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| **FT/CHQP/1221/A 15-SEP-2021** | | | | | | | |
| **FIRST TERM EXAMINATION (2021-22)** | | | | | | | |
| **Subject: CHEMISTRY**  **Grade: XII** | | | | Max. Marks: 35Time: 90 Minutes | | | |
| ***General Instructions:***  ***1. The Question Paper contains three sections.***  ***2. Section A has 25 questions. Attempt any 20 questions.***  ***3. Section B has 24 questions. Attempt any 20 questions.***  ***4. Section C has 6 questions. Attempt any 5 questions.***  ***5. All questions carry equal marks.***  ***6. There is no negative marking*** | | | | | | | |
|  | **SECTION A** | | | | | | |
|  | ***This section consists of 25 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.*** | | | | | | |
| 1. | Which of the following elements does not show allotropy? | | | | | | |
|  | a. | | Nitrogen | | b. | | Bismuth |
|  | c. | | Antimony | | d. | | Arsenic |
| 2. | Which of the following is not a characteristic of a crystalline solid? | | | | | | |
|  | a. | | Definite and characteristic heat of fusion. | | b. | | Isotropic nature |
|  | c. | | A regular periodically repeated pattern of arrangement of constituent particles | | d. | | A true solid |
| 3. | 4 L of 0.02 M aqueous solution of NaCl was diluted by adding 1 L of water. The molality of the resultant solution is .......... | | | | | | |
|  | a. | | 0.004 | | b. | | 0.008 |
|  | c. | | 0.012 | | d. | | 0.016 |
| 4. | Iodine molecules are held in the crystals lattice by \_\_\_\_\_\_\_\_\_\_\_\_ | | | | | | |
|  | a. | | london forces | | b. | | dipole-dipole interactions |
|  | c. | | covalent bonds | | d. | | coulombic forces |
| 5. | Identify the compound Y in the following reaction. | | | | | | |
|  | a. |  | | b. | | |  |
|  | c. |  | | d. | | |  |
| 6. | IUPAC name of *m*-cresol is \_\_\_\_\_\_\_\_\_\_\_. | | | | | | |
|  | a. | | 3-methylphenol | | b. | | 3-chlorophenol |
|  | c. | | 3-methoxyphenol | | d. | | benzene-1,3-diol |
| 7. | Which reagent will you use for the following reaction?  CH3CH2CH2CH3 → CH3CH2CH2CH2Cl + CH3CH2CHClCH3 | | | | | | |
|  | a. | | Cl2/UV light | | b. | | NaCl + H2SO4 |
|  | c. | | Cl2 gas in dark | | d. | | Cl2 gas in the presence of iron in dark |
| 8. | On addition of concentrated H2SO4 to a chloride salt, colourless fumes are evolved but in case of iodide salt, violet fumes come out. This is because | | | | | | |
|  | a. | | H2SO4 reduces HI to I2 | | b. | | HI is of violet colour |
|  | c. | | HI gets oxidised to I2 | | d. | | HI changes to HIO3 |
| 9. | Catalytic dehydrogenation of a primary alcohol gives | | | | | | |
|  | a. | Ketone | | | | b. | Aldehyde |
|  | c. | Secondary alcohol | | | | d. | Ester |
| 10. | The lattice site in a pure crystal cannot be occupied by \_\_\_\_\_\_\_\_\_. | | | | | | |
|  | a. | | molecule | | b. | | ion |
|  | c. | | Electron | | d. | | Atom |
| 11. | The reaction of carboxylic acid and alcohol catalysed by concentrated H2SO4 is called ? | | | | | | |
|  | a. | | Dehydration | | b. | | Saponification |
|  | c. | | Esterification | | d. | | Neutralisation |
| 12. | An unripe mango placed in a concentrated salt solution to prepare pickle shrivels because .......... | | | | | | |
|  | a. | | it gains water due to osmosis | | b. | | it loses water due to reverse osmosis |
|  | c. | | it gains water due to reverse osmosis | | d. | | it loses water due to osmosis |
| 13. | Sucrose (cane sugar) is a disaccharide. One molecule of sucrose on hydrolysis gives .......... | | | | | | |
|  | a. | | 2 molecules of glucose | | b. | | 2 molecules of glucose + 1 molecule of fructose |
|  | c. | | 1 molecule of glucose +1 molecule of fructose | | d. | | 2 molecules of fructose |
