CBSE Class 12 Chemistry 2015 - Set 56/2/MT

Question Paper

Conducted by the Central Board of Secondary Education (CBSE)

Time Allowed: 3 Hours **Maximum Marks: 70**

General Instructions

(i) This question paper contains 26 questions. All questions are compulsory.
(ii) All questions are compulsory.
(iii) Questions number 1 to 5 are very short answer questions and carry 1 mark each.
(iv) Questions number 6 to 10 are short answer questions and carry 2 marks each.
(v) Questions number 11 to 22 are also short answer questions and carry 3 marks each.
(vi) Question number 23 is a value based question and carry 4 marks.
(vii) Questions number 24 to 26 are long answer questions and carry 5 marks each.
(viii) Use log tables, if necessary. Use of calculators is not allowed.

Questions

1. Which would undergo S_N2 reaction faster in the following pair and why?

CH_3-CH_2-Br and $CH_3-C(CH_3)(Br)-CH_3$

2. Write the IUPAC name of the given compound:

$CH_3-O-CH_2-CH(OH)-CH_3$

3. Write the dispersed phase and dispersion medium of paints.

4. Copper atom has completely filled d-orbitals in its ground state but it is a transition element. Why?

5. How much charge in Faradays is required for the reduction of 1 mol of Al^{3+} to Al?

6. Derive the relationship between relative lowering of vapour pressure and molar mass of the solute.

7. Arrange the following:

(i) in increasing order of basic strength: $C_6H_5NH_2$, $CH_3CH_2NH_2$, $C_6H_5NHCH_3$

(ii) in increasing order of boiling point: C_2H_5OH, $CH_3CH_2NH_2$, CH_3NHCH_3

8(a). Write down the IUPAC name of the complex $[Co(NH_3)_5(CO_3)]Cl$. What type of isomerism is shown by this complex?

OR

8(b). Using IUPAC norms write the formulae for the following coordination compounds:

(i) Tetrachloridocuprate(II)

(ii) Potassium tetrahydroxozincate(II)

9. Define rate constant (k). Write the unit of rate constant for the following:

(i) First order reaction

(ii) Second order reaction

10. Write the structures of the following:

(i) $H_2S_2O_7$

(ii) XeO_3

11. When 1.5 g of a non-volatile solute was dissolved in 90 g of benzene, the boiling point of benzene raised from 353.23 K to 353.93 K. Calculate the molar mass of the solute.

(K_b for benzene = 2.52 K kg mol^{-1})

12. Give reasons for the following:

(i) Dinitrogen is a gas but phosphorus is a solid.

(ii) Bond angle decreases from H_2O to H_2Te.

(iii) Halogens have the maximum negative electron gain enthalpy.

13. Write the structure of the major product in each of the following reactions:

(i) $CH_3-CH=CH_2 + H_2O \xrightarrow{H^+}$

(ii) $CH_3-CH_2-CH(Br)-CH_3 + KOH \xrightarrow{ethanol/heat}$

(iii) Bromobenzene + $CH_3COCl \xrightarrow{anhyd.\ AlCl_3}$

14. Write the names and structures of the monomers of the following polymers:

(i) Buna-N

(ii) Bakelite

(iii) Teflon

15. (i) Write the product obtained when D-glucose reacts with Br_2 water.

(ii) What type of linkage is present in proteins?

(iii) Write one difference between DNA and RNA.

16. (a) Write the hybridization and shape of the following complexes:

(i) $[Co(NH_3)_6]^{3+}$

(ii) $[NiCl_4]^{2-}$

(Atomic number: Co = 27, Ni = 28)

(b) Out of NH_3 and 'en', which ligand forms more stable complex with metal and why?

17. Define the following terms:

(i) F-centre

(ii) p-type semiconductor

(iii) Ferrimagnetism

18. The rate constant of a first order reaction increases from 2×10^{-2} to 8×10^{-2} when the temperature changes from 300 K to 320 K. Calculate the energy of activation (E_a).

(log 2 = 0.301, log 3 = 0.4771, log 4 = 0.6021)

19. Give reasons for the following:

(a) p-nitrophenol is more acidic than o-nitrophenol.

(b) Bond angle C−O−C in ethers is slightly higher than the tetrahedral angle (109°28′).

