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| **PB1/CHQP/1223/B 30-NOV-2023** | | | | | |
| **PRE-BOARD EXAMINATION – I (2023-24)** | | | | | |
| **Subject: CHEMISTRY**  **Grade: XII** | | Max. Marks:70Time: 3 Hrs | | | |
| **Name:** | | | **Section:** | **Roll No:** | |
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|  | **SECTION A**  **This section has multiple -choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.** | | | | |
| 1 | When one mole of benzene is mixed with one mole of toluene ( vapour pressure of benzene= 12.8 K Pa, toluene= 3.85 k Pa)   1. the vapour will contain equal amount of benzene and toluene 2. not enough information is given for prediction 3. the vapour will contain a higher percentage of benzene 4. the vapour will contain higher percentage of toluene | | | | 1 |
| 2 | The unit of rate constant depends upon the   1. molecularity of the reaction 2. activation energy of the reaction 3. order of the reaction 4. temperature of the reaction | | | | 1 |
| 3 | The correct order of the stoichiometry of AgCl formed when AgNO3 in excess is treated with complexes: CoCl 3. 6NH3 , CoCl3.5NH3, CoCl3.4NH3 respectively are:   1. 3 AgCl, 1 AgCl, 2 AgCl 2. 3 AgCl, 2 AgCl, 1 AgCl 3. 2 AgCl, 3 AgCl, 2 AgCl 4. 1 AgCl, 2 AgCl, 3 AgCl | | | | 1 |
| 4 | The stereochemistry of the product formed if optically active alkyl halide undergoes substitution reaction by SN1 mechanism is:   1. optically active inverted product 2. optically active retention product 3. racemic mixture 4. none of the above | | | | 1 |
| 5 | If the t1/2 for a chemical reaction is 30 minutes, then the time taken for 90% reaction to be completed will be:   1. 100 minutes 2. 200 minutes 3. 300 minutes 4. 400 minutes | | | | 1 |
| 6 | In order to prepare 1⁰ amine from an alkyl halide with simultaneous addition of one CH2 group in the carbon chain, the reagent used as a source of nitrogen is :   1. Sodium amide, NaNH2 2. Sodium azide, NaN3 3. Potassium cyanide, KCN 4. Potassium phthalimide | | | | 1 |
| 7 | Pick out the correct statement with respect to [Mn(CN)6] -2 :   1. It is sp2d2 hybridised, Tetrahedral 2. it is d2 sp 3 hybridised, octahedral 3. it is dsp 2 hybridised, square planar 4. it is hybridised, octahedral | | | | 1 |
| 8 | α-D-Glucopyranose and β- D-Glucopyranose are:   1. Isomers which differ in configuration at C-5 2. Geometrical isomers 3. Functional isomers 4. Anomers | | | |  |
| 9 | The heating of phenyl methyl ether with HI produces:   1. iodobenzene 2. phenol 3. benzene 4. ethyl chloride | | | | 1 |
| 10 | The correct order of increasing acidic strength is:   1. phenol< ethanol< chloroacetic acid< acetic acid 2. ethanol< phenol< chloroacetic acid< acetic acid 3. ethanol< phenol< acetic acid< chloroacetic acid 4. chloroacetic acid< acetic acid< phenol< ethanol | | | | 1 |
| 11 | Which of the following cannot be prepared by Sandmeyer’s reaction?   1. Chlorobenzene 2. Bromobenzene 3. Cyanobenzene 4. Iodobenzene | | | | 1 |
| 12 | CH3CHO and C6H5CH2CHO can be distinguished chemically by:   1. Benedict’s test 2. Iodoform test 3. Tollen’s test 4. Fehling’s solution test | | | | 1 |
|  | **13-16 are Assertion & Reason type questions. Choose the correct option from the following:**   1. Both A and R are true and R is the correct explanation of A 2. Both A and R are true but R is not the correct explanation of A. 3. A is true but R is false 4. A is false but R is true. | | | |  |
| 13 | **Assertion:** The alpha hydrogen atom in carbonyl compounds is less acidic  **Reason :** The anion formed after the loss of alpha hydrogen atom is resonance stabilised | | | |  |
| 14 | **Assertion** : Non ideal solution of ethanol and water show positive deviation from Raoult's law.  **Reason** : They form minimum boiling azeotropes | | | | 1 |
| 15 | **Assertion** : In mono Haloarenes, further electrophilic substitution occurs at ortho and para positions  **Reason** : Halogen atom is a ring deactivator | | | | 1 |
| 16 | **Assertion:** Ortho and para nitrophenol can be separated by steam distillation  **Reason** : Ortho isomer associates through intermolecular hydrogen bonding while para isomer associates through intramolecular hydrogen bonding. | | | | 1 |
|  | **SECTION B**  **This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.** | | | |  |
| 17 | 1. When 10 mL of liquid A was mixed with 10 mL of liquid B, the volume of the resulting solution was found to be 19.9 mL. Explain giving reason. 2. When outer shell of two eggs are removed, one is placed in pure water and the other is placed in saturated solution of NaCl, what will be observed and why?   (OR)  H2S a toxic gas with rotten egg like smell, is used for the qualitative analysis. If the solubility of H2S in water at STP is 0.195m, calculate Henry's law constant. | | | | 2 |