| 14. | Which of the following statement is true? | | | | | | |
|  | a. | | Only type of interactions between particles of noble gases are due to dipole-dipole forces | | b. | | Ionisation enthalpy of molecular oxygen is very close to that of xenon. |
|  | c. | | Hydrolysis of XeF6 is a redox reaction | | d. | | Xenon fluorides are not reactive |
| 15. | Which of the following species can act as the strongest base? | | | | | | |
|  | a. | | OH- | | b. | | -OR |
|  | c. | | -OC6H5 | | d. | |  |
| 16. | The position of –Br in the compound in CH3CH=CHC(Br)(CH3)2 can be classified as | | | | | | |
|  | a. | | allyl | | b. | | aryl |
|  | c. | | vinyl | | d. | | secondary |
| 17. | Which of the following alkyl halides will undergo SN1 reaction most readily? | | | | | | |
|  | a. | | (CH3)3C—F | | b. | | (CH3)3C—Cl |
|  | c. | | (CH3)3C—Br | | d. | | (CH3)3C—I |
| 18. | Which of the following statement is correct? | | | | | | |
|  | a. | | S-S bond is present in H2S2O6 | | b. | | In peroxosulphuric acid H2SO5 sulphur is in + 5 oxidation state |
|  | c. | | Iron powder along with Al 2O3 and KO2 is used as a catalyst in the preparation of NH3 by Haber's process | | d. | | Change in enthalpy is positive for the preparation of SO3 by catalytic oxidation of SO2 |
| 19. | Maximum amount of a solid solute that can be dissolved in a specified amount of a given liquid solvent does not depend upon .......... | | | | | | |
|  | a. | | temperature | | b. | | nature of solute |
|  | c. | | pressure | | d. | | nature of solvent |
| 20. | **A black compound of manganese reacts with a halogen acid to give greenish yellow gas. When excess of this gas reacts with NH3 an unstable trihalide is formed. In this process the oxidation state of nitrogen changes from \_\_\_\_\_\_\_\_\_.** | | | | | | |
|  | a. | | – 3 to +3 | | b. | | – 3 to 0 |
|  | c. | | – 3 to +5 | | d. | | 0 to – 3 |
| 21. | Which of the following statements is true about glucose? | | | | | | |
|  | a. | | It is a ketohexose. | | b. | | On heating with HI it forms *iso*-hexane. |
|  | c. | | It is present in furanose form | | d. | | It does not give 2,4-DNP test. |
| 22. | Molecules whose mirror image is non-superimposable over them are known as chiral. Which of the following molecules is chiral in nature? | | | | | | |
|  | a. | | 2-Bromobutane | | b. | | 1-Bromobutane |
|  | c. | | 2-Bromopropane | | d. | | 2-Bromopropan-2-ol |
| 23. | Which of the following cannot be used to convert RCHO into RCH2OH? | | | | | | |
|  | a. | | H2/Pd | | b. | | LiAlH4 |
|  | c. | | NaBH4 | | d. | | Reaction with RMgX followed by hydrolysis |
| 24. | Three cyclic structures of monosaccharides are given below: Which of these are anomers? | | | | | | |
|  | a. | | I and II | | b. | | II and III |
|  | c. | | I and III | | d. | | III is anomer of I and II |
| 25. | On dissolving sugar in water at room temperature solution feels cool to touch. Under which of the following cases dissolution of sugar will be most rapid? | | | | | | |
|  | a. | | Sugar crystals in cold water | | b. | | Sugar crystals in hot water |
|  | c. | | Powdered sugar in cold water | | d. | | Powdered sugar in hot water |
| **SECTION B** | | | | | | | |
|  | ***This section consists of 24 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.*** | | | | | | |
| 26. | Considering the formation, breaking and strength of hydrogen bond, predict which of the following mixtures will show a positive deviation from Raoult’s law? | | | | | | |
|  | a. | | Phenol and aniline | | b. | | Methanol and acetone. |
|  | c. | | Chloroform and acetone | | d. | | Nitric acid and water |
| 27. | Which of the following compounds are gem-dihalides? | | | | | | |
|  | a. | | Ethylidene chloride | | b. | | Ethylene dichloride |
