Techior Solutions Pvt. Ltd.

CBSE XII Chemistry

Total Time: 3 Hr | Total Marks: 70.0

Chemistry

Section A

MCQ Single Correct

1) Which of the following reactions produces an ether?

A) Hydrolysis of an ester
B) Dehydration of an alcohol
C) Oxidation of a primary alcohol
D) Hydrogenation of an alkene

2) Which of the following best defines the Collision Theory of Chemical Reactions?

A) Reactions occur when reactant particles collide with each other
B) Reactions occur only in the presence of a catalyst
C) Reactions occur spontaneously without any external influence
D) Reactions occur only at high temperatures

3) Which of the following is NOT a limitation of the Sandmeyer reaction?

A) It cannot be used to prepare fluorobenzenes
B) It is not suitable for the synthesis of highly reactive compounds
C) It requires harsh reaction conditions
D) It cannot be used for large-scale industrial production

4) Which of the following metals can be used to couple with diazonium salts to form azo dyes?

A) Copper (Cu)
B) Iron (Fe)
C) Zinc (Zn)
D) Aluminum (Al)

5) The element used in the production of rechargeable batteries, particularly in electric vehicles, is:

A) Cobalt
B) Silver
C) Palladium
D) Rhodium

6) Aniline upon heating with conc. HNO_3 and $conc.H_2SO_4$ mixture gives:

A) o-and p-nitroaniline
B) o-nitroaniline
C) black tarry mass
D) no reaction

7) What is the IUPAC name of $CH_3OCH_2CH_2OH$?

A) Ethyl methyl ether

B) Ethanol

C) 1-Methoxyethane

D) Ethyl methanol

8) Which of the following ligands is classified as a strong field ligand?

A) H_2O

B) NH_3

C) Cl^-

D) CN^-

9) Which complex gives three chloride ions per formula unit?

A) $CrCl_3 \cdot 4H_2O$

B) $CrCl_3 \cdot 6H_2O$

C) $CrCl_3 \cdot 5H_2O$

D) All of these

10) The atomic radius of Lanthanoids tends to:

A) Decrease across the series

B) Remain constant across the series

C) Increase across the series

D) Follow no specific trend

11) Which of the following solvents is commonly used to dissolve diazonium salts?

A) Water

B) Acetic acid

C) Ethanol

D) Chloroform

12) On the basis of information given below, mark the correct option. Information: On adding acetone to methanol some of the hydrogen bonds between methanol molecules break.

A) At specific composition methanol-acetone mixture will form minimum boiling azeotrope and will show positive deviation from Raoulf s law.

B) At specific composition methanol-acetone mixture forms maximum boiling azeotrope and will show positive deviation from Raoulf s law.

C) At specific composition methanol-acetone mixture will form minimum boiling azeotrope and will show-negative deviation from Raoult's law.

D) At specific composition methanol-acetone mixture will form maximum boiling azeotrope and will show negative deviation from Raoulf s law.

13) The boiling points of aldehydes and ketones are generally higher than those of hydrocarbons of similar molecular masses. Which of the following best explains this observation?

A) Presence of hydrogen bonding
B) Stronger dipole-dipole interactions
C) Higher molecular weight
D) Presence of unsaturation

14) The abnormal molar mass behavior is a consequence of:

A) Increased temperature of the solution
B) Decreased concentration of the solute
C) Association or dissociation of solute particles in solution
D) Increased volume of the solvent

15) Which alcohol is commonly used as a solvent in the extraction of essential oils?

A) Methanol
B) Butanol
C) Ethanol
D) Propanol

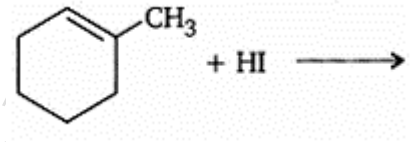
16) Which of the following has highest boiling point?

A) CH_3NH_2
B) CH_3CH_3
C) CH_3OH
D) HCOOH

Section B

Short Description

17) Complete the following reaction equations:

(i) 

(ii) $CH_3CH_2CH = CH_2 + HBr \longrightarrow$

18) What are interstitial compounds? Why are such compounds well known for transition metals?

