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Candidates must write the Set No.
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DAV PUBLIC SCHOOLS, ODISHA ZONE –I**PA-II EXAMINATION, 2021-22**

- Check that this question paper contains 08 printed pages.
- Set number given on the right hand side of the questions paper should be written on the OMR SHEET by the candidate.
- Check that this question paper contains 55 questions.

CLASS – XII**SUB: CHEMISTRY (043)****Time : 90 Minutes****Maximum Marks:35****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 numbers of questions are attempted, ONLY first 20 will be considered for evaluation.

- Q1. Which of the following statement is not true?**
A) $I_2 < F_2 < Br_2 < Cl_2$ (increasing bond dissociation energy)
B) $HI < HBr < HCl < HF$ (increasing acidic strength)
C) $BiH_3 < SbH_3 < AsH_3 < PH_3 < NH_3$ (increasing basic strength)
D) $H_2S < H_2Se < H_2Te < H_2O$ (increasing order of boiling point)
- Q2. Graphite cannot be classified as**
A) conducting solid
B) covalent solid
C) network solid
D) Ionic solid
- Q3. 5g of non- volatile solute when dissolved in 50g of benzene (K_b for benzene =2.53 Km^{-1}) raises its boiling point by 1°C. The molar mass of the solute (in g/mol) is**
A) 253 B) 353 C) 453 D) 653
- Q4. The number of tetrahedral voids per unit cell in NaCl crystal is**
A) 2 B) 4
C) Twice of octahedral void D) Four times of octahedral void
- Q5. $CH_3Br \xrightarrow{KCN} A \xrightarrow{H_3O^+} B \xrightarrow{LiAlH_4/ether} C$**
The compound C in the above reaction is:
A) CH_4 B) CH_3COCH_3 C) C_2H_5OH D) CH_3CHO
- Q6. When glucose reacts with Br_2 water, the major product is**
A) Gluconic acid B) Saccharic acid
C) Tartaric acid D) Meso oxalic acid
- Q7. Williamson's synthesis of preparing dimethyl ether is a/an**
A) S_N1 reaction B) S_N2 reaction
C) Electrophilic reaction D) Free radical reaction
- Q8. Which of the following oxide of Nitrogen is thermally most stable?**
A) N_2O_5 B) NO_2 C) NO D) N_2O
- Q9. Propan-1-ol and Propan-2-ol can be distinguished by:**
A) Oxidation with $KMnO_4$ followed by reaction with Fehling solution.
B) Oxidation with acidic dichromate followed by reaction with Fehling solution.
C) Oxidation by heating with copper followed by reaction with Fehling solution.
D) Oxidation with conc. sulphuric acid followed by reaction with Fehling solution.
- Q10. In fcc, atom A occupies the corner position and atom B occupies the face centre position. If one atom of B is missing from one of the face centred points, the formula of the compound is:**

- A) A_2B_5 B) A_2B C) AB_5 D) AB
- Q11. Among the four compounds,**
I) Phenol II)p-Methyl phenol III)m-nitrophenol IV)p-nitrophenol
The acidity order is
 A) $IV > III > I > II$ B) $III > IV > I > II$
 C) $I > IV > III > II$ D) $II > I > III > IV$
- Q12. The amount of Benzoic acid (C_6H_5COOH) required for preparing 250mL of 0.15 M solution of methanol (in g) is:**
 A) 4.6 B) 5.6 C) 6.6 D) 7.6
- Q13. During dehydration of alcohols to alkenes by heating with conc. Sulphuric acid, the initial step is:**
 A) Elimination of water. B) Formation of carbanion
 C) Formation of the carbocation. D) Protonation of an alcohol molecule.
- Q14. The gas that can readily decolourises acidified $KMnO_4$ solution is:**
 A) SO_2 B) NO_2 C) P_2O_5 D) CO_2
- Q15. The secondary structure of a protein is associated with**
 A) fixed configuration of the polypeptide backbone
 B) α – helical backbone
 C) hydrophobic interaction
 D) sequence of α – amino acids.
- Q16. 3-Phenylpropene on reaction with HBr gives(as a major product)**
 A) $C_6H_5CH_2CH(Br)CH_3$ B) $C_6H_5CH(Br)C_2H_5$
 C) $C_6H_5(CH_2)_3Br$ D) $C_6H_5CH(Br)CH=CH_2$
- Q17. Aryl halides are less reactive towards nucleophilic reaction as compared to alkyl halides due to**
 A) Formation of less stable carbonium ions.
 B) Resonance stabilisation.
 C) Longer C-X bond
 D) Inductive effect
- Q18. Nitrogen is chemically less reactive because of its**
 A) small atomic energy B) high ionisation enthalpy
 C) high electronegativity D) high bond enthalpy
- Q19. Which of the following statements regarding Henry's law is not correct?**
 A) Different gases have different K_H values at the same temperature.
 B) Higher the value of K_H at a given pressure, the higher is the solubility of a gas in the liquids.
 C) The value of K_H increases with the increase of temperature and K_H is the function of the nature of the gas.
 D) The partial pressure of the gas in the vapour phase is proportional to the mole fraction of the gas in the solution.

