : Diamond is a non-conductor of electricity. [ ]

25. **Assertion (A) :** C_3H_8 corresponds to the general formula for alkanes C_nH_{2n+2} [ ]
Reason (R) : C_3H_8 is an alkane.

26. **Assertion (A) :** C_3H_6 and C_4H_8 are both alkenes. [ ]
Reason (R) : C_3H_6 and C_4H_8 correspond to the general formula for alkenes C_nH_{2n}

27. **Assertion (A) :** Those metals which are below hydrogen in the activity series, do not displace hydrogen from dilute acids. [ ]
Reason (R) : Because they do not give out electrons required for the reduction of hydrogen ions present in acids.

28. **Assertion (A) :** When a metal reacts with dilute nitric acid, then hydrogen gas is *not* evolved.
Reason (R) : Nitric acid is a strong oxidising agent. [ ]

29. **Assertion (A) :** The Reaction of Zinc with Copper Sulphate Solution is a displacement reaction
Reason (R) : In displacement reactions A more reactive metal displaces a less reactive metal from its salt solution. [ ]

30. **Assertion (A) :** A strip of copper metal is placed in zinc sulphate solution, then no reaction occurs.
Reason (R) : Copper metal is less reactive than zinc metal and hence cannot displace zinc from zinc sulphate solution. [ ]

31. **Assertion (A) :** The formation of a potassium ion (K^+) is similar to the formation of a sodium ion
Reason (R) : Like sodium atom, the potassium atom (K) has also 1 electron in its outermost shell. [ ]

32. **Assertion (A) :** Sodium atom has 1 valence electron in its outermost shell, so we put 1 dot with the symbol of sodium and write Na. [ ]
Reason (R) : The valence electrons in an atom are represented by putting dots

33. **Assertion (A) :** A precipitate is a 'solid product' which separates out from the solution during a chemical reaction. [ ]
Reason (R) : A precipitate can also be formed by passing a gas into an aqueous solution of a substance

34. **Assertion (A) :** The chemical reaction between potassium iodide and lead nitrate is characterised by the formation of a yellow precipitate of lead iodide. [ ]
Reason (R) : Some chemical reactions are characterised by the formation of a precipitate

35. **Assertion (A) :** The chemical reaction between citric acid and purple coloured potassium permanganate solution is characterised by a change in colour from purple to colourless. [ ]
Reason (R) : In the above reaction potassium permagnate is acting as an oxidizing agent

36. **Assertion (A) :** The reaction between quicklime and water to form slaked lime is an exothermic reaction [ ]
Reason (R) : Dissolution of Quick lime in water releases lot of heat

37. **Assertion (A) :** Oxygen molecule, O_2, contains a double bond between two atoms [ ]
Reason (R) : A double covalent bond is formed by the sharing of four electrons between two atoms, each atom contributing two electrons for sharing.

38. **Assertion (A) :** Ionic compounds have high melting points and high boiling points. [ ]
Reason (R) : There is a strong force of attraction between the oppositely charged ions

39. **Assertion (A) :** The force of attraction between the molecules of a covalent compound is very weak. [ ]
Reason (R) : Covalent compounds have usually low melting points and low boiling points.

40. **Assertion (A) :** Anodising is a process of forming a thick layer of aluminium oxide on an aluminium object by making it anode during the electrolysis of dilute sulphuric acid. [ ]
Reason (R) : The layer of aluminium oxide on the surface of aluminium objects can be made thicker by electrolysis

41. **Assertion (A) :** Silver metal is fairly resistant to corrosion [ ]
Reason (R) : Silver is a bright, shiny metal which is chemically quite unreactive

42. **Assertion (A) :** Silver is a bright, shiny metal which is chemically quite unreactive [ ]
Reason (R) : Silver metal loses its shine and becomes dull (or tarnished) very slowly.

43. **Assertion (A) :** Aqueous solution of sodium carbonate is basic in nature [ ]
Reason (R) : The salts of weak acids and strong bases give basic solutions

44. **Assertion (A) :** The salts of strong acids and strong bases give neutral solutions [ ]
Reason (R) : Aqueous solution of sodium chloride is neutral.

45. **Assertion (A) :** The three very useful products obtained by the electrolysis of sodium chloride solution called brine (or chlor-alkali process) are sodium hydroxide, chlorine and hydrogen. [ ]
Reason (R) : The process of electrolysis of sodium chloride solution is called chlor-alkali process

46. **Assertion (A) :** Sodium carbonate (or washing soda) is used as a "cleansing agent" [ ]
Reason (R) : Washing soda has detergent properties

47. **Assertion (A) :** Bleaching powder is used as an oxidising agent in many chemical industries.
Reason (R) : The real bleaching agent present in bleaching powder is chlorine [ ]

48. **Assertion (A) :** Plaster of Paris should be stored in a moisture-proof container. [ ]
Reason (R) : Plaster of Paris has a very remarkable property of setting into a hard mass on wetting with water

49. **Assertion (A) :** Diamond is made up of carbon atoms only [ ]
Reason (R) : If we burn diamond in oxygen, then only carbon dioxide gas is formed and nothing is left behind.