|  | c. | | Methyl chloride | | d. | | Benzyl chloride |
| 28. | Which of the following statements are correct for SO2 gas? | | | | | | |
|  | a. | | It acts as bleaching agent in moist conditions. | | b. | | Its molecule has linear geometry. |
|  | c. | | Its dilute solution is used as reducing agent. | | d. | | It can be prepared by the reaction of dilute H2SO4 with metal sulphide |
| 29. | Phenol can be distinguished from ethanol by the reactions with \_\_\_\_\_\_\_\_\_. | | | | | | |
|  | a. | | Br2/water | | b. | | Na |
|  | c. | | Acidified FeCl3 | | d. | | All the above |
| 30. | Which of the following reactions of glucose can be explained only by its cyclic structure? | | | | | | |
|  | a. | | Glucose forms pentaacetate | | b. | | Glucose reacts with hydroxylamine to form an oxime. |
|  | c. | | Pentaacetate of glucose does not react with hydroxylamine. | | d. | | Glucose is oxidised by nitric acid to gluconic acid. |
| 31. | **Bond dissociation enthalpy of E—H (E = element) bonds is given below. Which of the compounds will act as strongest reducing agent?**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Compound** | **NH3** | **PH3** | **AsH3** | **SbH3** | |  | 389 | 322 | 297 | 255 | | | | | | | |
|  | a. | | NH3 | | b. | | PH3 |
|  | c. | | AsH3 | | d. | | SbH3 |
| 32. | The correct order of the packing efficiency in different types of unit cells is \_\_\_\_\_\_\_\_. | | | | | | |
|  | a. | | fcc< bcc< simple cubic | | b. | | fcc> bcc> simple cubic |
|  | c. | | fcc< bcc> simple cubic | | d. | | bcc<fcc> simple cubic |
| 33. | Arrange the compounds in increasing order of rate of reaction towards nucleophilic substitution. | | | | | | |
|  | a. | | (a) < (b) < (c) | | b. | | (c) < (b) < (a) |
|  | c. | | (a) < (c) < (b) | | d. | | (c) < (a) < (b) |
| 34. | Which of the following statement is incorrect? | | | | | | |
|  | a. | | Among halogens, radius ratio between iodine and fluorine is maximum. | | b. | | Leaving F - F bond, all halogens have weaker X- X bond than X- X ‘ bond in interhalogens. |
|  | c. | | Among interhalogen compounds maximum number of atoms are present in iodine fluoride. | | d. | | Interhalogen compounds are more reactive than halogen compounds |
| 35. | Low concentration of oxygen in the blood and tissues of people living at high altitude is due to | | | | | | |
|  | a. | | low temperature | | b. | | low atmospheric pressure |
|  | c. | | high atmospheric pressure | | d. | | both low temperature and high atmospheric pressure |
| 36. | Phenol is less acidic than | | | | | | |
|  | a. | | ethanol | | b. | | o -nitrophenol |
|  | c. | | o -methylphenol | | d. | | o -methoxyphenol |
| 37. | Optical rotations of some compounds along with their structures are given Below. Which of them have D configuration. | | | | | | |
|  | a. | | I, II, III | | b. | | II, III |
|  | c. | | I, II | | d. | | III |
| 38. | Which of the following solids is not an electrical conductor?   1. Mg (s) (B) TiO (s) (C) I2(s) (D) H2O (s) | | | | | | |
|  | a. | | (A) only | | b. | | (B) only |
|  | c. | | (C) and (D) | | d. | | (B), (C) and (D) |
| 39. | Intermolecular forces between two benzene molecules are nearly of same strength as those between two toluene molecules. For a mixture of benzene and toluene, which of the following is not true? | | | | | | |
|  | a. | | ΔmixH = zero | | b. | | ΔmixV = zero |
|  | c. | | These will form minimum boiling azeotrope | | d. | | These will form ideal solution |
| 40. | Identify the compound containing secondary bromide. | | | | | | |
|  | a. | | CH3CH2 CH2Br | | b. | | (CH3)3C CH2Br |
|  | c. | | CH3CH(Br)CH2CH3 | | d. | | (CH3)2CBrCH2CH3 |
