DR VIRENDRA SWARUP EDUCATION CENTRE, PANKI, KANPUR

SECOND TERM EXAM (2024-2025) CLASS XII CHEMISTRY

Set C

Date 09/11/24 Time 3 hrs. Max Marks 70

All questions are compulsory. There are 33 questions in all.

Section A Q1-16 carrying 1 mark each

Section B Q 17-21 carrying 2 marks each.

Section C Q 22-28 carrying 3 marks each.

Section D Q 29-30 carrying 4 marks each.

Section E Q31-33 carrying 5 marks each.

SECTION A

Choose the correct option :-

Q1 Which of the following solutions of KCl will have the highest value of specific conductance?

(a) 0.5M (b)0.01M (c)0.1M (d) 1.0M

Q2 What would be the major product of the given reaction?

$CH_3CHO + CH_3MgI \xrightarrow{H_2O}$

(a) CH_3CH_2OH (b) CH_3OH (c) $(CH_3)_3COH$ (d) $(CH_3)_2CHOH$.

Q3 In the given reaction $A + 3B \longrightarrow 2C$,

The rate of formation of C is 2.5×10^{-4} mol $L^{-1} s^{-1}$

Calculate the rate of reaction

(a) 1.25×10^{-4} mol $L^{-1} s^{-1}$ (b) 3.75×10^{-4} mol $L^{-1} s^{-1}$ (c) 3.25×10^{-4} mol $L^{-1} s^{-1}$

(d) 5.25×10^{-4} mol $L^{-1} s^{-1}$

Q4 The unit of rate of reaction is the same as that of the rate constant for a

(a)first order reaction (b) second order reaction (c)0 order reaction

(d) half order reaction.

Q5  CH_2NH_2 on heating with $CHCl_3$ and alcoholic KOH gives foul smell of

(a)  (b)  (c) 

(d) 

Q6 (A) compound reacts with sodium hypohalite to give a yellow precipitate, identify(A)

(a)CH_3CHO (b) $CH_3CH(OH)$ (c) both a and b (d) None of the above.

Q7 $(CH_3)_3C\text{-}OH$ $\underline{Cu/573K}$

(a)2methylprop1-ene (b)3methylprop1-ene (c) both the above (d)none of the above.

Q8 Which parts of amino acid molecules are linked through hydrogen bonds in the secondary structure of proteins?

(a) NH_2group (b)COOH group (c) C=O and NH groups

(d) none of the above

Q9 One mole of $CrCl_3.6H_2O$ compound reacts with excess $AgNO_3$ solution to yield two moles of AgCl(s). The structural formula of the compound is

(a) $[Cr(H_2O)_5Cl]Cl_2.H_2O$ (b) $[Cr(H_2O)_3Cl_3].3H_2O$ (c) $[Cr(H_2O)_4Cl_2]Cl.2H_2O$ (d) $[Cr(H_2O)_6]Cl_3$

Q10 While charging the lead storage battery

(a)$PbSO_4$ anode is reduced to Pb

(b) $PbSO_4$ cathode is reduced to Pb

(c) $PbSO_4$ anode is oxidized to Pb

(d)$PbSO_4$ anode is oxidized to PbO_2

Q11 Which one among the following metals of the 3d series have the lowest melting point?

(a)Fe (b)Mn (c)Zn (d)Cu.

Q12 For optically alkyl halides, inversion of configuration occurs in;

(a) SN_2 reaction (b)SN_1 reaction (c)Neither in SN_1 nor SN_2 reactions (d) SN reaction as well as SN_2 reaction.

Select the correct answer to these questions from the codes (a) (b) (c) (d) as given below

(a) Both Assertion (A) and Reason (R) are true and reason is 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 bur Reason is true.

Q13 (A) Acetic acid is stronger than formic acid

(R) in acetic acid the electron releasing methyl group makes it difficult to break the O-H bond

Q14 (A) Conductivity of an electrolyte decreases with decrease in concentration.

(R) Number of ions per unit volume increases on dilution.

