Question 1

In a sodium chloride crystal, how many chloride ions are there around sodium ion?

(a)   3

(b)   4

(c)   6

(d)   8

Answer: _____

Question 2

According to which law the solubility of a gas at equilibrium and constant temperature varies directly with the pressure of the gas, provided the gas does not undergo any chemical change during the dissolution?

(a)   Raoult's Law

(b)   Nernst distribution Law

(c)   Henry's Law

(d)   van't Hoff Law

Answer: _____

Question 3

Which of the following statements is true for electrochemical cell?

(a) Cations move towards zinc electrode

(b) Cations move towards copper electrode

(c) Current flows from zinc electrode to copper electrode

(d) Electrons flow from copper electrode to zinc electrode

Answer: _____

Question 4

In the extraction of copper from its sulphide ore, the metal is finally obtained by the reduction of cuprous oxide (Cu_2O) with:

(a) Cuprous sulphide (Cu_2S)

(b) Iron sulphide (FeS)

(c) Sulphur dioxide (SO_2)

(d) Carbon monoxide (CO)

Answer: _____

Question 5

If chlorine gas is passed through hot and conc. aqueous sodium hydroxide solution, the products formed have chlorine in different oxidation states. These oxidation states are indicated as:

(a) -1 and +5

(b) -1 and +3

(c) -1 and +1

(d) +1 and +5

Answer: _____

Question 6

When ethyl chloride is heated with alcoholic AgCN, the main product formed is:

(a) Ethyl isocyanide

(b) Ethyl cyanide

(c) Ethyl nitrate

(d) Ethyl amine

Answer: _____

Question 7

When phenol is treated with excess of bromine water, a white precipitate is formed. The compound formed is:

(a) m-bromophenol

(b) o and p-bromophenol

(c) 3,5 dibromophenol

(d) 2,4,6 tribromophenol

Answer: _____

Question 8

The ratio of number of atoms present in a face centred cubic, body centred cubic and simple cubic structure are respectively:

(a) 1:2:4

(b) 4:2:1

(c) 8:1:6

(d) 4:2:3

Answer: _____

Question 9

Electrochemical equivalent (Z) is the amount of substance which gets deposited from its solutions on passing electrical charge equal to:

(a) 96,500 coulombs

(b) 9650 coulombs

(c) 965 coulombs

(d) 1 coulomb

Answer: _____

Question 10

A solution containing components A and B follows Raoult's Law.

With reference to the statement which of the following options is correct?

(a) A-B attraction force is greater than A-A and B-B

(b) A-B attraction force is less than A-A and B-B

(c) A-B attraction force remains the same as A-A and B-B

(d) Total volume of solution is different from sum of volumes of both components A and B

Answer: _____

Question 11

What is used in the blast furnace to obtain iron from haematite ore?

(a) Electrolytic reduction

(b) Carbon dioxide

(c) Carbon monoxide

(d) Aluminium

Answer: _____

Question 12

Copper metal on treatment with conc. nitric acid (HNO_3) gives:

(a) $Cu(NO_3)_2 + CuO + H_2O$

(b) $Cu(NO_3)_2 + NO + H_2O$

(c) $Cu(NO_3)_2 + NO_2 + H_2O$

(d) $Cu(NO_3)_2 + H_2SO_4 + H_2O$

Answer: _____

Question 13

Haloform reaction DOES NOT take place with which of the following compounds:

(a) Propanone

(b) 2-propanol

(c) Ethanol

(d) Methanol

Answer: _____

Question 14

A solid has a structure in which 'Y' atoms are located at the corners of a cubic lattice, 'O' atoms at the centre of edges and 'K' atoms at the centre of the cube. What is the formula of this compound?

(a) KYO_2

(b) KYO_3

(c) K_2YO_3

(d) K_2YO_3

Answer: _____

Question 15

Formaldehyde when reacts with CH₃MgI forms an additional product, which on hydrolysis gives:

(a) Ethyl iodide

(b) Methyl alcohol

(c) Methyl iodide

(d) Ethyl alcohol

Answer: _____

Question 16

A solution of urea (molecular mass = 60) contains 8·6 g per litre. It is isotonic with a 5% solution of a non-volatile and non-electrolytic solute. What will be the molecular mass of the solute?

(a) 34·9 g mol⁻¹

(b) 349 g mol⁻¹

(c) 861 g mol⁻¹

(d) 3490 g mol⁻¹

Answer: _____

Question 17

The standard reduction electrode potential of Cu^{2+}/Cu is +0·34 V and that of Cr^{3+}/Cr is -0·74 V. These two electrodes are connected in their standard state to make an electrochemical cell. What will be the standard electrode potential (E°) of this cell?