- Q20. Which of the following element does not show allotropy?**
 A) Nitrogen B) Bismuth C) Antimony D) Arsenic
- Q21. Which of the following bases is not present in DNA?**
 A) Adenine B) Thymine C) Cytosine D) Uracil
- Q22. The type of hybridisation and number of lone pair(s) of electrons of Xe in XeOF₄, respectively are**
 A) sp³d² and 1 B) sp³d and 2
 C) sp³d and 1 D) sp³d² and 2
- Q23. Which of the following is secondary allylic alcohol?**
 A) But-3-en-2-ol B) But-2-en-2-ol
 C) Prop-2-enol D) Butan-2-ol
- Q24. Which is the stable form of sulphur is stable at room temperature?**
 A) Rhombic B) Monoclinic
 C) S₂ D) Both rhombic and monoclinic
- Q25. The solution which shows large positive deviation from Raoult's law form**
 A) Maximum boiling azeotrope at a specific composition.
 B) Maximum freezing azeotrope at a specific composition.
 C) Minimum boiling azeotrope at a specific composition.
 D) Minimum freezing azeotrope at a specific composition.

SECTION B

This section consists of 24 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable numbers of questions are attempted, ONLY first 20 will be considered for evaluation.

- Q26. The mole fraction of benzene in a solution containing 30% by mass in carbon tetrachloride is**
 A) 0.26 B) 0.34 C) 0.46 D) 0.54
- Q27. What should be the correct IUPAC name for diethyl bromomethane?**
 A) 1-Bromo-1,1-diethylmethane B) 3-Bromopentane
 C) 1-bromo-1-ethylpropane D) 1-Bromopentane
- Q28. In which of the following reactions conc. H₂SO₄ is used as an oxidising agent?**
 A) CaF₂ + H₂SO₄ → CaSO₄ + 2HF
 B) Cu + 2H₂SO₄ → Cu SO₄+ SO₂+2H₂O
 C) NaCl + H₂SO₄ → NaHSO₄ + HCl
 D) CuSO₄.5H₂O $\xrightarrow{H_2SO_4}$ CuSO₄ +5H₂O
- Q29. Which of the following is a monosaccharide?**
 A) Sucrose B) Galactose C) Maltose D) Lactose

- Q30. Consider the following reaction ;**
 Phenol $\xrightarrow{\text{Zn dust}}$ X $\xrightarrow{\text{CH}_3\text{Cl}/\text{anhyAlCl}_3}$ Y $\xrightarrow{\text{alkaline KMnO}_4}$ Z
The product Z is
 A) Benzaldehyde
 B) Benzoic acid
 C) Benzene
 D) Toluene
- Q31. A brown ring is formed in the ring test for NO_3^- ion. It is due to the formation of :**
 A) $[\text{Fe}(\text{H}_2\text{O})_5(\text{NO})]^{2+}$
 B) $\text{FeSO}_4 \cdot \text{NO}_2$
 C) $[\text{Fe}(\text{H}_2\text{O})_5(\text{NO})_2]^{2+}$
 D) $\text{FeSO}_4 \cdot \text{HNO}_3$
- Q32. Schottky defect in crystals is observed when:**
 A) Unequal number of cations and anions are missing from lattice.
 B) Equal number of cations and anions are missing from lattice.
 C) Anion leaves its normal site and occupy interstitial site.
 D) Density of crystal is increased.
- Q33. The synthesis of alkyl fluorides is best accomplished by:**
 A) Finkelstein reaction
 B) Sandmeyer's reaction
 C) Swart's reaction
 D) Free radical fluorination
- Q34. 0.1 mole of XeF_6 is reacts with 1.8g of water. The product obtained is:**
 A) XeO_3
 B) XeO_2F_2
 C) XeOF_4
 D) $\text{Xe} + \text{XeO}_3$
- Q35. A binary solution is prepared by mixing n-heptane and ethanol. Which statement is correct regarding behaviour of the solution?**
 A) An ideal solution is formed
 B) Non ideal solution is formed showing positive deviation from Raoult's law.
 C) Non ideal solution is formed showing negative deviation from Raoult's law.
 D) n-heptane shows positive deviation, while ethanol shows negative deviation from Raoult's law.
- Q36. The number of amino acids which form protein in nature is about:**
 A) 6
 B) 10
 C) 20
 D) 25
- Q37. Which of the following oxides is expected to exhibit a paramagnetic behaviour?**
 A) CO_2
 B) ClO_2
 C) SO_2
 D) SiO_2
- Q38. The sharp melting point of crystalline solids is due to**
 A) a regular arrangement of constituent particles observed over a short distance in the crystal lattice.
 B) a regular arrangement of constituent particles observed over a long distance in the crystal lattice.
 C) same arrangement of constituent particles in different directions.
 D) different arrangements of constituent particles in different directions.

