CBSE Class 12 Chemistry 2015 - Set 56/1/P

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. How much charge is required for the reduction of 1 mol of Zn^{2+} to Zn?

2. Write the dispersed phase and dispersion medium of butter.

3. Zn^{2+} salts are white while Cu^{2+} salts are coloured. Why?

4. Write the IUPAC name of the given compound:

$CH_2=C(CH_3)-CH_2-OH$

5. Which would undergo S_N1 reaction faster in the following pair:

CH_3-CH_2-Br and $(CH_3)_3C-Br$

6. Why does a solution containing non-volatile solute have higher boiling point than the pure solvent? Why is elevation of boiling point a colligative property?

7. Define rate of reaction. Write two factors that affect the rate of reaction.

8. Write the structures of the following molecules:

(i) H_2SO_3

(ii) $XeOF_4$

9(a). Write down the IUPAC name of the complex $[Pt(en)_2Cl_2]^{2+}$. What type of isomerism is shown by this complex?

OR

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

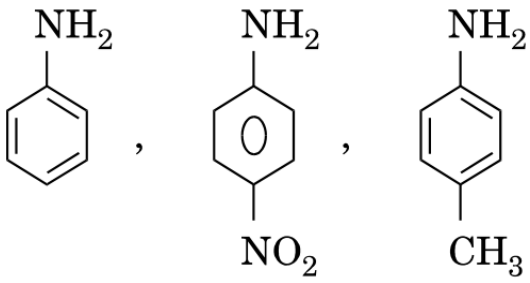
(i) Hexaamminecobalt(III) chloride

(ii) Potassium tetrachloridonickelate(II)

10. Arrange the following in increasing order of their basic strength:

(i) $C_6H_5NH_2$, $C_6H_5CH_2NH_2$, $C_6H_5NHCH_3$

(ii)



11. Calculate the freezing point of the solution when 31 g of ethylene glycol ($C_2H_6O_2$) is dissolved in 500 g of water. (K_f for water = 1.86 K kg mol^{-1})

12. Define the following terms:

(i) Primitive unit cells

(ii) Schottky defect

(iii) Ferromagnetism

13. The rate constant of a first order reaction increases from 2×10^2 to 4×10^2 when the temperature changes from 300 K to 310 K. Calculate the energy of activation (E_a).

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

14. Define the following terms:

(i) Brownian movement

(ii) Peptization

(iii) Multimolecular colloids

15. (i) What is the principle behind the zone refining of metals?

(ii) What is the role of silica in the extraction of copper?

(iii) How is 'cast iron' different from 'pig iron'?

16. Give reasons for the following:

(i) N_2 is less reactive at room temperature.

(ii) H_2Te is the strongest reducing agent amongst all the hydrides of Group 16 elements.

(iii) Helium is used in diving apparatus as a diluent for oxygen.

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

(i) $[CoF_6]^{3-}$

(ii) $[Ni(CN)_4]^{2-}$

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

(b) Out of NH_3 and CO, which ligand forms a more stable complex with a transition metal and why?

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

(i) $CH_3-CH=C(CH_3)-CH_3 + HBr \rightarrow$

(ii) $CH_3-CH_2-CH_2-CH(Br)-CH_3 + KOH$ ethanol/heat $\rightarrow$

(iii) Bromobenzene + CH_3Cl anhyd. $AlCl_3 \rightarrow$

19. Give reasons for the following:

(i) Phenol is more acidic than ethanol.

(ii) Boiling point of ethanol is higher in comparison to methoxymethane.

(iii) $(CH_3)_3C-O-CH_3$ on reaction with HI gives CH_3OH and $(CH_3)_3C-I$ as the main products and not $(CH_3)_3C-OH$ and CH_3I.

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

(i) $C_6H_5CONH_2$ to $C_6H_5NH_2$

(ii) Aniline to phenol

(iii) Ethanenitrile to ethanamine

OR

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

(i) Br_2 water

(ii) $CHCl_3$ + KOH

(iii) HCl

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

(i) Buna-S

(ii) Glyptal

(iii) Polyvinyl chloride

22. (i) Write the product obtained when D-glucose reacts with H_2N-OH.

(ii) Amino acids show amphoteric behaviour. Why?

(iii) Why cannot vitamin C be stored in our body?

23. **Case Study:** Seeing the growing cases of diabetes and depression among young children, Mr. Lugani, the principal of one reputed school organized a seminar in which he invited parents and principals. 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. Lugani conducted the 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. Lugani?

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

(iii) What are antidepressant drugs? Give an example.

(iv) Name the sweetening agent used in the preparation of sweets for a diabetic patient.

24(a). (a) A compound 'A' of molecular formula C_2H_3OCl undergoes a series of reactions as shown below. Write the structures of A, B, C and D:

$$(C_2H_3OCl)\ A \xrightarrow{H_2/Pd-BaSO_4} B \xrightarrow{\text{dil. NaOH}} C \xrightarrow{\text{Heat}} D$$

(b) Distinguish between the following:

(i) $C_6H_5COCH_3$ and C_6H_5CHO

(ii) Benzoic acid and methyl benzoate

(c) Write the structure of 2-methylbutanal.

OR

24(b). (a) Write the structures of the main products when acetone ($CH_3-CO-CH_3$) reacts with the following reagents:

(i) Zn−Hg/conc. HCl

(ii) $H_2N-NHCONH_2/H^+$

(iii) CH_3MgBr and then H_3O^+

(b) Arrange the following in the increasing order of their boiling points:

C_2H_5OH, CH_3CHO, CH_3COOH

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

CH_3CH_2CHO and $CH_3CH_2COCH_3$

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

$Mg(s)\ |\ Mg^{2+}(0.001\ M)\ ||\ Cu^{2+}(0.0001\ M)\ |\ Cu(s)$

Given: $E^\circ_{(Mg^{2+}/Mg)} = -2.37$ V, $E^\circ_{(Cu^{2+}/Cu)} = +0.34$ V

OR

25(b). (a) The conductivity of 0.20 mol L^{-1} solution of KCl is 2.48×10^{-2} S cm^{-1}. Calculate its molar conductivity and degree of dissociation (a). Given $\Lambda^\circ(K^+) = 73.5$ S cm^2 mol^{-1} and $\Lambda^\circ(Cl^-) = 76.5$ S cm^2 mol^{-1}.

(b) What type of battery is mercury cell? Why is it more advantageous than dry cell?

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

(i) Zr and Hf have almost similar atomic radii.

(ii) Transition metals show variable oxidation states.

(iii) Cu^+ ion is unstable in aqueous solution.

(b) Complete the following equations:

(i) $2MnO_2 + 4KOH + O_2 \rightarrow$

(ii) $2Na_2CrO_4 + 2H^+ \rightarrow$

OR

26(b). (a) $E^\circ_{(M^{2+}/M)}$ values (V): Cr −0.91, Mn −1.18, Fe −0.44, Co −0.28, Ni −0.25, Cu +0.34. From the given data, answer the following:

(i) Why is $E^\circ_{(Cu^{2+}/Cu)}$ value exceptionally positive?

(ii) Why is $E^\circ_{(Mn^{2+}/Mn)}$ value more negative than expected?

(iii) Which is a stronger reducing agent, Cr^{2+} or Fe^{2+}? Give reason.

(b) Why do actinoids show a wide range of oxidation states? Write one similarity between the chemistry of lanthanoids and actinoids.

- End of Question Paper -