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| **PB1/CHQP/1222/A 24-NOV-2022** | | | | | |
| **PRE-BOARD EXAMINATION - I (2022-23)** | | | | | |
| **Subject: CHEMISTRY**  **Grade: XII** | | Max. Marks:70Time: 3Hrs | | | |
| **Name:** | | | **Section:** | **Roll No:** | |
| ***General Instructions:***  Read the following instructions carefully.  1. There are 35 questions in this question paper.  2. SECTION A consist of 18 multiple choice questions carrying 1marks each.  3. SECTION B consist of 7 very short answer questions carrying 2 marks each.  4. SECTION C consist of 5 short answer questions carrying 3 marks each.  5. SECTION D consist of 2 case-based questions carrying 4 marks each.  5. SECTION E consist of 3 long answer question carrying 5 marks.  6. All questions are compulsory.  7. Use of calculators is not allowed | | | | | |
|  | **SECTION A** | | | | |
| 1 | Which one of the following compounds is more reactive towards SN1 reaction?  a. CH2=CHCH2Br  b. C6H5CH2Br  c. C6H5CH (C6H5)Br  d. C6H5CH(CH3) Br | | | | 1 |
| 2 | Following reactions are taking place in a Galvanic cell,  Zn → Zn2+ + 2e– → Ag+ + e– → Ag  Which of the given representations is the correct method of depicting the cell?  (a) Zn(s) |Zn2+ (aq) ||Ag+ (aq) |Ag(s)  (b) Zn2+ |Zn ||Ag |Ag+  (c) Zn(aq) |Zn2+ (s) ||Ag+ (s) |Ag(aq)  (d) Zn(s) |Ag+ (aq) ||Zn2+ (aq) |Ag(s) | | | | 1 |
| 3 | The molar conductivity of CH3COOH at infinite dilution is 390 Scm2 /mol. Using the graph and given information, the molar conductivity of CH3COOK will be: | | | | 1 |
| 4 | What would be the major product of the following reaction? | | | | 1 |
| 5 |  | | | | 1 |
| 6 | Which of the following aqueous solutions should have the highest boiling point?   1. 1.0 M NaOH 2. 1.0 M Na2SO4 3. 1.0 M NH4NO3 4. 1.0 M KNO3 | | | | 1 |
| 7 | Identify the configuration of transition element, which shows highest magnetic moment.   1. 3d7 2. 3d5 3. 3d8 4. 3d2 | | | | 1 |
| 8 | KMnO4 is coloured due to:  (a) d-d transitions  (b) Charge transfer from ligand to metal  (c) Unpaired electrons in d orbital of Mn  (d) Charge transfer from metal to ligand | | | | 1 |
| 9 | Which of the following species is not expected to be a ligand?  (a) NO  (b) CO  (c) NH2CH2CH2NH2  (d) NH4 + | | | | 1 |
| 10 | The correct IUPAC name of [Pt(NH3)2Cl2] is  (a) Diamminedichloridoplatinum (II)  (b) Diamminedichloridoplatinum (IV)  (c) Diamminedichloridoplatinum (0)  (d) Dichloridodiammineplatinum (IV) | | | | 1 |
| 11 | Electronic configuration of [Cu(NH3)6] 2+ on the basis of crystal field splitting theory is  (a) t2g 4 eg 5  (b) t2g 6 eg 3  (c) t2g 9 eg 0  (d) t2g 5 eg 4 . | | | | 1 |
| 12 | Which of the following primary and secondary valencies are not correctly marked against the compound?  (a) [Cr(NH3)6]Cl3 p = 3, s = 6  (b) K2[PtCl4] p = 2, s = 4  (c) [Pt(NH3)2Cl2] p = 2, s = 4  (d) [Cu(NH3)4]SO4 p = 4, s = 4 | | | | 1 |
| 13 | Which of the following can exist as zwitter ion?  (a) p-Aminoacetophenone  (b) Sulphanilic acid  (c) p-Nitroaminobenzene  (d) p-Methoxyphenol | | | | 1 |
| 14 | The major product of acid catalysed dehydration of 1-methylcyclohexanol is:  (a). 1-methylcyclohexane  (b). 1-methylcyclohexene  (c.) 1-cyclohexylmethanol  (d). 1-methylenecyclohexane | | | | 1 |
| 15 | Choose the correct answer out of the following choices.  (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  **Assertion**: ∞-Hydrogen atoms in aldehydes and ketones are acidic.  **Reason**: The anion left after the removal of a-hydrogen is stabilized by inductive effect. | | | | 1 |
| 16 | **Assertion** : Actinoids form relatively less stable complexes as compared to lanthanoids.  **Reason** : Actinoids can utilize their 5f orbitals along with 6d orbitals in bonding but lanthanoids do not use their 4f orbital for bonding. | | | | 1 |
| 17 | **Assertion** : An ether is more volatile than an alcohol of comparable molecular mass.  **Reason** : Ethers are polar in nature | | | | 1 |
| 18 | **Assertion** : Tertiary amines are more basic than corresponding secondary and primary amines in gaseous state.  **Reason** : Tertiary amines have three alkyl groups which cause +I effect. | | | | 1 |
|  | **SECTION B** | | | |  |