Q15 (A) Phenol is more acidic than p-methylphenol

(R) The presence of an electron releasing group in p- methylphenol makes it less acidic.

Q16 (A) Osmotic pressure is a colligative property

(R) Osmotic pressure is directly proportional to molarity.

SECTION B

Q17 (a) What is glycogen how is it different from starch?

(b)Write a reaction which shows that all the carbon atoms are linked in a straight chain

OR

(a)Where does the water goes after boiling an egg?

(b)What happens when D-Glucose is treated with Br_2 water?

Q18 (a) Convert Aniline to chlorobenzene.

(b) Convert Ethanol to but-1-yne.

OR

Write the major products in the following

(a) $(CH_3)_3$-C-OC_2H_5 + HI ⟶

(b)CH_3-CH_2-CH_2-O-CH_3 + HBr ⟶

Q19 For the first order thermal decomposition reaction the following data was obtained;

$$C_2H_5Cl(g) \longrightarrow C_2H_{4(g)} + HCl_{(g)}$$

Time/sec	Total pressure/atm
0	0.30
300	0.50

Calculate the rate constant

(log 2 =0.301, log 3=0.4771, log4= 0.6021)

Q20 (a) Give reason why zinc salts are white in colour?

(b) Using IUPAC norms write the name for the following $[Zn(OH)_4]^{2-}$

Q21 Account for the following :-

(a) Alkaline medium inhibits the rusting of iron

(b) Name and describe the cell which is generally used in hearing aids.

SECTION C

Q22 (a)What is the effect of catalyst:

(a) on Gibbs Energy $\triangle G$

(b Activation Energy of a reaction.

Q23 Arrange the following in order of property indicated for each set

(a) CH_3CHO, CH_3CH_2OH, CH_3OCH_3, $CH_3CH_2CH_3$, (increasing order of boiling points).

(b) $(CH_3)_2CHCOOH$, $CH_3CH_2CH(Br)COOH$, $CH_3CH(Br)CH_2COOH$ (increasing order of their acid strengths)

Q24 How do you convert:

(1) Ethanoic acid to methanamine.

(ii)Methanol to ethanoic acid

(111) Benzoic acid to aniline.

Collage time

Q25 Discuss the method of preparation of following compounds

(a)Cyanohydrin (b) Acetal

OR

Discuss the following reactions

(a) Wolff- Kishner reduction (b) Clemmensen reduction

Q26 A solution containing 2g of glucose (M =180g mol^{-1}) in 100g of water is prepared at 300K. If the vapour pressure of pure water at 300k is 32.8 mm Hg, what would be the vapour pressure of the solution?

Q27 Give reasons for the following

(a) Aniline does not undergo Friedal-Crafts reaction

(b) $(CH_3)_2NH$ is more basic than $(CH_3)_3N$ in an aqueous solution

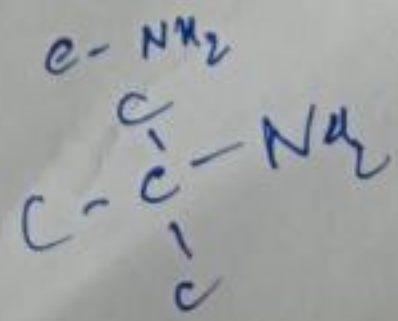
(c) Primary amines have higher boiling points than tertiary amines.

Q28 Write the state of hybridization shape and IUPAC name of the complex $[CoF_6]^{-3}$ (Atomic number of Co=27).

SECTION D

Read the passage carefully and answer the questions that follow.