| 41. | Arrange the following compounds in increasing order of boiling point.  Propan-1-ol, butan-1-ol, butan-2-ol, pentan-1-ol | | | | | | |
|  | a. | | Propan-1-ol, butan-2-ol, butan-1-ol, pentan-1-ol | | b. | | Propan-1-ol, butan-1-ol, butan-2-ol, pentan-1-ol |
|  | c. | | Pentan-1-ol, butan-2-ol, butan-1-ol, propan-1-ol | | d. | | Pentan-1-ol, butan-1-ol, butan-2-ol, propan-1-ol |
| 42. | Hot conc. H2SO4 acts as moderately strong oxidizing agent. It oxidizes both metals and non-metals. Which of the following element is oxidized by conc. H2SO4 into two gaseous products? | | | | | | |
|  | a. | | Cu | | b. | | S |
|  | c. | | C | | d. | | Zn |
| 43. | Structure of a disaccharide formed by glucose and fructose is given below. Identify anomeric carbon atoms in monosaccharide units. | | | | | | |
|  | a. | | ‘a’ carbon of glucose and ‘a’ carbon of fructose. | | b. | | ‘a’ carbon of glucose and ‘e’ carbon of fructose. |
|  | c. | | ‘a’ carbon of glucose and ‘b’ carbon of fructose. | | d. | | ‘f’ carbon of glucose and ‘f’ carbon of fructose. |
| 44. | Give IUPAC name of the compound given below. | | | | | | |
|  | a. | | 2-Chloro-5-hydroxy hexane | | b. | | 2-Hydroxy-5-chlorohexane |
|  | c. | | 5-Chlorohexan-2-ol | | d. | | 2-Chlorohexan-5-ol |
|  | * + Given below are two statements labelled as Assertion (A) and Reason (R)   + Select the most appropriate answer from the options given below: | | | | | | |
| 45. | Assertion (A): Both rhombic and monoclinic sulphur exist as S8 but oxygen exists as O2.  Reason (R): Oxygen forms pπ– pπ multiple bond due to small size and small bond length but pπ– pπ bonding is not possible in sulphur. | | | | | | |
|  | a. | | Both A and R are true and R is the correct explanation of A | | b. | | Both A and R are true but R is not the correct explanation of A. |
|  | c. | | A is true but R is false. | | d. | | A is false but R is true. |
| 46. | Assertion: Presence of a nitro group at *ortho* or *para* position increases the reactivity of haloarenes towards nucleophilic substitution.  Reason: Nitro group, being an electron withdrawing group decreases the electron density over the benzene ring. | | | | | | |
|  | a. | | Both A and R are true and R is the correct explanation of A | | b. | | Both A and R are true but R is not the correct explanation of A. |
|  | c. | | A is true but R is false. | | d. | | A is false but R is true. |
| 47. | Assertion(A): When NaCl is added to water a depression in freezing point is observed..  Reason (R): The lowering of vapour pressure of a solution causes depression in the freezing point. | | | | | | |
|  | a. | | Both A and R are true and R is the correct explanation of A | | b. | | Both A and R are true but R is not the correct explanation of A. |
|  | c. | | A is true but R is false. | | d. | | A is false but R is true. |
| 48. | Assertion: Bond angle in ethers is slightly less than the tetrahedral angle. Reason: There is a repulsion between the two bulky (—R) groups. | | | | | | |
|  | a. | | Both A and R are true and R is the correct explanation of A | | b. | | Both A and R are true but R is not the correct explanation of A. |
|  | c. | | A is true but R is false. | | d. | | A is false but R is true. |
| 49. | Assertion: D (+) – Glucose is dextrorotatory in nature.  Reason: ‘D’ represents its dextrorotatory nature. | | | | | | |
|  | a. | | Both A and R are true and R is the correct explanation of A | | b. | | Both A and R are true but R is not the correct explanation of A. |
|  | c. | | A is true but R is false. | | d. | | A is false but R is true. |
| **SECTION C** | | | | | | | |
|  | ***This section consists of 6 multiple choice questions with an overall choice to attempt any5. In case more than desirable number of questions are attempted, ONLY first 5 will be considered for evaluation.*** | | | | | | |