| 19 | 1. Name the suitable alcohol and reagent, from which 2-Chloro-2-methyl propane can be prepared 2. Out of the Chloromethane and Fluoromethane , which one is has higher dipole moment and why? | | | | 2 |
| 20 | Assign reasons for the following:  a) Depression in freezing point be same if 0.1 mole of sugar or 0.1 mole of glucose is dissolved in one liter of water?  b) Chilled cold drink is tastier than a hot cold drink. | | | | 2 |
| 21 | Use the data to answer the following and also justify giving reasons :     1. Which is a stronger reducing agent in aqueous medium, Cr2+ or Fe2+ and why? 2. Which is the most stable ion in +2 oxidation state and why? | | | | 2 |
| 22 | 1. What do you understand by ‘denticity of a ligand’? 2. What is the difference between a complex and a double salt?   **OR**   1. [Mn(CN)6]3– has two unpaired electrons whereas [MnCl6]3– has four unpaired electrons. Why? 2. Anhydrous CuSO4 is white while hydrated CuSO4 is blue in colour. Why? | | | | 2 |
| 23 | Write the equations for the following reaction:  a) Salicylic acid is treated with acetic anhydride in the presence of conc. H2SO4  b) Phenol is treated with chloroform in the presence of NaOH | | | | 2 |
| 24 | 1. Arrange the following in the increasing order of their boiling points.   CH3CHO, CH3COOH, CH3CH2OH   1. Write chemical equation for the following reaction:   Benzoyl chloride is hydrogenated in presence of Pd/BaSO4 | | | | 2 |
| 25 | a) Give one chemical test to distinguish between the following pair of compounds  Aniline and ethylamine.  b) Write short note on Coupling reaction | | | | 2 |
|  | **SECTION C** | | | |  |
| 26 | Give reasons for the following observations:   1. Aniline is acetylated before nitration reaction. 2. Primary amine on treatment with benzenesulphonyl chloride forms a product which is soluble in NaOH however secondary amine gives product which is insoluble in NaOH. 3. Aniline does not react with methyl chloride in the presence of anhydrous AlCl3 catalyst. | | | | 3 |
| 27 | 1. Identify the major product formed when 2-cyclohexylchloroethane undergoes a dehydrohalogenation reaction. Name the reagent which is used to carry out the reaction. Write the reactions involved.   b) Allyl chloride is hydrolysed more readily than n-propyl chloride. Why? | | | | 3 |
| 28 | 1. Write the structures of compounds A, B and C in each of the following reactions :      1. Do the following conversion in not more than two steps :   Benzoic acid to benzaldehyde  **OR**  Two moles of organic compound ‘A’ on treatment with a strong base gives two compounds ‘B’ and ‘C’. Compound ‘B’ on dehydrogenation with Cu gives ‘A’ while acidification of ‘C’ yields carboxylic acid ‘D’ with molecular formula of CH2O2. Identify the compounds A, B, C and D and write all chemical reactions involved. | | | | 3 |
| 29 | 1. The following is not an appropriate reaction for the preparation of tert.-butyl ethyl ether:      1. What would be the major product of the given reaction? 2. Write a suitable reaction for the preparation of tert.-butyl ethyl ether, specifying the names of reagents used. Justify your answer in both cases. | | | | 3 |
| 30 | E° cell for the given redox reaction is 2.71 V.    a) Calculate Ecell for the reaction.  b) Write the direction of flow of current when the external opposite potential applied is:   1. Less than 2.71 V and (ii) Greater than 2.71 V | | | | 3 |
|  | **SECTION D** | | | |  |
| 31 | **Read the passage given below and answer the following questions**:  The unique behaviour of Cu, having a positive E° accounts for its inability to liberate H2 from acids. Only oxidizing acids (nitric and hot concentrated sulphuric acid) react with Cu, the acids being reduced. The stability of the half-filled (d5) subshell in Mn2+ and the filled (d10) configuration in Zn2+ are related to their E° (M3+/M2+) values. The low value for Sc reflects the stability of Sc3+ which has a noble gas configuration. The comparatively high value for Mn shows that Mn2+(d5) is particularly stable, whereas a comparatively low value for Fe shows the extra stability of Fe3+(d5). The comparatively low value for V is related to the stability of V2+ (half-filled t2g level).  i)    ii) Give reasons:  (a) In the series Sc (Z = 21) to Zn (Z = 30), the enthalpy of atomisation of zinc is the lowest.  (b) Cu+ ion is not stable in aqueous solutions.  (c) Mn2+compounds more stable than Fe2+towards oxidation | | | | 4 |
