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PB2/CHAK/1222/B 03-JAN-2023

PRE-BOARD (EEE CONSORTIUM) EXAMINATION, 2022 – 23

**SET-2**

# CHEMISTRY THEORY

**(ANSWER KEY)**

**CLASS**: **XII**  **MAX.MARKS**: **70**

**TIME** : **3 HOURS**

|  |  |  |
| --- | --- | --- |
|  | **SECTION A** |  |
|  | **The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section** | **Mark** |
| 1 | (c) I (HCl), II (NaCl), III (NH4OH) | **1** |
| 2 | **(**b) 1.24 V | **1** |
| 3 |  | **1** |
| 4 | (b) L mol–1 s–1 | **1** |
| 5 |  | **1** |
| 6 |  | **1** |
| 7 |  | **1** |
| 8 |  | **1** |
| 9 | (a) 1, 4-dichlorobenzene | **1** |
| 10 | (c)Benzaldehyde | **1** |
| 11 |  | **1** |
| 12 | (c) R-COOH → R-CH2OH : NaBH4 | **1** |
| 13 | (a) X = Acetophenone, Y = m-Nitroacetophenone | **1** |
| 14 | b) Carbylamine reaction | **1** |
| 15 | (c) Assertion is true but Reason is false. | **1** |
| 16 | c) Assertion is true but Reason is false. | **1** |
| 17 | (a) Both Assertion and Reason are true but Reason is the correct explanation of Assertion. | **1** |
| 18 | d) Assertion is false but Reason is true. | **1** |
|  | **SECTION B** |  |
|  | **This section contains 7 questions with internal choice in two questions. The following questions are very short answer type and carry 2 marks each.** |  |
| 19 | (i) The electrolyte is ammonium chloride in the form of a paste next to the zinc anode.  (ii) Zinc or magnesium whose reduction potential is lesser than iron. | 2 |
| 20 | A bimolecular reaction can be kinetically first order in behaviour provided one of the reactants is taken in such a large excess that its concentration may hardly change. Such a reactant will not contribute to the order. Thus, a bimolecular reaction will be of first order.   1. Eg.Ester hydrolysis[Equation] | 2 |
| 21 |  | 2 |
| 22 |  | 2 |
| 23 | (i) l is allylic and also this chloride undergoes SN1 reaction faster than ii because in case of allyl , the carbocation formed after the loss of Cl– is stabilised by resonance, whereas, no such stabilisation is possible in the carbocation obtained from( ii)  **OR** (i)is a Benzyl chloride and also undergoes SN1 reaction faster than ii because in case of benzyl chloride, the carbocation formed after the loss of Cl– is stabilised by resonance, whereas, no such stabilisation is possible in the carbocation obtained from( ii) | 2 |
| 24 |  | 2 |
| 25 | ***OR*** | 2  1  1 |
|  | ***SECTION C*** |  |
|  | **This section contains 5 questions with internal choice in two questions. The following questions are short answer type and carry 3 marks each.** |  |
| 26 |  | 1  1  1 |
| 27 | iii) 4/9 x 18000= 8,000 cm–1 | 1  1  1 |
| 28a) | **OR**  (a)1-bromobutane (b)but-1-ene (c)1,2-dibromobutane (d)but1-yne **(STRUCTURE NEEDEDOR EACH COMPOUND)** | 1  1  1  3 |
| 29 a  b)  c) | **[OR]**  Step I: Protonation of ethanol  https://search-static.byjusweb.com/question-images/byjus/infinitestudent-images/ckeditor_assets/pictures/147488/content_1.jpg  Step II: Formation of carbocation  https://search-static.byjusweb.com/question-images/byjus/infinitestudent-images/ckeditor_assets/pictures/147489/content_2.jpg  Step III: Elimination of a proton  https://search-static.byjusweb.com/question-images/byjus/infinitestudent-images/ckeditor_assets/pictures/147491/content_3.jpg  Note The acid used in Step I is released in Step III. To drive the equilibrium to the right, ethene is removed as it is formed. | 1  1  1  1  1  1 |