| 18 | [NiCl4] -2 is paramagnetic while [Ni(CO)4] is diamagnetic though both are tetrahedral. Why? | | | | 2 |
| 19 | Account for the following:   1. CH3CHO is more reactive than CH3COCH3 towards reaction with HCN. 2. Carboxylic acids do not show the reactions undergone by carbonyl compounds. | | | | 2 |
| 20 | Accomplish the following conversions:   1. Nitro benzene to benzoic acid 2. benzoic acid to aniline | | | | 2 |
| 21 | Differentiate between globular and fibrous proteins giving examples. | | | | 2 |
|  | **SECTION C**  **This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each.** | | | |  |
| 22 | The following data were obtained for the given reaction:  X + Y 🡪 Products   |  |  |  |  | | --- | --- | --- | --- | | Experiment | [X] / M | [Y] / Y | Initial Rate( M min-1) | | 1. | 0.1 M | 0.1 M | 1.2 x 10- 3 | | 2. | 0.1 M | 0.2 M | 1.2 x 10 -3 | | 3. | 0.2 M | 0.1 M | 2.4 x 10- 3 |  1. Identify the order of the reaction. Write the rate law for the reaction. 2. Calculate the value of rate constant for the reaction. | | | | 3 |
| 23 | Predict the major alkene that would be formed by dehydrohalogenation of the following halides with sodium ethoxide:   1. 1- Bromo- 1- methylcyclohexane 2. 2- Chloro-2- methylbutane 3. 2,2,3 - Trimethyl- 3- bromopentane | | | | 3 |
| 24 | Predict the products of the following reactions:      (OR)  Write the mechanism of hydration of ethene to yield ethanol. | | | | 3 |
| 25 | 1. Write chemical reaction to show that open chain structure of D- glucose contains the straight chain of carbon atoms. 2. Name the base that is found in nucleotide of RNA only. 3. Deficiency of which vitamin causes rickets. | | | | 3 |
| 26 | Arrange the compounds of each set in order of reacivity towards SN2 displacement:   1. 2- Bromo- 2-methylbutane, 1 – Bromopentane , 2- Bromopentane 2. 1- Bromo- 3- methylbutane , 2- Bromo- 2-methylbutane , 2 – Bromo-3 – methylbutane 3. 1- Bromobutane, 1- Bromo- 2,2- dimethylpropane, 1- Bromo -2- methylbutane, 1- Bromo-3 -methyl butane | | | | 3 |
| 27 | Enumerate the reactions of D-glucose which cannot be explained by its open chain structure. | | | | 3 |
| 28 | Give reason for the following:   1. Phenol is a stronger acid than alcohol 2. The boiling points of alcohols decrease with increase in branching of the alkyl chain 3. Phenol undergoes electrophilic substitution more readily than benzene | | | |  |
|  | **SECTION D**  **This section contains case – based questions. Each question has an internal choice and carries 4 (1+1+2) marks** | | | |  |
| 29 | Read the given passage and answer the questions that follow:  The rate of a reaction, which may also be called its velocity or speed, can be defined with relation to the concentration of any of the reacting substances, or to that of any product of the reaction. If the species chosen is a reactant which has a concentration C at time t the rate is – dc/dt, while the rate with the reference to a product having a concentration X at time t is dx/dt. Any concentration units may be used for expressing the rate; thus, if moles per litre are employed for concentration and seconds for the time, the units of the rate are moles litre – 1 sec -1 . For gas reactions pressure units are sometimes used in place of concentrations, so that the units for the rate would be(mm Hg) sec – 1 and atm sec -1 .  The order of a reaction concerns the dependence of the rate upon the concentrations of reacting substances; thus if the rate is found experimentally to be proportional to the αth power of the concentration of one of the reactants A, to the βth power of the concentration of a second reactant B, and so forth then  rate = k[A]α[B]β  And the overall order of the reaction is simply  n= α + β +  Such a reaction is said to be αth order with respect to A and αth order with respect to B and so on.  (*Laidler, KJ and Glasstone, S (1948).Jjournal of chemical education, 25(7, 383.)*   1. Identify the reaction order from each of the following rate constants.   (i) k = 2.3 × 10–5 L mol–1 s–1 (ii) k = 3 × 10–4 s–1   1. Calculate the overall order of a reaction which has the rate expression: Rate = k [A]1/2 [B]3/2 2. The conversion of molecules X to Y follows second order kinetics. If concentration of X is increased to three times how will it affect the rate of formation of Y ?   (OR)  A reaction is first order in A and second order in B.   1. Write the differential rate equation 2. How is the rate affected when the concentrations of both A and B are doubled? | | | | 5 |