Q39. Consider the following compounds:

i) $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ ii) NH_4NO_2 iii) NH_4VO_3 iv) NH_4NO_3

which compound(s) yield nitrogen gas upon heating?

A) i and ii B) ii and iii C) iii and iv D) i and iv

Q40. Ethanol is converted to ethoxy ethane by:

- A) Treating with conc. H_2SO_4 at room temperature
- B) Treating with conc. H_2SO_4 at 273K
- C) Heating excess of ethanol with conc. H_2SO_4 at 140°C
- D) Heating ethanol with excess of conc. H_2SO_4 at 443K

Q41. In which of the following reactions, Chloroethane is not formed?

- A) $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5 + \text{PCl}_5 \xrightarrow{\Delta}$
- B) $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5 + \text{CH}_3\text{COCl} \xrightarrow{\text{AlCl}_3}$
- C) $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5 + \text{Cl}_2 \xrightarrow{h\nu}$
- D) $\text{C}_2\text{H}_5\text{OH} + \text{PCl}_3 \rightarrow$

Q42. Halogens are all coloured:

- A) Due to absorption of UV light.
- B) Due to absorption of IR light.
- C) Due to absorption of visible light.
- D) Due to absorption of UV light and IR

Q43. At low temperature, phenol reacts with Br_2 in CS_2 to form

- A) m-bromophenol B) p-bromophenol
- C) 2,4,6-tribromophenol D) o- and p-bromophenol

Q44. When chloroethane is heated with AgCN , the main product is:

- A) Ethanenitrile B) Ethyl isocyanide
- C) Ethanamine D) Ethylnitrate

Q45. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion (A): The negative value of electron gain enthalpy of chlorine is less than that of fluorine.

Reason (R): Fluorine is small in size and has high electron density

Select the most appropriate answer from the options given below:

- 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.

Q46. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion (A): Optically active 2-iodobutane on treatment with NaI in acetone undergoes racemization.

Reason (R): Reaction involves multiple Walden inversion and the product

contains mixture of dextro and leavo isomers.

Select the most appropriate answer from the options given below:

- 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.

- Q47. Given below are two statements labelled as Assertion (A) and Reason (R)**
Assertion (A): Out of various colligative properties, osmotic pressure is used for determination of molecular masses of polymers.
Reason (R): Polymer solutions do not possess a constant boiling point.

Select the most appropriate answer from the options given below:

- 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.

- Q48. Given below are two statements labelled as Assertion (A) and Reason (R)**
Assertion (A): H_2SO_4 is a strong acid.
Reason (R): It is one of the oxo acids of sulphur.

Select the most appropriate answer from the options given below:

- 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.

- Q49. Given below are two statements labelled as Assertion (A) and Reason (R)**
Assertion (A): NaCl is used to clear snow on roads
Reason (R): NaCl being non-volatile, brings depression in freezing point of water.

Select the most appropriate answer from the options given below:

- 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 any 5. In case more than desirable number of questions are attempted, ONLY first 5 will be considered for evaluation.

- Q50. The term anomers of glucose refer to:**
- A) isomers of glucose that differ in configuration at C-1 and C-4.
 - B) a mixture of D-glucose and L-glucose.

- C) enantiomers of glucose.
- D) isomers of glucose that differ in configuration at C-1.

Q51. A black compound of manganese reacts with a halogen acid to give greenish yellow gas. When an excess of this gas reacts with ammonia 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

Q52. The number of chiral compounds possible on monochlorination of 2-methylbutane are

- A) 2
- B) 4
- C) 6
- D) 8

CASE1: Read the passage given below and answer the following questions 53-55

In hexagonal system of crystals, a frequently encountered arrangement of atoms is described as a hexagonal prism. Here the top and bottom of the cell are regular hexagon and three atoms are present in between them. A space filling model of this structure called hexagonal closed packed (hcp) is constituted of a sphere on a flat surface surrounded in the same plane by six identical spheres as closely as possible. Three spheres are then packed over the first layer so that they touch each other and represent the second layer. Finally, the second layer is covered by a third layer that is identical to the bottom layer in relative position. Assume radius of every sphere to be 'r'. The following questions are multiple choice questions. Choose the most appropriate answer.

Q53. Which of the following statement is not true about the hexagonal close packing?

- A) The coordination number is 12.
- A) It has packing efficiency of 74%.
- B) Tetrahedral voids of the second layer are covered by the spheres of the third layer.
- C) In this arrangement spheres of the fourth layers are exactly aligned with those of the first layer.

Q54. The empty space in this hcp unit cell is:

- A) 74%
- B) 47.6%
- C) 32%
- D) 26%

Q55. Which of the following has hcp structure?

- A) Al
- B) Mg
- C) Cu
- D) Ni