| 32 | Suleiman, 14, used to spend 4 hours each day, traveling by donkey to collect water from a river. By the time he reached school, he would feel very tired and have difficulties concentrating. He would also often complain of stomach pains from drinking the river water. With the RO system now in his community, this is no longer the case. “Today, I slept more in the morning and just walked 20 minutes to collect the water from the tap. I had enough time to do my school homework and play with my friends. In school, our Chemistry teacher always said that clean water is tasteless and without color and smell. Today for first time I was able to taste real clean water.” Reverse osmosis differs from [filtration](https://en.wikipedia.org/wiki/Filtration) in that the mechanism of fluid flow is by osmosis across a membrane. The predominant removal mechanism in membrane filtration is straining, or size exclusion, where the pores are 0.01 [micrometers](https://en.wikipedia.org/wiki/Micrometre) or larger, so the process can theoretically achieve perfect efficiency regardless of parameters such as the solution's pressure and concentration. Reverse osmosis instead involves solvent [diffusion](https://en.wikipedia.org/wiki/Diffusion) across a membrane that is either nonporous or uses [nanofiltration](https://en.wikipedia.org/wiki/Nanofiltration) with pores 0.001 micrometers in size.  Answer the following questions:  Given below the sketch of a plant for carrying out a process.     1. Name the process occouring in the given plant. 2. To which container does the net flow of water take place? 3. Name one SPM which can be used in this plant. 4. At 300 K, 36 g of glucose present in a litre of its solution has an osmotic pressure of 4.98 bar. If the osmotic pressure of the solution is 1.52 bars at the same temperature, what would be its concentration? | | | | 4 |
|  | . **SECTION E** | | | |  |
| 33 | (a) What is meant by crystal field splitting energy? On the basis of crystal field theory, write the electronic configuration of d4 in terms of t2g and eg in an octahedral field when  (i) ∆o > P (ii) ∆o < P  (b) Write two limitations of crystal field theory.  (C)Give reason: [CoF6] 3– is outer orbital but [Co(NH3)6] 3+ is inner orbital complex.  **OR**  a)  What type of structural isomerism is represented by the following pairs :    b)  Draw all the isomers (geometric and optical) of following complex:  .  c) | | | | 5 |
| 34 | 1. For the cell reaction,        1. What is the use of platinum foil in the hydrogen electrode 2. Out of HCl and NaCl, which do you expect will have greater value for molar conductivity and why?   **OR**   1. The conductivity of 0.001 M acetic acid is 4 × 10–5 S/cm. Calculate the dissociation constant of acetic acid, if molar conductivity at infinite dilution for acetic acid is 390 S cm2 /mol. 2. Give reason : 3. On the basis of E° values, O2 gas should be liberated at anode but it is Cl2 gas which is liberated in the electrolysis of aqueous NaCl. 4. Molar conductivity of CH3COOH increases on dilution. | | | | 5 |
| 35 | A hydrocarbon (A) with molecular formula **C5H10** on ozonolysis gives two products (B) and (C). Both (B) and (C) give a yellow precipitate when heated with iodine in presence of NaOH while only (B) give a silver mirror on reaction with Tollen’s reagent.  a. Identify (A), (B) and (C).  b. Write the reaction of B with Tollen’s reagent  c. Write the equation for iodoform test for C  d. Write down the equation for aldol condensation reaction of B and C.  **OR**  An organic compound (A) with molecular formula C**2Cl3O2H** is obtained when (B) reacts with Red P and Cl2. The organic compound (B) can be obtained on the reaction of methyl magnesium chloride with dry ice followed by acid hydrolysis.  a. Identify A and B  b. Write down the reaction for the formation of A from B. What is this reaction called?  c. Give any one method by which organic compound B can be prepared from its corresponding acid chloride.  d. Which will be the more acidic compound (A) or (B)? Why?  e. Write down the reaction to prepare methane from the compound (B). | | | |  |

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