CBSE Class 12 Chemistry 2018 - Set 56-3 - Compartment

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

Questions

1. Why is adsorption always exothermic?

2. Predict the major product formed when sodium ethoxide reacts with tert-Butyl chloride.

3. An aromatic organic compound 'A' with molecular formula C_8H_8O gives positive DNP and iodoform tests. It neither reduces Tollens' reagent nor does it decolourise bromine water. Write the structure of 'A'.

4. For the reaction A → B, the rate of reaction becomes three times when the concentration of A is increased by nine times. What is the order of reaction?

5. Write the coordination isomer of $[Cu(NH_3)_4][PtCl_4]$.

6(a). A current of 1.50 A was passed through an electrolytic cell containing $AgNO_3$ solution with inert electrodes. The weight of silver deposited was 1.50 g. How long did the current flow? (Molar mass of Ag = 108 g mol^{-1}, 1F = 96500 C mol^{-1}).

OR

6(b). The conductivity of a 0.01 M solution of acetic acid at 298 K is 1.65×10^{-4} S cm^{-1}. Calculate molar conductivity (Λ_m) of the solution.

7. Draw the structures of the following:

(i) XeF_2

(ii) BrF_5

8. Which one of the following compounds is more reactive towards S_N2 reaction and why?

$CH_3CH(Cl)CH_2CH_3$ or $CH_3CH_2CH_2Cl$

9. Identify the following:

(i) Transition metal of 3d series that exhibits the maximum number of oxidation states.

(ii) An alloy consisting of approximately 95% lanthanoid metal used to produce bullet, shell and lighter flint.

10. Why does a mixture of Carbon disulphide and acetone show positive deviation from Raoult's law? What type of azeotrope is formed by this mixture?

11. Consider the following reaction:

$Cu(s) + 2Ag^+(aq) \rightarrow 2Ag(s) + Cu^{2+}(aq)$

(i) Depict the galvanic cell in which the given reaction takes place.

(ii) Give the direction of flow of current.

(iii) Write the half-cell reactions taking place at cathode and anode.

12. Write the role of

(i) NaCN in the extraction of gold from its ore.

(ii) Cryolite in the extraction of aluminium from pure alumina.

(iii) CO in the purification of Nickel.

13(a). (i) Complete the following equations:

(a) $2MnO_4^- + 5SO_3^{2-} + 6H^+ \rightarrow$

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

(ii) Based on the data, arrange Fe^{2+}, Mn^{2+} and Cr^{2+} in the increasing order of stability of +2 oxidation state.

$E^\circ_{Cr^{3+}/Cr^{2+}} = -0.4\ V$

$E^\circ_{Mn^{3+}/Mn^{2+}} = +1.5\ V$

$E^\circ_{Fe^{3+}/Fe^{2+}} = +0.8\ V$

OR

13(b). Write the preparation of following:

(i) $KMnO_4$ from K_2MnO_4

(ii) Na_2CrO_4 from $FeCr_2O_4$

(iii) $Cr_2O_7^{2-}$ from CrO_4^{2-}

14. (i) Arrange the following compounds in the increasing order of their basic strength in aqueous solution:

CH_3NH_2, $(CH_3)_3N$, $(CH_3)_2NH$

(ii) Identify 'A' and 'B':

$C_6H_5NH_2 \xrightarrow{NaNO_2/HCl,\ 273\ K} A \xrightarrow{H_2O/H^+} B$

(iii) Write equation of carbylamine reaction.

15. Give the formula of monomers involved in the formation of the following polymers:

(i) Buna-N

(ii) Nylon-6

(iii) Dacron

16. Write IUPAC name for each of the following complexes:

(i) $[Ni(NH_3)_6]Cl_2$

(ii) $K_3[Fe(CN)_6]$

(iii) $[Co(en)_3]^{3+}$

17. (i) Complete the following reaction and suggest a suitable mechanism for the reaction:

$CH_3CH_2OH \xrightarrow{H^+,\ 443\ K}$

(ii) Why is ortho-Nitrophenol steam volatile while para-Nitrophenol is less volatile?

18. Explain the following:

(i) Amino acids behave like salts rather than simple amines or carboxylic acids.

(ii) The two strands of DNA are complementary to each other.

(iii) Reaction of glucose that indicates that the carbonyl group is present as an aldehydic group in the open structure of glucose.

