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

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. Write the formulae of any two oxoacids of chlorine.

2. Which would undergo S_N2 reaction faster in the following pair:

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

3. What is the type of charge on AgI colloidal sol formed when $AgNO_3$ solution is added to KI solution?

4. What is the formula of a compound in which the element Y forms hcp lattice and atoms of X occupy 1/3rd of octahedral voids?

5. Write the IUPAC name of the given compound:

$C_6H_5-CH_2-CH(OH)-CH_3$

6. Calculate the time to deposit 1.17 g of Ni at cathode when a current of 5 A was passed through a solution of $Ni(NO_3)_2$.

(Molar mass of Ni = 58.5 g mol^{-1}, 1F = 96500 C mol^{-1})

7. (i) Write the IUPAC name of the following complex: $K_3[Fe(CN)_6]$

(ii) Write the formula for the following complex: Pentaamminenitrito-N-cobalt(III)

8. (i) Why do actinoids show a wide range of oxidation states?

(ii) Why is actinoid contraction greater than lanthanoid contraction?

9. (i) On mixing liquid X and liquid Y, the volume of the resulting solution increases. What type of deviation from Raoult's law is shown by the resulting solution? What change in temperature would you observe after mixing liquids X and Y?

(ii) How can the direction of osmosis be reversed? Write one use of reverse osmosis.

10(a). Name the reagents used in the following reactions:

(i) $C_6H_5COCl \rightarrow C_6H_5CHO$

(ii) $CH_3COONa \rightarrow CH_4$

OR

10(b). Arrange the following compounds in increasing order of their property as indicated:

(i) CH_3COCH_3, $C_6H_5COC_6H_5$, CH_3CHO (reactivity towards nucleophilic addition reaction)

(ii) $Cl-CH_2-COOH$, $Cl_2CH-COOH$, CCl_3-COOH (acidic character)

11. (i) Name the method of refining to obtain a low boiling metal like mercury.

(ii) What is the role of pine oil in the froth floatation process?

(iii) Reduction of metal oxide to metal becomes easier if the metal obtained is in liquid state. Why?

12. Examine the given defective crystal (alternating X^+ and Y^- ions with one Y^- site vacant and an extra X^+ ion lodged nearby):

Answer the following questions:

(i) Is the above defect stoichiometric or non-stoichiometric?

(ii) Write the term used for this type of defect.

(iii) Why do silver halides show this type of defect?

13. Predict the products of the following reactions:

(i) CH_3CHO with $HCN \rightarrow$?

(ii) C_6H_5MgBr with (a) CO_2 (b) $H_3O^+ \rightarrow$?

(iii) CH_3CN with $LiAlH_4 \rightarrow$?

14. (i) What type of isomerism is shown by the complex $[Ag(NH_3)_2][Ag(CN)_2]$?

(ii) On the basis of crystal field theory, write the electronic configuration for d^4 ion if $\Delta_o < P$.

(iii) Write the hybridization and shape of $[Ni(CN)_4]^{2-}$. (Atomic number of Ni = 28)

15. Give reasons for the following:

(i) Benzyl chloride is highly reactive towards the S_N1 reaction.

(ii) 2-Bromobutane is optically active but 1-bromobutane is optically inactive.

(iii) Electrophilic reactions in haloarenes occur slowly.

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

(i) Aniline to phenol

(ii) Prop-1-ene to Propan-1-ol

(iii) Anisole to 2-methoxytoluene

OR

16(b). What happens when:

(i) ethanol is treated with Cu at 573 K,

(ii) phenol is treated with CH_3COCl / anhydrous $AlCl_3$,

(iii) ethyl chloride is treated with $NaOCH_3$?

Write chemical equations in support of your answer.

17. (i) Which one of the following is an oligosaccharide: starch, maltose, fructose, glucose

(ii) Write one difference between DNA and RNA.

(iii) Write the name of the disease caused by the deficiency of Vitamin B_1.