Q29 Vitamins are vital for life A,D,E,K are fat soluble vitamins whereas B1, B2, B3 B5 and C are water soluble vitamins. Vitamin A helps in improving eyesight. Vitamin C prevents scurvy and increases immunity. Vitamin D helps in strong bones and teeth. Our requirement of Vitamin D is 15 mcg. We get Vitamin D from sunlight, Eggs, dairy products, orange, oats and mushroom etc. Citrus fruits contain Vitamin C. Carrot contains Vitamin A. We should include chick pea flour (basan) in our diet to prevent inflammation. It has phytonutrients and fibres which have anti-inflammatory properties. It prevents accumulation of fats. It contains Fe, Cu, Mg, fibre, K which are essential to control our weight. It increases our immune system. It contains proteins, amino acids, Mg, Vitamin B and phosphorous. Pomegranates are good source of Vitamin C which our body needs to make collagen. It is rich source of B-complex, Vitamin B_c folates, pyridoxine and Vitamin K. It contains essential minerals like Ca, Cu, Mg and Mn. Pomegranates are rich source of insoluble fibres which help us to keep fuller for longer time and regulate bowel function.



Answer the following questions:

(a) Why should Vitamin B and C be taken regularly in diet?

(b) Which vitamin deficiency causes pernicious anaemia? Is it fat or water soluble?

(c) (i) What is meant by vitamin B Complex?

(ii) What is source of Vitamin E and the disease caused by its deficiency?

OR

(1) Which vitamin deficiency leads to bleeding for long time? What is its source?

(11) What is the role of fibre in our diet?

Q30 Carbohydrates are optically active polyhydroxy Aldehydes and ketones. They are also called Saccharides. All the carbohydrates which reduce Felhing solution and Tollen's reagent are referred to as reducing sugars. Glucose the most important source of energy for mammals, is obtained by the hydrolysis of starch. Vitamins are necessary food factors required in the diet. Proteins are the polymers of alpha amino acids and perform various structural and dynamic functions in the organism. Deficiency of vitamins lead to many diseases.

Answer the follcwing:

(a) The pentaacetate of glucose does not react with hydroxylamine what does it indicates.

(b)Why cannot vitamin C be stored in our body?

(c) define the following as related to proteins (1) peptide linkage

(2) denaturation.

OR

Define the following as related to carbohydrates (1) Anomers (2) glycosidic linkage.

SECTION E

Q31 (a)Predict weather van't Hoff factor will be less or greater than one, when ethanoic acid is dissolved in benzene.

(b)define ideal sulution.

(c) Calculate the mass of $CaCl_2$ (molar mass =111) to be dissolved in 500 g of water to lower its freezing point by 2K, assume in that $CaCl_2$ to undergoes complete dissociation (k_f for water = 1.86 K kg mol^{-1}).

Q32 Compound A undergoes Rosenmund reduction to give compound B with molecular formula C_7H_6O. Compound B does not give Fehlings test but reacts with concentrated NaOH to give C and D. Identify A, B, C and D and write all the reactions involved.

Write one chemical test to distinguish between compound B and propanone.

OR

Compound A with molecular formula (C_2H_6O) on oxidation by PCC gives compound B, which on treatment with dilute alkali forms compound D which is a B-hydroxy aldehyde. B on oxidation by potassium permanganate forms C. Identify A, B, C and D and write all the chemical equations involved.

Q33 (a)Calculate E^0_{cell} for the following reaction at 298K:

$2Al(s) + 3Cu^{2+}(0.01M) \rightarrow 2Al^{3+}(0.01M) + 3Cu(s)$

Given: $E_{cell} = 1.98$ V

(b) Using the E° values of A and B, predict which is better for coating the surface of iron [$E^\circ (Fe^{2+}/Fe) = -0.44V$] to prevent corrosion and why?

Given: $E^\circ (A^{2+}/A) = -2.37V$: $E^\circ (B^{2+}/B) = -0.14V$

(c) What is meant by limiting molar conductivity?

OR

(a) The conductivity of 0.001 mol L^{-1} solution of CH_3COOH is 3.905×10^{-5} S cm^{-1}. Calculate its molar conductivity and degree of dissociation (α).

Given $\lambda^\circ (H^+) = 349.6$ S cm^2 mol^{-1} and $\lambda^\circ (CH_3COO^-) = 40.9$ S $cm^2 mol^{-1}$