19. Write the product(s) formed when

(i) 2-Bromopropane undergoes dehydrohalogenation reaction.

(ii) Chlorobenzene undergoes nitration reaction.

(iii) Methyl bromide is treated with KCN.

20. A reaction is first order in A and second order in B.

(i) Write the differential rate equation.

(ii) How is the rate affected on increasing the concentration of B three times?

(iii) How is the rate affected when the concentration of both A and B are doubled?

21. Give reason for the following observations:

(i) When Silver nitrate solution is added to Potassium iodide solution, a negatively charged colloidal solution is formed.

(ii) Finely divided substance is more effective as an adsorbent.

(iii) Lyophilic colloids are also called reversible sols.

22. Calculate the freezing point of an aqueous solution containing 10.5 g of Magnesium bromide in 200 g of water, assuming complete dissociation of Magnesium bromide.

(Molar mass of Magnesium bromide = 184 g mol^{-1}, K_f for water = 1.86 K kg mol^{-1}).

23. Mathew works in a multinational company where the working conditions are tough. He started taking sleeping pills without consulting a doctor. When his friend Amit came to know about it he was disturbed and advised Mathew not to do so. He suggested that Mathew should instead practice yoga to be stress free. Mathew is now relaxed and happy after practicing yoga.

After reading the above passage, answer the following questions:

(a) Pick out the odd chemical compound on the basis of its different medicinal property: Luminal, Seconal, Phenacetin and Equanil.

(b) List at least two qualities of Amit that helped Mathew to be happy.

(c) Why is it advisable not to take the dose of sleeping pill without consulting a doctor?

(d) Name the class of chemical compounds used in sleeping pills.

24(a). (i) Give reasons :

(a) HCHO is more reactive than CH_3-CHO towards addition of HCN.

(b) pK_a of O_2N–CH_2–COOH is lower than that of CH_3–COOH.

(c) Alpha hydrogen of aldehydes and ketones is acidic in nature.

(ii) Give simple chemical tests to distinguish between the following pairs of compounds :

(a) Ethanal and Propanal

(b) Pentan-2-one and Pentan-3-one

OR

24(b). (i) Write structure of the product(s) formed :

(a) CH_3–CH_2–COOH $\xrightarrow{Cl_2,\ \text{red phosphorus}}$

(b) C_6H_5COCl $\xrightarrow{H_2,\ Pd–BaSO_4}$

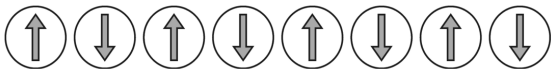
(c) 2HCHO $\xrightarrow{\text{Conc. KOH}}$

(ii) How will you bring the following conversions in not more than two steps :

(a) Propanone to propene

(b) Benzyl chloride to phenyl ethanoic acid

25(a). (i) (a) Following is the schematic alignment of magnetic moments :



What type of magnetism is shown by this substance ?

(b) What type of stoichiometric defect is shown by (i) KCl (ii) AgCl ?

(ii) An element with density 11.2 g cm^{-3} forms a fcc lattice with edge length of 4×10^{-8} cm. Calculate the atomic mass of the element. (N_A = 6.02×10^{23} mol^{-1})

OR

25(b). Silver metal crystallises with a face centred cubic lattice. The length of the unit cell is found to be 3.0×10^{-8} cm. Calculate atomic radius and density of silver.

(Molar mass of Ag = 108 g mol^{-1}, $N_A = 6.02 \times 10^{23}$ mol^{-1})

26(a). (i) (a) What happens when chlorine gas reacts with cold and dilute solution of NaOH ?

(b) What happens when XeF_2 undergoes hydrolysis ?

(ii) Assign suitable reasons for the following :

(a) SF_6 is inert towards hydrolysis.

(b) H_3PO_3 is diprotic.

(c) Out of noble gases only Xenon is known to form established chemical compounds.

OR

26(b). (i) Considering the parameters such as bond dissociation enthalpy, electron gain enthalpy and hydration enthalpy, compare the oxidizing power of F_2 and Cl_2.

(ii) Complete the following reactions :

(a) $Cu + HNO_3$(dilute) $\rightarrow$

(b) $Fe^{3+} + SO_2 + H_2O \rightarrow$

(c) $XeF_4 + O_2F_2 \rightarrow$

- End of Question Paper -