(a) 1·19 V

(b) 1·08 V

(c) 0·69 V

(d) 1·83 V

Answer: _____

Question 18

Acetyl chloride on heating with diethyl ether in the presence of anhydrous $ZnCl_2$ gives:

(a) Ethyl alcohol and acetic acid

(b) Methyl chloride and methyl alcohol

(c) Methyl acetate and methyl alcohol

(d) Ethyl acetate and ethyl chloride

Answer: _____

Question 19

In compounds XeF_2, XeF_4 and XeF_6, the number of lone pair(s) on Xe atom respectively is:

(a) 2,3,1

(b) 1,2,3

(c) 4,1,2

(d) 3,2,1

Answer: _____

Question 20

The value of molal depression constant or cryoscopic constant (K_f) depends on which of the following?

(a) Nature of solvent.

(b) Heat of the solution of the solute in the solvent.

(c) Nature of solute.

(d) Vapour pressure of the solution.

Answer: _____

Question 21

Anti-Markownikoff addition of HBr is NOT observed in which of the following alkenes?

(a) Propene

(b) But-1-ene

(c) But-2-ene

(d) Pent-1-ene

Answer: _____

Question 22

When phenol is treated with zinc dust, it gives:

(a) Benzoic acid

(b) Benzaldehyde

(c) Benzene

(d) Toluene

Answer: _____

Question 23

The appearance of colour in solid alkali metal halides is generally due to:

(a) Schottky defect

(b) Frenkel defect

(c) Interstitial positions

(d) F-centres

Answer: _____

Question 24

The ionic conductance at infinite dilution for Ba^{2+} and Cl^- ions are 127 $ohm^{-1}cm^2mol^{-1}$ and 76 $ohm^{-1}cm^2mol^{-1}$ respectively. What will be the molar conductance of $BaCl_2$ at infinite dilution?

(a) 139·5 $ohm^{-1}cm^2mol^{-1}$

(b) 279·0 $ohm^{-1}cm^2mol^{-1}$

(c) 203·0 $ohm^{-1}cm^2mol^{-1}$

(d) 101·5 $ohm^{-1}cm^2mol^{-1}$

Answer: _____

Question 25

When excess of ethanol is heated with conc. H_2SO_4 at 413K, which compound is obtained?

(a) Diethyl sulphate

(b) Ethyl hydrogen sulphate

(c) Ethoxy ethane

(d) Ethene

Answer: _____

Question 26

With reference to the extraction of metal, answer the following:

(i) What is the process of removing impurity from crude metal called?

(a) Roasting

(b) Calcination

(c) Refining

(d) Concentration

Answer: _____

(iv) Which of the following is not a method for the concentration of ores?

(a) Froth floatation

(b) Smelting

(c) Magnetic separation

(d) Gravity separation

Answer: _____

Question 27

(i) An alkyl halide reacts with metallic sodium in the presence of dry ether.

What is this reaction known as?

(a) Frankland's reactions

(b) Sandmeyer's reaction

(c) Wurtz reaction

(d) Kolbe's reaction

Answer: _____

(ii) An organic compound 'A' on reaction with sodium metal in dry ether gives a hydrocarbon, 2, 2, 3, 3 tetramethyl butane. Identify compound 'A'.

(a) tert-butyl chloride

(b) sec-butyl chloride

(c) iso-butyl chloride

(d) n-butyl chloride

Answer: _____

Question 28

Answer the following questions with reference to the extraction of copper from its ore.

(i) Which one of the following is the sulphide ore?

(a) Cuprite

(b) Malachite

(c) Azurite

(d) Chalcopyrite

Answer: _____

(ii) In the Bessemer converter, copper sulphide is reduced to copper by which one of the following reaction?

(a) $Cu_2S + FeO \longrightarrow 2Cu + FeO + S$

(b) $Cu_2S + FeS \longrightarrow 2Cu + FeS_2$

(c) $Cu_2S + 2Cu_2O \longrightarrow 6Cu + SO_2$

(d) $Cu_2S + Fe \longrightarrow 2Cu + FeS$

Answer: _____

Question 29

Chlorobenzene is fused with aqueous sodium hydroxide at 623K and 300 atm followed by hydrolysis with dil. HCl.

(i) The organic product formed is

(a) Phenol

(b) Sodium phenoxide

(c) Benzene

(d) Cyclohexyl chloride

Answer: _____

(ii) What is the name of the above reaction?

(a) Williamson's synthesis

(b) Dow's process

(c) Rosenmund's reduction

(d) Kolbe's reaction

Answer: _____

Question 30

BrF₅ molecule is an interhalogen compound

(i) What is the structure of the given molecule?

(a) Pentagonal bipyramidal

(b) Square pyramidal

(c) Square planar

(d) Tetrahedral

Answer: _____

(ii) What is the type of hybridisation shown by central atom of the above molecule?

