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| **A close-up of a sign  Description automatically generated with medium confidence** | | | |
| **FT/CHAK/1223/A 05-JUN-2023** | | | |
| **FIRST TERM EXAMINATION (2023-24)** | | | |
| **Subject: CHEMISTRY (ANSWER KEY)**  **Grade: XII** | | Max. Marks:70 Time: 3Hrs | |
|  | **SECTION A** | | |
| 1 | b) CH3C(Br)2CH3 | | 1 |
| 2 | b). 1-Methylcyclohexene | | 1 |
| 3 | c). C6H5CH(C6H5)Br | | 1 |
| 4 | d) 2-Methylpropan-2-ol | | 1 |
| 5 | c) oxidation of secondary alcohols | | 1 |
| 6 | c) 2,4 DNP test | | 1 |
| 7 | b) 𝜋1 < 𝜋2 | | 1 |
| 8 | a) Etard reaction | | 1 |
| 9 | a) Ditert. butyl ether | | 1 |
| 10 | b) nature of the solvent | | 1 |
| 11 | b) Tetrachloromethane | | 1 |
| 12 | a) C4H8O4 | | 1 |
| 13 | (d) A is false but R is true. | | 1 |
| 14 | (a) Both A and R are true and R is the correct explanation of A | | 1 |
| 15 | b) intermolecular hydrogen bonding in alcohols. | | 1 |
| 16 | d) | | 1 |
|  | SECTION-B | |  |
| 17 | 1. 1-Bromopentane 2. 1-Bromo-2-methylbutane.   As they are primary alkyl halides with least steric hindrance. | | 2 |
| 18 | a) Methanol < ethanol < propan-1-ol < butan-2-ol < butane-1-ol < pentan-1-o  b) . n-butane < ethoxyethane < pentanal < pentan-1-ol. | | 2 |
| 19 | a)  b) | | 2 |
| 20 |  | | 2 |
| 21 | Give a reason for the following:  a). At the ortho position, there is higher steric hindrance, hence para isomer predominates and is obtained in the major amount.  b). During the SN1 mechanism, the intermediate carbocation formed is sp2 hybridized and is planar in nature. This allows the attack of nucleophile from either side of the plane resulting in a racemic mixture.  **OR**  a). Tertiary butyl alcohol/ 2-methyl propan-2-ol using Lucas reagent  b). CH3Cl has more dipole moment than CH3F because the charge separation is larger in CH3Cl compared to CH3F.This is due to greater C−Cl bond length than C−F bond length. | | 2 |
|  | SECTION-C | |  |
| 22 | a) Ketones are less reactive due to the presence of two bulky alkyl groups (steric hindrance). Also, the +I effect of alkyl groups reduces the electrophilicity of the carbonyl group more in ketones than in aldehydes.  b) Formaldehyde does not have any alpha–hydrogen.  c) One molecule of the aldehyde is reduced to alcohol, while another is oxidized to the carboxylic acid salt. | | 3 |
| 23 | Give the chemical tests to distinguish between the following pairs of compounds:  a) Pentan-2-one and Pentan-3-one.  Iodoform test  b) Benzaldehyde and Acetaldehyde  Iodoform test/ Fehling’s test  c) Propanal and propanone  Tollen’s/Fehling’s/Benedict’s/ Oxidation with K2Cr2O7 | | 3 |
| 24 | ∆Tb = wB/×1000×Kb  MB wA  Given: wB = 18 g  Molar mass of glucose MB = 180g/mol  Wt. of solvent wA= 1 kg or 1000 g,  Kb = 0.52 K kg mol-1  Hence, ∆Tb = 18𝑔×1000×0.52 = 0.52 K  180 1000g  ∴B.P of the solution = 373.15 + 0.052  = 373.202 K | | 3 |
| 25 | a) The reaction is reversible in nature and leads to the formation of reactants back. Therefore, an oxidizing agent oxidizes the HI formed in the reaction and moves the reaction in the forward direction.  b) Allyl chloride shows high reactivity as the carbocation formed by hydrolysis is stabilised by resonance while no such stabilisation of carbocation exists in the case of n-propyl chloride.  A picture containing black, darkness  Description automatically generated  c) As C-X bond in aryl and vinyl halides acquires a partial double bond character due to resonance while the C-X bond in alkyl halide is a pure single bond. Hence, bond strength more and they are less reactive than haloalkanes towards nucleophilic substitution | | 3 |
| 26 | a)  b)  c)  **OR**  a)  b)  c) | | 3 |
| 27 | a) Compound B gives Fehling’s test, which means it is aldehyde.  Also, it forms an iodoform, so compound B is acetaldehyde, among aldehydes.  b) Compound C does not give Fehling’s test but gives iodoform, so ketone must have a methyl group attached to carbonyl.  c) ‘A’ is 2-Methyl-but-2-ene | | 3 |