| 30 | **(**i)Dimethyl amine and trimethyl amine can be distinguished by using Hinsberg’s reagent, i.e., C6H5SO2Cl. When treated with Hinsberg’s reagent dimethylamine being a 2° amine gives N, N-dimethyl benzene sulphonamide which is insoluble in aqueous KOH solution while trimethyl amine being a 3° amine does not react with Hinsberg’s reagent (ii)Aniline being primary amine gives carbylamine test while N-methylaniline being sec amine does not give this test.  (iii) Ethylamine is 1° amine, therefore, it gives carbylamine test, i.e., when heated with an alcoholic solution of KOH and CHCl3 it gives an offensive smell of methyl carbylamine. In contrast, diethylamine is a secondary amine and hence does not give this test | 1  1  1  1 |
|  |  |  |
|  | **SECTION -D .Each question has 4 marks** |  |
| 31 | 1. 1M glucose < 1M PbCl2 < 1M Al2(SO4)3 2. When acetone & chloroform are mixed together a hydrogen bond is formed between them which increases the intermolecular attraction between them & hence decreases the vapour pressure.   See the source image  **c) ∆Tb = 353.93 K – 353.23 K = 0.7 K** | 1  1  2 |
| 32 | i) The hydrolysis of lactose gives β-D-galactose and β-D-glucose.  ii).Lactose .  See the source imageiii) | 1  1    2 |
|  |  |  |
|  |  |  |
| 33  a)  b) | **(OR)** | 1  1  1  1  1  1  1  1 |
| 34 | 1. Electronic configuration . of Mn2+ [18Ar] 3d5 (Stable configuration) E.C. of Fe2+; [18Ar] 3d6. Since Mn2+ has stable half filled electronic configuration, therefore Mn2+ compounds are more stable than Fe2+ towards oxidation to their +3 state. Fe2+(3d6) can lose one electron easily to give Fe3+(3d5, stable configuration).  +2 state becomes more and more stable in the first half of the first row transition elements with increasing atomic number as 3d orbitals acquire only one electron in each of five 3d orbitals (remain half-filled) and the electronic repulsion is least and the nuclear charge increases. In the second half of the first row transition series, electrons pair up in 3d orbitals. This increases the electronic repulsion.  1. Cobalt (II) is stable in aqueous solution but in the presence of complexion agent, it undergoes change in oxidation state from +2 to +3 and is easily oxidised. This is because Co3+ has more tendency to form coordination complexes than Co2+. 2. Transition elements have almost similar sizes so that atom of one metal can easily take up the position in the crystal lattices of other.. 3. The lower oxide of transition metal is basic because the metal atom has low oxidation state and still has electrons todonate whereas highest is acidic due to highest oxidation state and not left with free electrons.   **OR** Transition metals and many of their compounds show paramagnetic behaviour.This is due to presence of one or more unpaired electrons in d subshell.b)The enthalpies of atomisation of the transition metals are high. This is due to high effective nuclear charge and large number of valence electrons. This results in formation of strong metallic bonds.c) T**h**is is due to d-d transition of unpaired electrons.  In presence of ligands, the d orbitals split into two sets. Transition metal ions absorb radiation of a particular wavelength and reflect the remaining. This imparts colour.d) Transition metals show variable oxidation states and forms complexes. They form unstable intermediate compounds. They provide a new path with lower activation energy of reaction. They also provide a suitable surface for the reaction to occur. e) Cr2+ is strongly reducing in nature. It has a d4 configuration. While acting as a reducing agent, it gets oxidized to Cr3+ (electronic configuration, d3). This d3 configuration can be written as t32g configuration, which is a more stable configuration. In the case of Mn3+(d4), it acts as an oxidizing agent and gets reduced to Mn2+(d5). This has an exactly half-filled d-orbital and is highly stable. | 5  5 |
| **35**  **a)**  **c)** | **OR** | 1  1    2  0.5  0.5  1  1  1  1  1 |

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