(a) sp^3

(b) sp

(c) sp^3d^2

(d) sp^3d

Answer: _____

Question 31

When ethene reacts with HBr, a compound (X) is formed. When compound (X) reacts with sodium ethoxide then compound (Y) is formed along with sodium bromide.

(i) Identify the compound (X)?

(a) C₂H₆

(b) C₂H₅Br

(c) CH₃Br

(d) C₂H₄Br₂

Answer: _____

(ii) Identify the compound (Y)?

(a) CH₃OH

(b) C₂H₅OH

(c) CH₃OCH₃

(d) C₂H₅OC₂H₅

Answer: _____

Question 32

Extraction of silver metal is done mainly from argentite (Ag₂S) ore.

(i) The concentrated ore on treatment with dil. NaCN solution and then followed by continuous agitation for several hours, which of the following products are obtained?

(a) AgCN and Na₂S

(b) Ag and NaCN

(c) Na₂SO₄ and Na₂SO₃

(d) Na[Ag(CN)₂] and Na₂S

Answer: _____

(ii) What is the above process of extraction of silver using dilute sodium cyanide known as?

(a) Dexcott's process

(b) Pattinson's process

(c) Mac-Arthur-Forrest cyanide process

(d) Parke's process

Answer: _____

Question 33

Silver acetate is refluxed with bromine in carbon tetrachloride.

(i) What are the products formed?

(a) Ethane, silver bromide and water

(b) Ethanoyl bromide and silver

(c) Ethanoic acid and silver bromide

(d) Bromomethane, silver bromide and carbon dioxide

Answer: _____

(b) What is the above reaction known as?

(i) Oxidation reaction
(ii) Iron reaction
(iii) Reduction reaction
(iv) Sandmeyer's reaction

Answer: _____

Question 34

With reference to XeF_2 molecule, answer the following questions:

(i) What is the type of hybridisation of Xe atom in the given molecule?

(a) sp^3d
(b) sp^3d^2
(c) sp^3d^3
(d) sp^3

Answer: _____

(ii) What is the geometry of this molecule?

(a) Octahedral
(b) Square pyramidal
(c) Square planar
(d) Tetrahedral

Answer: _____

Question 35

Phenol and ethyl alcohol can be distinguished by a single chemical test.

(i) Which of the following is the reagent used to distinguish phenol from ethyl alcohol?

(a) Solid PCl_5
(b) Dry sodium metal
(c) Neutral $FeCl_3$
(d) Acetyl chloride in presence of pyridine

Answer: _____

(ii) Which colour is developed in the solution due to the addition of the above reagent to phenol?

(a) Blue
(b) Green
(c) Red
(d) Violet

Answer: _____

Question 36

Ozone is an allotropic form of oxygen. It acts as a powerful oxidizing agent.

(i) During the oxidation of mercury (Hg) by ozone, the sub oxide (Hg_2O) formed dissolves in mercury causing it to lose its meniscus and starts sticking to the sides of glass. What is this phenomenon called?

(a) Branching of mercury
(b) Tailing of mercury
(c) Breaking of meniscus
(d) Distorted meniscus

Answer: _____

(ii) Which one of the following compounds is formed when Ozone reacts with black lead sulphide?

(a) Blue coloured lead trioxide
(b) White coloured lead sulphate
(c) Green coloured lead oxide
(d) Red coloured tri lead tetroxide

Answer: _____

Question 17

An element 'X' having atomic mass 60 has density 6.23 g/cm³. The edge length of its cubic unit cell is 400 pm. ($N_A = 6.023 \times 10^{23}$ mol⁻¹)

(i) What is the type of unit cell known as?

    (a) Body centred cubic

    (b) Face centred cubic

    (c) Simple cubic

    (d) Side centred cubic

    Answer: _____

(ii) What is the radius of an atom of this element?

    (a) 259.5 pm

    (b) 346.4 pm

    (c) 141.4 pm

    (d) 115.3 pm

    Answer: _____

(iii) What is the molarity of the glucose solution?

    (a) 0.42 M

    (b) 0.21 M

    (c) 4.01 M

    (d) 2.02 M

    Answer: _____

Question 18

0.7 kg of glucose (molecular mass = 180 g mol⁻¹) is dissolved in 20 ml of aqueous solution at 298 K. (R = 0.082 L atm K⁻¹ mol⁻¹)

(i) What is the osmotic pressure of solution at 298 K?

    (a) 8.41 atm

    (b) 9.48 atm

    (c) 4.81 atm

    (d) 3.16 atm

    Answer: _____

Question 19

A conductivity cell is filled with 0.05 M NaOH solution offering a resistance of 31.6 ohm. If the cell constant of the cell is 0.36 cm⁻¹, calculate the following.