| 30 | Read the given passage and answer the questions that follow:  Amines are classified as primary secondary and tertiary amines. Primary amines cannot be obtained by ammonolysis of alkyl halide because we will get a mixture of primary, secondary and tertiary amines. Nitro compounds on reduction also give primary amines. Primary amines react with CHCl 3 and KOH to form foul smelling isocyanide. They react with HNO2 and liberate nitrogen gas. They react with Hinsberg reagent to form salt soluble in KOH. Secondary amine form yellow oily compounds with HNO 2 and salt formed with Hinsberg reagent is insoluble in KOH. Tertiary amines form salt soluble in water with HNO2 but does not react with Hinsberg agent.  Diazonium salts are prepared by reaction of aniline with NaNO2 and concentrated HCl at 0 to 5⁰ Celsius. Aromatic diazonium salts are more stable because phenyl diazonium ion is stabilised by resonance. Benzene diazonium chloride can be used to prepared Halo benzene, phenol, nitrobenzene, benzene, para- hydroxy azobenzene and large number of useful compounds.   1. Which of the following does not react with benzene sulphonyl chloride: Methenamine, Ethanamine, Trimethylamine and Dimethylamine 2. What is the product formed when benzyl amine reacts with chloroform and ethanolic KOH? 3. Give a chemical test to distinguish between the following pairs: 4. aniline and benzyl amine 5. dimethyl amine and trimethyl amine   (OR)  Write chemical equations for the following reactions:   1. Reaction of ethanolic NH3 with C2H5Cl. 2. Ammonolysis of benzyl chloride and reaction of amine so formed with two moles of CH3Cl. | | | | 5 |
|  | **SECTION E**  **The following questions are long answer type and carry 5 marks each. All questions have an internal choice.** | | | |  |
| 31 | **Answer any 5 from the following.**   1. Why are aquatic species more comfortable in cold water in comparison to warm water? 2. Explain why on addition of one mole of NaCl to one litre of water, the boiling point of water increases, while addition of one mole of methyl alcohol to one litre of water decreases its boiling point. 3. Calculate the amount of sodium chloride which must be added to 1 kg of water so that the freezing point of water is depressed by 3K.[ Given Kf = 1.86 KKgmol- 1 , At mass of Na=23u, Cl =35.5u] 4. How does sprinkling of salt help in clearing snow covered roads in hilly areas? Name the phenomenon responsible. 5. Elevation of boiling point of 1M KCl solution is nearly double than that of 1M sugar solution Explain why? 6. 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? 7. An aqueous solution of 2% non-volatile solute exerts a pressure of 1.004 bar at the normal boiling point of the solvent. What is the molar mass of the solute? | | | | 5 |
| 32 | 1. Give one chemical test as an evidence to show that [Co(NH3)5Cl]SO4 and [Co(NH3)5 SO4] Cl are ionization isomers. 2. Write the IUPAC name of K3[Fe(C2O4)3]. 3. Why removal of water from [Ti(H2O)6]Cl3 on heating renders it colourless? 4. [Ni(H2O)6] 2+ Is green in colour where as [Ni(H2O)4(en)]+2 is blue in colour, give reason in support of your answer. 5. On the basis of crystal field theory write the electronic configuration for d4, if ∆0 > P.   (OR)   1. Draw the geometrical isomers of the complex [Pt(NH3)2Cl2]. 2. Write the IUPAC name of the complex [Cr(NH3)6][Co(CN)6]. 3. Arrange the following complexes in the increasing order of conductivity of their solution: [Co(NH3)3Cl3], [Co(NH3)6]Cl3, [Co(NH3)4Cl2]Cl, [Co(NH3)5Cl]Cl2. 4. Explain why [Fe(H2O)6]+3 has magnetic moment value of 5.92 BM, whereas [Fe(CN)6] – 3 has a value of only 1.7 4 BM. | | | | 5 |
| 33 | 1. Arrange the following compounds in increasing order of their boiling points:   CH3CHO, CH3CH2OH, CH3OCH3, CH3CH2CH3   1. Draw the structures of the following derivatives: 2. Cyclopropenone oxime 3. Acetaldehydedimethylacetal 4. And organic compound ‘A’ C5 H 10 O2 reacts with Br2 in presence of phosphorus to give ‘B’. compound ‘B’ contains an asymmetric carbon atom and yields ‘C’ on dehydrobromination. Compound ‘C’ does not show geometrical isomerism and on decarboxylation gives an alkene ‘D’. Give the structures of A, B, C & D.   (OR)   1. Give the products of cross aldol condensation of ethanal and propanal. 2. Give a simple chemical test to distinguish between acetophenone and benzophenone. 3. Although phenoxide ion has more number of resonating structures than carboxylate ion, yet carboxylic acid is a stronger acid than phenol give reason why? 4. Complete each synthesis by giving missing starting material, reagent or products: | | | | 56 |

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