19) A metal ion M^{n+} having d^4 valence electronic configuration combines with three didentate ligands to form a complex compound. Assuming $A_0 > P$.

(i) Draw the diagram showing d orbitals splitting during this complex formation.

(ii) Write the electronic configuration of the valence electrons of the metal M^{n+} ion in terms of t_{2g} and e_g.

(iii) What type of hybridization will M^{n+} ion have?

(iv) Name the type of isomerism exhibited by this complex.

---OR---

Give the electronic configuration of the

(a) d-orbitals of Ti in $[Ti(H_2O)_6]^{3+}$ ion in an octahedral crystal field.

(b) Why is the complex coloured? Explain on the basis of distribution of electrons in the d-orbitals.

(c) How does the colour change on heating $[Ti(H_2O)_6]^{3+}$ ion?

20) Calculate the magnetic moment of a divalent ion in aqueous solution of its atomic number is 25.

21) State the constitutional difference between DNA and RNA. Write down the names of the bases produced on hydrolysis of DNA.

Section C

Medium Description

22) Explain how an OH group attached to a carbon in the benzene ring activates benzene towards electrophilic substitution.

23) $[Fe(H_2O)_6]^{3+}$ is strongly paramagnetic whereas $[Fe(CN)_6]^{3-}$ is weakly paramagnetic. Explain.

24) When kept in water, raisin swells in size. Name and explain the phenomenon involved with the help of a diagram. Give three applications of the phenomenon.

---OR---

Why is the molar mass determined by measuring a colligative property in case of some solutes abnormal? Discuss it with the help of van't Hoff factor.

25) What is meant by positive and negative deviations from Raoult's law and how is the sign of $\Delta_{sol}H$ related to positive and negative deviations from Raoult's law?

26) The melting points and solubility in water of amino acids are generally higher than that of the corresponding halo acids. Explain.

27) An antifreeze solution is prepared from 222.6 g of ethylene glycol $(C_2H_6O_2)$ and 200 g of water. Calculate the molality of the solution. If the density of the solution is 1.072 g mol^{-1} then what shall be the molarity of the solution?

28) Discuss biological and industrial importance of osmosis.

Section D

Case Study

Solve Question 29 to Question 32 based on the following paragraph:

Case Study 1:

Read the passage given below and answer the following questions:

At 298 K, the vapour pressure of pure benzene, C_6H_6 is 0.256 bar and the vapour pressure of pure toluene $C_6H_5CH_3$ is 0.0925 bar. Two mixtures were prepared as follows:

(I) 7.8 of C6H6 + 9.2 g of toluene

(II) 3.9 g of C6 H6 + 13.8 g of toluene

29) Which of the following statements is / are correct?

(I) Mole fraction of toluene in vapour phase is more solution I

(II) Mole fraction of toluene in vapour phase is less in solution I

(III) Mole fraction of benzene in vapour phase is less in solution I

A) Only II
B) Only I
C) I and III
D) II and III

30) The total vapour pressure (bar) of solution I is

A) 0.128
B) 0.174
C) 0.198
D) 0.258

31) Which of the given solutions have higher vapour pressure?

A) I
B) II
C) Both have equal vapour pressure
D) Cannot be predicted

---OR---

Solution I is an example of a/an

A) Ideal solution
B) Non ideal solution with positive deviation
C) Non-ideal solution with negative deviation
D) Can't be predicted

32) Mole fraction of benzene in vapour phase in solution I is

A) 0.128

B) 0.174

C) 0.734

D) 0.266

Solve Question 33 to Question 36 based on the following paragraph:

Case Study

Read the, passage given below and answer the following questions:

If some solute is added to a solvent, the boiling point of solution increases. This is known as elevation in boiling point.

$\Delta T_b = K_b m$, where, K_b = Molal elevation constant

$\Delta T_b \propto m$

Hence, it is a colligative property.