| 50. | Match the items of column I with items of column II.   |  |  | | --- | --- | | **Column I** | **Column II** | | (i) Methanol | (a) Conversion of phenol to *o*-hydroxysalicylic acid | | (ii) Kolbe’s reaction | (b) Ethyl alcohol | | (iii) Williamson’s synthesis | (c) Conversion of phenol to salicylaldehyde | | (iv) Conversion of alcohol to ketone | (d) Wood spirit | | (v) Reimer-Tiemann reaction | (e) Heated copper at 573K | | (vi) Fermentation | (f) Reaction of alkyl halide with sodium alkoxide | | | | | | | |
|  | **a.** | | (i)- (e)    (ii)- (f)     (iii)- (d)    (iv)- (c)    (v)- (a)    (vi)- (b) | | **b.** | | (i)- (d)    (ii)- (e)    (iii)- (b)    (iv)- (a) (v)- (f)    (vi)- (c) |
|  | **c.** | | (i)- (d)   (ii)- (a)    (iii)- (f)    (iv)- (e)   (v)- (c)    (vi)- (b) | | **d.** | | (ii)- (a)    (iii)- (f)    (iv)- (e)   (v)- (c)    (vi)- (b) |
| 51. | Complete the following analogy:  Same molecular formula but different structures: A:: Non superimposable mirror images: B | | | | | | |
|  | **a.** | | A: Isomers B: Enantiomer | | **b.** | | A: Enantiomers B: Racemic mixture |
|  | **c.** | | A: Stereoisomers B: Retention | | **d.** | | A: Isomers B: Stereoisomers |
| 52. | **Which one of the following does not exist?** | | | | | | |
|  | **a.** | |  | | **b.** | |  |
|  | **c.** | |  | | **d.** | |  |
| **Case** | Read the passage given below and answer the following questions:  In ideally ionic structures, the coordination numbers of the ions are determined by electrostatic considerations. Cations surround themselves with as many anions as possible and vice versa. This maximizes the attractions between neighbouring ions of opposite charge and hence maximizes the lattice energy of the crystal. This requirement led to the formulation of the radius ratio rule for ionic structures in which the ions and the structure adopted for a particular compound depend on the relative sizes of the ions. Thus, for the stable ionic crystalline structures, there is definite radius ratio limit for a cation to fit perfectly in the lattice of anions, called radius ratio rule. This depends upon the ratio of radii of two types of ions, r+/r–.  This ratio for coordination numbers 3, 4, 6 and 8 are respectively 0.155 – 0.225, 0.225 -0.414, 0.414 -0.732 and 0.732 – 1.000. The coordination number of ionic solids also depends upon temperature and pressure. On applying high pressure, coordination number increases. On the other hand, on applying high temperature, it decreases.  The following questions are multiple choice questions. Choose the most appropriate answer: | | | | | | |
| 53. | **Which is not the correct statement for ionic solids in which positive and negative ions are held by strong electrostatic attractive forces?** | | | | | | |
|  | **a.** | | The radius ratio r+/r– increases as coordination number increases. | | **b.** | | As the difference in size of ions increases, coordination number increases. |
|  | **c.** | | When coordination number is eight, r+/r– ratio lies between 0.225 to 0.414. | | **d.** | | In ionic solid of the type AX (ZnS, wurtzite), the coordination number of Zn2+ and S2- respectively are 4 and 4. |
| 54. | **If the pressure of CsCl is increased, then its coordination number will** | | | | | | |
|  | **a.** | | increase | | **b.** | | remain the same |
|  | **c.** | | decrease | | **d.** | | none of these |
| 55. | **The ionic radii of K+, Rb+ and Br– are 137, 148 and 195 pm. The coordination number of cations in RbBr and KBr structures are respectively** | | | | | | |
|  | **a.** | | 8,6 | | **b.** | | 6,4 |
|  | **c.** | | 6,8 | | **d.** | | 4,6 |

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