(c) $(CH_3)_3C-Br$ on reaction with $NaOCH_3$ gives an alkene instead of an ether.

20(a). How do you convert the following:

(i) Aniline to benzene

(ii) Ethanamide to methanamine

(iii) Nitrobenzene to aniline

OR

20(b). Write the chemical equations involved when $C_2H_5NH_2$ is treated with the following reagents:

(i) CH_3COCl/pyridine

(ii) $C_6H_5SO_2Cl$

(iii) $CHCl_3$ + KOH

21. Define the following terms:

(i) Homogeneous catalysis

(ii) Coagulation

(iii) Macromolecular colloids

22. (i) Mention the principle behind the zone refining of metals.

(ii) What is the role of dilute NaCN in the extraction of gold?

(iii) Which form of iron is the purest form of commercial iron?

23. **Case Study:** Seeing the growing cases of diabetes and depression among young children, Mr. Chopra, the principal of one reputed school, organized a seminar in which he invited parents and other principals. They resolved to strictly ban junk food in schools and introduce healthy snacks and drinks like soup, lassi, milk, etc. in school canteens. They also decided to make half an hour of daily physical activity compulsory for students in the morning assembly. After six months, Mr. Chopra conducted a health survey in most schools and found a tremendous improvement in students' health.

After reading the above passage, answer the following:

(i) What are the values (at least two) displayed by Mr. Chopra?

(ii) As a student, how can you spread awareness about this issue?

(iii) Why should antidepressant drugs not be taken without a doctor's advice?

(iv) Give two examples of artificial sweeteners.

24(a). (a) Account for the following:

(i) Ce^{4+} is a strong oxidizing agent in aqueous solution.

(ii) Transition metals have high enthalpy of atomization.

(iii) Mn shows maximum number of oxidation states in the 3d series.

(b) Complete the following equations:

(i) $2MnO_4^- + 6H^+ + 5NO_2^- \rightarrow$

(ii) $Cr_2O_7^{2-} + 14H^+ + 6Fe^{2+} \rightarrow$

OR

24(b). (a) Account for the following:

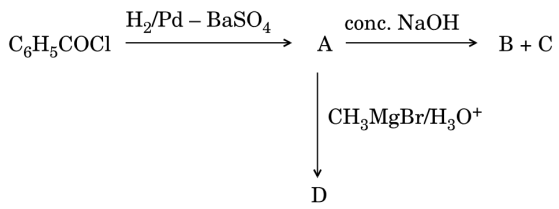
(i) Transition metals form coloured compounds.

(ii) Cr^{2+} is a strong reducing agent.

(iii) Actinoids show irregularities in their electronic configurations.

(b) Define lanthanoid contraction. Write the common oxidation state of lanthanoids.

25(a). (a) Write the structures of A, B, C and D in the following reactions:



(b) Distinguish between the following:

(i) $C_6H_5COCH_3$ and $C_6H_5COCH_2CH_3$

(ii) Benzoic acid and Phenol

(c) Write the structure of 2-hydroxybenzaldehyde.

OR

25(b). (a) Write the structures of the main products when ethanal (CH_3CHO) reacts with the following reagents:

(i) HCN

(ii) H_2N-NH_2/H^+

(iii) $LiAlH_4$

(b) Arrange the following in increasing order of reactivity towards nucleophilic addition: $C_6H_5COCH_3$, CH_3CHO, CH_3COCH_3

(c) Give a simple chemical test to distinguish between CH_3CH_2CHO and CH_3CHO.

26(a). Calculate e.m.f. and ΔG for the following cell:

$Ni(s) \mid Ni^{2+}(0.01\ M) \mid\mid Ag^+(0.001\ M) \mid Ag(s)$

Given: $E^\circ(Ni^{2+}/Ni) = -0.25$ V, $E^\circ(Ag^+/Ag) = +0.80$ V

OR

26(b). (a) The conductivity of 0.1 mol L^{-1} solution of NaCl is 1.06 x 10^{-2} S cm^{-1}. Calculate its molar conductivity and degree of dissociation (α). Given $\Lambda^\circ(Na^+) = 50.1$ S cm^2 mol^{-1} and $\Lambda^\circ(Cl^-) = 76.5$ S cm^2 mol^{-1}.

(b) What is the difference between primary and secondary battery? Give one example of each.

- End of Question Paper -