Also, $K_b = \frac{MRT_b^2}{\Delta_{vap}H \times 1000}$

where, M= Molar mass of solvent

Δ_{vap} H = Enthalpy of vaporisation

Molar mass can also be calculated using elevation in boiling point.

$$M_B = \frac{K_b \times W_B \times 1000}{\Delta T_b \times W_A}$$

33) Assertion: When sugar is added to water, boiling point of water increases.
Reason: When a non-volatile solute is added to a solvent, elevation in boiling point is observed.

A) Assertion and reason both are correct statements and reason is correct explanation for assertion

B) Assertion and reason both are correct statements but reason is not correct explanation for assertion

C) Assertion is correct statement but reason is wrong statement

D) Assertion is wrong statement but reason is correct statement

---OR---

Assertion : Elevation in boiling point of two isotonic solutions is same.

Reason : Boiling point depends upon the concentration of the solute.

A) Assertion and reason both are correct statements and reason is correct explanation for assertion

B) Assertion and reason both are correct statements but reason is not correct explanation for assertion

C) Assertion is correct statement but reason is wrong statement

D) Assertion is wrong statement but reason is correct statement

34) Assertion: In a pressure cooker, the water is brought to boil. The cooker is then removed from the stove. Now on removing the lid of pressure cooker, the water starts boiling again.
Reason: The impurities in water bring down its boiling point.

A) Assertion and reason both are correct statements and reason is correct explanation for assertion

B) Assertion and reason both are correct statements but reason is not correct explanation for assertion

C) Assertion is correct statement but reason is wrong statement

D) Assertion is wrong statement but reason is correct statement

35) Assertion: On dissolving 3.24 g of sulphur in 40 g of benzene, boiling point of solution get higher than that of benzene by 0.081 K, then the formula of sulphur is S_8. (K_b for benzene = 2.53 K kg mol
Reason: Molecular mass of sulphur comes out to be 253.

A) Assertion and reason both are correct statements and reason is correct explanation for assertion

B) Assertion and reason both are correct statements but reason is not correct explanation for assertion

C) Assertion is correct statement but reason is wrong statement

D) Assertion is wrong statement but reason is correct statement

36) Assertion: Cooking time in pressure cookers is reduced.
Reason: Boiling point inside the pressure cooker in raised.

A) Assertion and reason both are correct statements and reason is correct explanation for assertion

B) Assertion and reason both are correct statements but reason is not correct explanation for assertion

C) Assertion is correct statement but reason is wrong statement

D) Assertion is wrong statement but reason is correct statement

Section E

Long Description

37) (a) Name the starting material used in the industrial preparation of phenol.
(b) Write complete reaction for the bromination of phenol in aqueous and non-aqueous medium.
(c) Explain why Lewis acid is not required in bromination of phenol?

---OR---

How can phenol be converted to aspirin?

38) (i) How will you prepare:
(a) Acetic anhydride and
(b) Acetyl chloride from acetic acid?
Write the reaction involve in each case.
(ii) Why is the boiling point of an acid anhydride higher than the acid from which it is derived?

---OR---

(i) Describe the preparation of acetic acid from acetylene.
(ii) how can the following be obtained from acetic acid.
(a) Acetone? (b) Acetaldehyde?
(iii) In what way can acetic acid be undistinguished from acetone?
(iv) Why do carbonylic acid not give the characteristic reactions of a carbonyl groups?

39) (a) Give reason for the following:
(i) Rusting of iron is quicker in saline water than in ordinary water.
(ii) Aluminium metal cannot be produced by the electrolysis of aqueous solution of aluminium salt.
(b) Resistance of a conductivity cell filled with 0.1 M KCl solution is 100 ohm. F the resistance of the same cell when filled with 0.02 M KCl solution is 520 ohms, calculate the conductivity and molar conductivity of 0.02 M KCl solution. Conductivity of 0.01 M KCl solution is $1.29\ Sm^{-1}$

---OR---

A voltaic cell is set up at 25°C with the half cells, $Al|Al^{3+}$ (0.001 M) and $Ni|Ni^{+}$(0.50 M). Write the equation for the reaction that occurs when the cell generates an electric current and determine the cell potential.

Given: $E^{0}_{Ni^{2+}/Ni} = -0.25V$

$E^{0}_{Al^{3+}/Al} = -1.66\ V$