50. **Assertion (A) :** Very dilute nitric acid, however, reacts with magnesium and manganese metals to evolve hydrogen gas. [ ]
Reason (R) : Very dilute nitric acid is a weak oxidising agent which is not able to oxidise hydrogen to water.

CASE BASED

1. Read the following and answer any four questions.

The technical definition of pH is that it is a measure of the concentration of the hydrogen ion (H^+). The pH scale ranges from 0 to 14.

0 - < 7	7	> 7 - 14
acidic	neutral	basic

In general, a water with a pH < 7 is considered acidic and with a pH > 7 is considered basic. The normal range for pH in surface water systems is 6.5 to 8.5 and for ground water systems 6 to 8.5.

The pH of pure water (H_2O) is 7 at 25°C, but when exposed to the carbon dioxide in the atmosphere this equilibrium results in a pH of approximately 5.2. Because of the association of pH with atmospheric gases and temperature, it is strongly recommended that the water be tested as soon as possible.

In general, a water with a low pH (< 6.5) could be acidic, soft, and corrosive, which could cause premature damage to metal piping, and have associated aesthetic problems such as a metallic or sour taste, staining of laundry, and the characteristic "blue-green" staining of sinks and drains. The primary way to treat the problem of low pH water is with the use of a neutralizer. Water with a pH > 8.5 could indicate that the water is hard. Hard water does not pose a health risk, but can also cause aesthetic problems as mentioned earlier.

i) The substance is acidic when it's pH lies between the range of [ ]
a) 0-14 b) 0-7 c) 1-7 d) 7-14

ii) What is the pH value of Rainwater? [ ]
a) Approx. 5.2 b) > 8.5 c) 7 d) Approx. 6.5

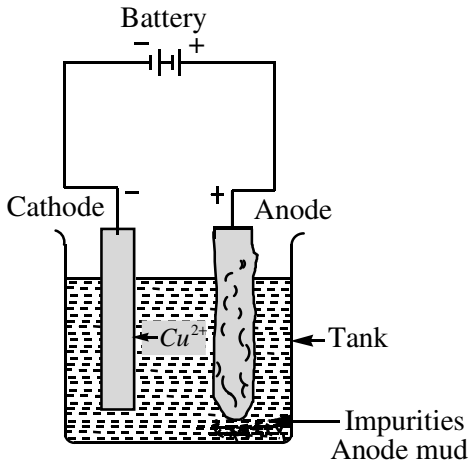
iii) pH of Hard water can be [ ]
a) < 7 b) > 7 c) > 8.5 d) < 6.5

iv) pH of some Common Liquids [ ]

Vinegar	Coffee	Milk	Pure Water	Seawater
3.0	5.0	6.3 - 6.6	7.0	8.3

Among these liquids which is the most acidic [ ]
a) Vinegar b) Seawater c) Milk d) Pure water

2. Refining is the process of purification of metals. One of the important method of refining is electrolysis. In electrolysis, electrical energy is used to bring about a non-spontaneous redox reaction. This is done by passing an electric current through a liquid containing ions, known as an electrolyte. In contrast to metals, the current in electrolytes is carried by the movement of ions rather than the movement of electrons. The solid conductors inserted into the liquid are called electrodes, the one with a positive charge is called the anode (because it attracts anions) and the one with the negative charge is called the cathode. A diagrammatic representation of electrolysis of copper is shown below



i) Name the electrolyte used in refining of copper.

ii) a) $Cu \rightarrow Cu^{2+} + 2e^-$ b) $Cu^{2+} + 2e^- \rightarrow Cu$

Which of these two reactions occur at cathode and anode?

(OR)

iii) What is anode mud ? Name two metals which can be refined by electrolytic method.

3. Activity series : Relative reactivities of metals

Potassium		Most reactive
Sodium		
Calcium		
Magnesium		
Aluminium		
Zinc		Reactivity decreases
Iron		
Lead		
Hydrogen		
Copper		
Mercury		
Silver		Least reactive
Gold		

i) What happens when iron nail is added to copper sulphate solution? What is the colour change ?

ii) Identify the metal which reacts with very dilute nitric acid to evolve hydrogen gas. Name one more metal not given in the above series which reacts in the same way with dilute nitric acid.

iii) Name one important ore of copper with its chemical formula.

iv) Which method is used to extract sodium from molten sodium chloride ?

(OR)

v) Which metal is used in the galvanization of iron ?

4. When a metal is attacked by substances around it such as moisture, acids, etc., it is said to corrode, and this process is called corrosion. The black coating on silver, green coating on copper and reddish-brown powder on iron surface are some examples of corrosion.

i) What is the name given to the corrosion of iron?
ii) What is the formula of green colour coating on copper?
iii) Name two methods to prevent corrosion of iron.

(OR)

iv) Is corrosion a redox reaction?

5. Study the table related to colour change with indicators and answer the questions that follow.

Solutions	Colour change with phenolphthalein indicator	Colour change with methyl orange indicator
P	Pink	Yellow
Q	Colourless	Orange
R	Colourless	Red

i) Name the solution which is acidic.

ii) Arrange the given solutions in increasing order of their pH value.

iii) What is the name of solution P and Q ?

(OR)

iv) When solution P added to the china rose indicator, what is the colour of solution P ?