18. Calculate E_{cell} for the following reaction at 25°C:

$A + B^{2+}$ (0.001 M) $\rightarrow A^{2+}$ (0.0001 M) + B

Given: $E^\circ_{cell} = 2.6805$ V, 1F = 96500 C mol^{-1}

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

(i) Glyptal

(ii) Teflon

(iii) Nylon-6

20. (i) MnO is basic whereas Mn_2O_7 is acidic in nature. Why?

(ii) Transition metals form alloys. Why?

(iii) Complete the following equation: $2MnO_2 + 4KOH + O_2 \rightarrow ?$

21. Differentiate between the following:

(i) Solution and Colloid

(ii) Homogeneous catalysis and Heterogeneous catalysis

(iii) O/W emulsion and W/O emulsion

22. A solution is prepared by dissolving 5 g of non-volatile solute in 95 g of water. It has a vapour pressure of 23.375 mm Hg at 25°C. Calculate the molar mass of the solute. (Vapour pressure of pure water at 25°C is 23.75 mm Hg)

23. **Case Study:** Mr. Roy, the principal of one reputed school, organized a seminar in which he invited parents and other principals to discuss the serious issue of diabetes and depression in students. They all resolved this issue by strictly banning junk food in schools and introducing healthy snacks and drinks like soup, lassi, milk, etc. in school canteens. They also decided to make compulsory half an hour of daily physical activities for the students in the morning assembly. After six months, Mr. Roy conducted a health survey in most of the schools and discovered a tremendous improvement in the health of the students.

After reading the above passage, answer the following questions:

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

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

(iii) What are tranquilizers? Give an example.

(iv) Why is the use of aspartame limited to cold foods and drinks?

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

(i) Bi(V) is a stronger oxidizing agent than Sb(V).

(ii) H−O−I is a weaker acid than H−O−Cl.

(iii) Bond angle decreases from H_2O to H_2S.

(b) Draw the structures of the following:

(i) SF_4

(ii) XeF_2

OR

24(b). (i) Why does PCl_5 fume in moisture?

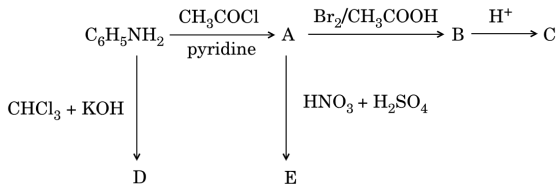
(ii) Write the name of the allotrope of sulphur which is stable at room temperature.

(iii) Chlorine water on standing loses its yellow colour. Why?

(iv) Write the disproportionation reaction of H_3PO_3.

(v) Complete the following equation: $F_2 + H_2O \rightarrow ?$

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



OR

25(b). (a) Write the structures of the main products when benzene diazonium chloride reacts with the following reagents:

(i) KI

(ii) CH_3CH_2OH

(iii) Cu/HCl

(b) Arrange the following in increasing order of their basic character in an aqueous solution: CH_3NH_2, $(CH_3)_2NH$, $(CH_3)_3N$

(c) Give a simple chemical test to distinguish between the following pair of compounds: $C_6H_5NH_2$ and CH_3NH_2

26(a). (a) For the hydrolysis of methyl acetate in aqueous solution, the following results were obtained:

t/s: 0, 20, 40 $[CH_3COOCH_3]$/mol L^{-1}: 0.40, 0.20, 0.10

(a) Show that it follows a pseudo first order reaction, as the concentration of water remains constant.

(b) Calculate the average rate of reaction between the time interval 20 to 40 seconds.

OR

26(b). (a) Define the following terms:

(i) Collision frequency

(ii) Rate constant (k)

(b) The rate constant of a first order reaction increases from 4×10^{-2} to 24×10^{-2} when the temperature changes from 300 K to 350 K. Calculate the energy of activation (E_a). (log 2 = 0.301, log 3 = 0.4771, log 4 = 0.6021, log 6 = 0.7782)

- End of Question Paper -