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

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 IUPAC name of the given compound:

$HO-CH_2-CH=C(CH_3)-CH_3$

2. Physisorption is reversible while chemisorption is irreversible. Why?

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

CH_3-CH_2-Br and CH_3-CH_2-I

4. Which allotrope of sulphur is thermally stable at room temperature?

5. What is the formula of a compound in which the element Y forms ccp lattice and atoms of X occupy 2/3rd of octahedral voids?

6. Name the reagents used in the following reactions:

(i) $CH_3CHO \rightarrow CH_3CH(OH)CH_3$

(ii) $CH_3COOH \rightarrow CH_3COCl$

7. (a) Following reactions occur at cathode during the electrolysis of aqueous copper(II) chloride solution:

$Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$, $E^\circ = +0.34$ V

$H^+(aq) + e^- \rightarrow \frac{1}{2}H_2(g)$, $E^\circ = 0.00$ V

On the basis of their standard reduction electrode potential (E°) values, which reaction is feasible at the cathode and why?

(b) State Kohlrausch law of independent migration of ions. Write its one application.

8(a). What is meant by negative deviation from Raoult's law? Give an example. What is the sign of $\Delta_{mix}H$ for negative deviation?

OR

8(b). Define azeotropes. What type of azeotrope is formed by negative deviation from Raoult's law? Give an example.

9. Why do transition elements show variable oxidation states? In 3d series (Sc to Zn), which element shows the maximum number of oxidation states and why?

10. (i) Write down the IUPAC name of the following complex: $[Cr(en)_3]Cl_3$

(ii) Write the formula for the following complex: Potassium tri oxalato chromate(III)

11. Calculate the emf of the following cell at 25°C:

$Zn \mid Zn^{2+}$ (0.001 M) $\mid\mid H^+$ (0.01 M) $\mid H_2(g)$ (1 bar) $\mid Pt(s)$

$E^\circ(Zn^{2+}/Zn) = -0.76$ V, $E^\circ(H^+/H_2) = 0.00$ V

12. Give reasons for the following observations:

(i) A delta is formed at the meeting point of sea water and river water.

(ii) NH_3 gas adsorbs more readily than N_2 gas on the surface of charcoal.

(iii) Powdered substances are more effective adsorbents.

13. (i) Draw the geometrical isomers of complex $[Pt(en)_2Cl_2]^{2+}$.

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

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

14. (a) How would you account for the following:

(i) Highest fluoride of Mn is MnF_4 whereas the highest oxide is Mn_2O_7.

(ii) Transition metals and their compounds show catalytic properties.

(b) Complete the following equation:

$3MnO_4^{2-} + 4H^+ \rightarrow ?$

15. Predict the products of the following reactions:

(i) $CH_3-CH=CH_2$ with (i) B_2H_6 (ii) H_2O_2/OH^- ?

(ii) C_6H_5-OH with $Br_2(aq)$?

(iii) CH_3CH_2OH with Cu/573K ?

16. An element X (molar mass = 60 g mol^{-1}) has a density of 6.23 g cm^{-3}. Identify the type of cubic unit cell, if the edge length of the unit cell is 4×10^{-8} cm.

17. Calculate the mass of NaCl (molar mass = 58.5 g mol^{-1}) to be dissolved in 37.2 g of water to lower the freezing point by 2°C, assuming that NaCl undergoes complete dissociation. (K_f for water = 1.86 K kg mol^{-1})

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

(i) Terylene

(ii) Bakelite

(iii) Buna-S

19. (a) Why are alkyl halides insoluble in water?

(b) Why is Butan-1-ol optically inactive but Butan-2-ol is optically active?

(c) Although chlorine is an electron withdrawing group, yet it is ortho-, para- directing in electrophilic aromatic substitution reactions. Why?

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

(i) Benzoic acid to Benzaldehyde

(ii) Ethyne to Ethanal

(iii) Acetic acid to Methane

OR

20(b). Write the equations involved in the following reactions:

(i) Stephen reaction

(ii) Wolff-Kishner reduction

(iii) Etard reaction

21. (i) Which one of the following is a monosaccharide: starch, maltose, fructose, cellulose

(ii) What is the difference between acidic amino acids and basic amino acids?

(iii) Write the name of the vitamin whose deficiency causes bleeding of gums.

22. (i) Indicate the principle behind the method used for the refining of Nickel.

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

(iii) What is 'copper matte'?

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

After reading the above passage, answer the following questions:

(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 consulting a doctor?

(iv) Give two examples of artificial sweeteners.

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

(i) Bond angle in NH_4^+ is higher than NH_3.

(ii) H_2S has lower boiling point than H_2O.

(iii) Reducing character decreases from SO_2 to TeO_2.

(b) Draw the structures of the following:

(i) $H_4P_2O_7$ (Pyrophosphoric acid)

(ii) XeF_2

OR

24(b). (a) Draw the structures of the following:

(i) XeF_4

(ii) $H_2S_2O_7$

(b) Account for the following:

(i) Iron on reaction with HCl forms $FeCl_2$ and not $FeCl_3$.

(ii) $HClO_4$ is a stronger acid than HClO.

(iii) BiH_3 is the strongest reducing agent amongst all the hydrides of group 15.

25(a). (a) Illustrate the following reactions giving suitable example in each case:

(i) Ammonolysis

(ii) Coupling reaction

(iii) Acetylation of amines

(b) Describe Hinsberg method for the identification of primary, secondary and tertiary amines. Also write the chemical equations of the reactions involved.

OR

25(b). (a) Write the structures of main products when benzene diazonium chloride ($C_6H_5N_2^+Cl^-$) reacts with the following reagents:

(i) HBF_4 / Δ

(ii) Cu / HBr

(b) Write the structures of A, B and C in the following reactions.

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

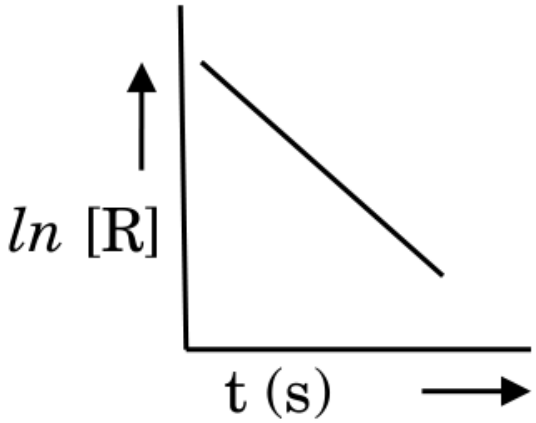
(i) Activation energy

(ii) Rate constant

(b) A first order reaction takes 10 minutes for 25% decomposition. Calculate $t_{1/2}$ for the reaction. (Given: log 2 = 0.3010, log 3 = 0.4771, log 4 = 0.6021)

OR

26(b). (a) For a chemical reaction R → P, the variation in the concentration, ln[R] vs. time (s) plot is given.



(i) Predict the order of the reaction.

(ii) What is the slope of the curve?

(iii) Write the unit of rate constant for this reaction.

(b) Show that the time required for 99% completion is double of the time required for the completion of 90% reaction.

- End of Question Paper -