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**PB-T2/CHQP/1221/B 25-APR-2022**

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| **PREBOARD EXAMINATION 3 - TERM II (2021-22)** | | | |
| **Subject: Chemistry**  **Grade: 12** | | Max. Marks: 35 **Time: 2Hours** | |
| ***General Instructions:***  **Read the following instructions carefully.**  1. There are 12 questions in this question paper with internal choice.  2. SECTION A - Q. No. 1 to 3 are very short answer questions carrying 2 marks each.  3. SECTION B - Q. No. 4 to 11 are short answer questions carrying 3 marks each.  4. SECTION C- Q. No. 12 is case based question carrying 5 marks.  5. All questions are compulsory.  6. Use of log tables and calculators is not allowed | | | |
| **SECTION A** | | | |
| 1 | Arrange the following compounds in increasing order of their reactivity in a nucleophilic addition reaction: (i) Ethanal, propanal, propanone, Butanone. (ii) Benzaldehyde, , p−Nitrobenzeldehyde, Acetophenone. | | 2 |
| 2. | **Write the Nernst equation and find the EMF of the cell at 298 K: E0 Fe2+ / Fe = - 0.44V**  **Fe(s)|Fe2+(0.001M)||H+(1M)|H2(g)(1bar)| Pt(s)** | | 2 |
| 3. | i) During the preparation of esters from a carboxylic acid and an alcohol in the presence of an acid catalyst, the water or the ester should be removed as soon as it is formed.ii) Chloroacetic acid is a stronger acid than acetic acid. Give reason | | 2 |
|  | **SECTION B** | | 3 |
| 4 | Account for the following  i) Methylamine is soluble in water while aniline is not.  ii) Aniline does not undergo Friedal craft reaction.  iii) Aniline is a weaker base than ethylamine | | 3 |
| 5. | Represent suitable equations for the below conversions  i) Benzamide to benzenediazonium chloride  ii) Aniline to p-bromoaniline | | 3 |
| 6. | i) [Cr(NH3)6]3+ is paramagnetic while [Ni(CN)4]2– is diamagnetic. Explain on the basis of the valence bond theory.( Z for Cr =24 , Ni=28)  ii) Give the IUPAC name of [Co(NH3)4Cl(NO2)]Cl  **OR**  i) [Fe (CN) 6]4– and [Fe (H2O) 6]2+ are of different colours in dilute solutions. Why?  ii) **What is the spectrochemical series? Explain the difference between a weak field ligand and a strong field ligand.**  ii) Give the structure of Pentaamminenitrito-O-cobalt(III) | | 3 |
| 7. | An organic compound (A) has characteristic odour. On treatment with NaOH, it forms compounds (B) and (C). Compound (B) has molecular formula C7​H8​O which on oxidation gives back (A). The compound (C) is a sodium salt of an acid. When (C) is treated with soda-lime, it yields an aromatic compound (D). Deduce the structures of (A),(B),(C) and (D). Write the sequence of reactions involved. | | 3 |
| 8. | Account for the following:  i) Ammonia is easily adsorbed in comparison to oxygen.  ii) Explain using thermodynamic parameters as to why adsorption is always exothermic. | | 3 |
| 9. | Explain why aromatic amines cannot be prepared by Gabriel Pthalimide process. Give reactions in support of your answer  **OR**  **a) Give one chemical test to distinguish between the following pairs of compounds.**  **(i) Methylamine and dimethylamine  ii) Aniline and benzyl amine**  Chemical structure of N-methylaniline. | Download Scientific Diagram**b) Give the IUPAC name of** | | 3 |
| 10. | A strip of nickel metal is placed in a 1 molar solution of Ni(NO3​)2​ and a strip of silver metal is placed in a 1 molar solution of AgNO3​ . An electrochemical cell is created when the two solutions are connected by a salt bridge and the two strips are connected by wires to a voltmeter .  (i) Write the balanced equation for the overall reaction occurring in the cell and calculate the cell potential .  (ii) Calculate the cell potential , E at 25∘C for the cell if the initial concentration of Ni(NO3​)2​ is 0.100 molar and the initial concentration of AgNO3​ is 1.00 molar .  [E0 Ni2+/Ni=−0.25V; E 0Ag/Ag∘​=0.80V, log10−1 = −1] | | 3 |
| 11. | Assign reasons for the following:  (i) Copper (I) ion is not known to exist in aqueous solutions. (ii) Both O2 and F2 stabilize high oxidation states of transition metals but the ability of oxygen to do so exceeds that of fluorine. (iii) The transition metals exhibit variable oxidation states.  **OR**  Account for the following properties of the members of the first series of transition elements:  (i) E0 M**2+**/ M for copper is positive (+0.34 V) in contrast to the other members of the series.  (ii) Cr2+ is reducing while Mn3+ is oxidising, though both have d4 configuration.  (iii)The oxidising power in the series increases in the order | | 3 |
|  | **SECTION C** | |  |
| 12. | **Read the passage given below and answer the questions given below :**  The half-life of a reaction is the time in which the concentration of a reactant is reduced to one half of its initial concentration. It is represented as t1/2. It can be seen that for a first order reaction, half-life period is constant, i.e., it is independent of initial concentration of the reacting species. The half-life of a first order equation is readily calculated from the rate constant and vice versa. The order of a reaction is sometimes altered by conditions. There are many reactions which obey first order rate law although they are higher order reactions. Consider the hydrolysis of ethyl acetate which is a chemical reaction between ethyl acetate and water. In reality, it is a second order reaction and concentration of both ethyl acetate and water affect the rate of the reaction. Zero order reactions are relatively uncommon but they occur under special conditions. Some enzyme catalyzed reactions and reactions which occur on metal surfaces are a few examples of zero order reactions.  This reaction which apparently seems to be of tenth order is actually a second order reaction. This shows that this reaction takes place in several steps. Which step controls the rate of the overall reaction? The question can be answered if we go through the mechanism of reaction, for example, chances to win the relay race competition by a team depend upon the slowest person in the team. Similarly, the overall rate of the reaction is controlled by the slowest step in a reaction called the rate determining step.  i) Analyse how the decomposition of gaseous ammonia on a hot platinum surface is a zero order reaction at high pressure.  ii) Approximately how old is a fossil with 12 g of Carbon -14 if it initially possessed 32 g of Carbon -14? (Given log 2.667 = 0.4260)  iii) Show that in a first order reaction, time required for completion of 99.9% of the reaction is 10 times of half-life (t 1/2) of the reaction.  **OR**  ii) A first order reaction takes 40 minutes for 30% decomposition .Find the (t 1/2) of the reaction. | | 1.5  1.5  2 |

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