(i) The value of specific conductance:

    (a) $1.39 \times 10^{-2} \, \Omega^{-1} cm^{-1}$

    (b) $1.29 \times 10^{-2} \, \Omega^{-1} cm^{-1}$

    (c) $1.16 \times 10^{-2} \, \Omega^{-1} cm^{-1}$

    (d) $1.1 \times 10^{-2} \, \Omega^{-1} cm^{-1}$

    Answer: _____

(ii) The value of molar conductance:

    (a) $232.20 \, \Omega^{-1} cm^2 mol^{-1}$

    (b) $21.22 \, \Omega^{-1} cm^2 mol^{-1}$

    (c) $119.07 \, \Omega^{-1} cm^2 mol^{-1}$

    (d) $165.36 \, \Omega^{-1} cm^2 mol^{-1}$

    Answer: _____

Question 40

The radius of silver atom is 143·5 pm and it crystallizes in face centred cubic arrangement. (molecular mass of $Ag = 107·87$; $N_A = 6·023 \times 10^{23}$).

(i) What is the edge length of the unit cell?

(a) 405·8 pm

(b) 40·6 pm

(c) 331·4 pm

(d) 287·0 pm

Answer: _____

(ii) What is the density of silver metal?

(a) 5·36 g/cm³

(b) 8·60 g/cm³

(c) 10·72 g/cm³

(d) 7·07 g/cm³

Answer: _____

Question 41

A solution contains 54g of glucose (molecular mass = 180g mol⁻¹) in 250g of water (K_f for water = 1·86 K kg mol⁻¹).

(i) What will be the freezing point of this glucose solution?

(a) 276·402 K

(b) 270·768 K

(c) 370·402 K

(d) 272·563 K

Answer: _____

(ii) What will be the molality of this glucose solution?

(a) 1·20 m

(b) 0·12 m

(c) 2·40 m

(d) 0·24 m

Answer: _____

Question 42

The standard reduction electrode potential for Sn^{4+}/Sn^{2+} couple is $+0·15V$ and that for the Cr^{3+}/Cr couple is $-0·74V$. These two couples are connected in their standard state are connected to make a cell. (1 Faraday = 96,500 C mol⁻¹).

(i) What will be the value of E° cell?

(a) +1·19V

(b) +0·89V

(c) +0·18V

(d) +1·83V

Answer: _____

(ii) What will be the value of standard Gibbs energy ($\Delta G°$)?

(a) -650·3 kJ

(b) -515·3 kJ

(c) -226·4 kJ

(d) -406·8 kJ

Answer: _____

(ii) What will be the mole fraction of sucrose in water?

    (a)   0·8261

    (b)   0·0826

    (c)   0·4376

    (d)   0·0435

Answer: _____

Question 45

A solution containing 2g of anhydrous barium chloride in 400 cm^3 of water has a specific conductivity of 0·0058 S cm^{-1}. (at. wt. of Ba = 137, Cl = 35·5)

(i) What is the molarity of the above solution?

    (a)   0·204 M

    (b)   0·024 M

    (c)   0·420 M

    (d)   4·021 M

Answer: _____

(ii) What is the molar conductivity of the above solution?

    (a)   241·67 S cm^2mol

    (b)   261·47 S cm^2mol

    (c)   247·17 S cm^2mol

    (d)   361·47 S cm^2mol

Answer: _____

Question 46

Assertion: Structure of chlorobenzene leads to the formation of m-nitro chlorobenzene.

Reason: Nitro (-NO₂) group is m-directing group.

(a) Both assertion and reason are true and reason is the correct explanation of the assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of the assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Answer: ____

Question 47

Assertion: Copper obtained after bessemerisation is known as blister copper.

Reason: Blisters are produced on the surface of the metal due to escaping of sulphur dioxide gas during cooling.

(a) Both assertion and reason are true and reason is the correct explanation of the assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of the assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Answer: ____

Question 48

Assertion: Phenol reacts with neutral ferric chloride ($FeCl_3$) and gives violet colour solution.

Reason: The violet colour solution is due to the formation of $[Fe(OC_6H_5)_6]^{3-}$ complex ion.

(a) Both assertion and reason are true and reason is the correct explanation of the assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of the assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Question 49

Assertion: Interhalogen compounds are more reactive than constituent halogens.

Reason: Bond between two different halogens is stronger than the bond between two similar halogen atoms.

(a) Both assertion and reason are true and reason is the correct explanation of the assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of the assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Answer: ____

Question 50

Assertion: The minerals from which the metals are conveniently and economically extracted are called ores.

Reason: All the metals can be extracted from their ores by one method.

(a) Both assertion and reason are true and reason is the correct explanation of the assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of the assertion.

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

Answer: ____