| 28 | 1. Phenol is more acidic than ethanol because after losing a proton (H+), phenol forms phenoxide ion which is stabilised by resonance whereas ethoxide ion is not.. 2. Boiling point of ethanol is higher in comparison to methoxymethane due to intermolecular H-bonding. 3. The reaction between (CH3) C-O-CH, and HI follows SN1 mechanism decided by the stability of the carbocation. As tert-butyl carbocation is more stable than methyl carbocation, therefore (CH3)3 C-I and CH3OH are formed as main products | | 3 |
|  | **SECTION D** | |  |
| 29 | **Read the passage given below and answer the questions that follow**:  (i) (a) RI > RBr > RCl  (ii) (d) 4-Chloroacetophenone  (iii)  a)  b) | | 4 |
| 30 | **Read the passage given below and answer the questions that follow**:  **a)** On taking large amount of salt, ions entering the body fluid thereby raises the concentration of solutes. As a result, osmotic pressure increases which may rupture the blood cells.  b) Potassium iodide ionizes in water into K+ and I- ions. When HgI2 is added to it, it forms complex with KI i.e, K2[HgI4]. Hence, number of particles will decrease from 4 to 3. So, there would be less depression in freezing point and freezing point will increase.  c) | | 4 |
|  | . **SECTION E** | |  |
| 31 | Since B gives a negative Tollen’s test but a positive Iodoform test, it is methyl ketone, i.e,.  CH3COCH2CH2CH3 Also it is formed by oxidation of A.  Therefore, A is secondary alcohol i.e, CH3CH(OH)CH2CH2CH3. On reduction\, B gives pentane with Zn –Hg/ HCl. Therefore, C is CH3CH2CH2CH2CH3    **OR**    As the compound A gives a positive 2, 4-DNP test but negative Tollen’s test, it is a ketone. Since on oxidation, it gives an acid B, of molecular formula, C3H6O2, it is CH3CH2COCH2CH3 and B is CH3CH2COOH. As C is obtained by Kolbes decarboxylation of B, C is CH3CH2CH2CH3 .  Therefore A = Pentan -3 one, B = Propanoic acid, and C = Butane | | 5 |
| 32 | a) mass of K2​SO4​, w=25 mg = 0.025 g  molality = .025  T=25+273 =298 K  K2​SO4​ → 2K++ SO42−  Number of ions produced = 3 = i  Π = iCRT    b) Raoult’s law: For a solution of volatile liquids the partial vapour pressure of each component of the solution is directly proportional to its mole fraction present in the solution. P = P°x  Non-ideal solutions shows positive and negative deviations from Raoult’s law.  Positive deviation from Raoult’s law: The total vapour pressure for any solution is greater than the corresponding ideal solution of same composition. Such behaviour is called positive deviation. Example: ethanol + cyclohexane/ acetone + carbon disulphide  Negative deviation from Raoult’s law: When the total vapour pressure will be less than the corresponding vapour pressure, then it is termed a negative deviation.  Example : Chloroform + Benzene / Chloroform + Diethylether  OR    b) The solubility of a gas in a liquid at a particular temperature is directly proportional to the pressure of the gas in equilibrium with the liquid at that temperature. ***P = kH.S/***  The partial pressure of a gas in vapour phase (P) is proportional to its mole fraction (X) in the solution. ***P = kH.X***  Applications of Henry's Law: production of carbonated drinks/ scuba divers breathe in high-pressure areas when air is diluted with Helium.  Limitations of Henry's Law: only applicable when molecules of a system are in the state of equilibrium.  Henry's law is not applicable when the gas and the solution participate in chemical reactions with each other.  This law does not hold when gases are placed under extremely high pressure. | | 5 |
| 33 | a)  b)  c)    d)  e)  f)  g) Name the reagent used in the following reaction Butan 2 one ... | | 5 |

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