CBSE Class 12 Chemistry 2017 - Set 56-2 - 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) Question number 1 to 5 are very short-answer questions and carry 1 mark each.
(iii) Question number 6 to 10 are short-answer questions and carry 2 marks each.
(iv) Question 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) Question 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. Write the dispersion medium and dispersed phase in milk.

2. Write the IUPAC name of the complex $[Co(NH_3)_4Cl(NO_2)]^+$.

3. Write the IUPAC name of the following compound:

CH_3-CH_2-CH_2-CH_2-$N(CH_3)_2$

4. What type of stoichiometric defect is shown by NaCl?

5. What happens when phenol is heated with zinc dust?

6(a). (a) Explain why H_2 and O_2 do not react at room temperature.

(b) Write the rate equation for the reaction $A_2 + 3B_2 \rightarrow 2C$, if the overall order of the reaction is zero.

OR

6(b). Derive integrated rate equation for rate constant of a first order reaction.

7. Explain the following observations:

(i) Silver atom has completely filled d-orbitals ($4d^{10}$) in its ground state, yet it is regarded as a transition element.

(ii) E° value for Mn^{3+}/Mn^{2+} couple is much more positive than Cr^{3+}/Cr^{2+}.

8. How will you carry out the following conversions:

(i) 2-Bromopropane to 1-bromopropane

(ii) Benzene to p-chloronitrobenzene

9. "Orthophosphoric acid (H_3PO_4) is not a reducing agent whereas hypophosphorus acid (H_3PO_2) is a strong reducing agent." Explain and justify the above statement with the help of a suitable example.

10. Following reactions can occur at cathode during the electrolysis of aqueous silver nitrate solution using Pt electrodes:

$Ag^+(aq) + e^- \rightarrow Ag(s)$; $E^\circ = 0.80$ V

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

On the basis of their standard electrode potential values, which reaction is feasible at cathode and why?

11. (i) Name a substance which can be used as an antiseptic as well as disinfectant.

(ii) Name an artificial sweetener whose use is limited to cold foods and drinks.

(iii) What are cationic detergents?

12. (a) Why water soluble vitamins must be supplied regularly in the diet? Give one example of it.

(b) Differentiate between the following:

(i) Essential and non-essential amino acids.

(ii) Fibrous and globular proteins.

13. Identify A, B and C in the following reactions:

(i) $CH_3CH_2Cl \xrightarrow{KCN} A \xrightarrow{H_2/Ni} B \xrightarrow{CH_3COCl/Base} C$

(ii) $C_6H_5N_2^+Cl^- \xrightarrow{HBF_4} A \xrightarrow{NaNO_2/Cu} B \xrightarrow{Sn/HCl} C$

14. (a) Account for the following:

(i) Electrophilic substitution reactions in haloarenes occur slowly.

(ii) Haloalkanes, though polar, are insoluble in water.

(b) Arrange the following compounds in increasing order of reactivity towards S_N2 displacement:

2-Bromo-2-methylbutane, 1-Bromopentane, 2-Bromopentane

15. (i) Write Reimer-Tiemann reaction.

(ii) Write the mechanism of acid dehydration of ethanol to yield ethene:

$CH_3CH_2OH \xrightarrow[443\ K]{H^+} CH_2{=}CH_2 + H_2O$

16. For the complex ion $[CoCl_2(en)_2]^+$ write hybridization type and spin behaviour. Draw one of the geometrical isomer of the complex ion which is optically active. [Atomic number: Co = 27]

17. Write the principles involved in the following methods of refining of metals:

(i) Zone refining

(ii) Chromatographic method

(iii) Electrolytic refining

18(a). A mixed oxide of iron and chromium is fused with sodium carbonate in free access of air to form a yellow coloured compound (A). On acidification the compound (A) forms an orange coloured compound (B), which is a strong oxidizing agent. Identify compound (A) and (B). Write chemical reactions involved.

OR

18(b). (a) Give reasons for the following:

(i) Compounds of transition elements are generally coloured.

(ii) MnO is basic while Mn_2O_7 is acidic.

(b) Calculate the magnetic moment of a divalent ion in aqueous medium if its atomic number is 26.

19. Explain the following phenomenon giving reasons:

(i) Tyndall effect

(ii) Brownian movement

(iii) Physical adsorption decreases with increase in temperature.

20. For a first order reaction, show that time required for 99% completion is twice the time required for completion of 90% reaction.

21. An element exists in bcc lattice with a cell edge of 288 pm. Calculate its molar mass if its density is 7.2 g/cm^3.

22. Calculate $\Delta_rG°$ and log K_c for the following reaction at 298 K.

$2Cr(s) + 3Fe^{2+}(aq) \rightarrow 2Cr^{3+}(aq) + 3Fe(s)$

[Given: $E°_{cell} = 0.30$ V, 1F = 96500 C mol^{-1}]

23. Once there was a heavy downpour for about 3 hours in the early morning. Irfan and his family were finding it difficult to carry out their daily morning chores as the sewer water was flowing back into the toilets, the road in front of their house was flooded with water and they could not move out. On this very serious problem Irfan called a meeting of all the residents. In the meeting Irfan discussed the problem and said that we are using too much polythene bags and other plastic items which we throw here and there. All these move into the drains and sewer lines which get choked and do not allow flow of water. As these are non-biodegradable, they remain as such for a long time. So to overcome this problem, we should use bags made up of cloth or jute which are biodegradable.

Answer the following questions:

(i) Name the polymer which is biodegradable. Write the structures of monomers and the repeating unit.

(ii) Write two uses of this polymer.

(iii) Write any two values shown by Irfan.

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

(i) Propanal is more reactive than propanone towards nucleophilic reagents.

(ii) Electrophilic substitution in benzoic acid takes place at meta position.

(iii) Carboxylic acids do not give characteristic reactions of carbonyl group.

(b) Give simple chemical test to distinguish between the following pairs of compounds:

(i) Acetophenone and benzaldehyde

(ii) Benzoic acid and ethyl benzoate

OR

24(b). (a) Write structures of A, B, C and D in the following reaction sequence:

$CH_3COCl \xrightarrow{H_2/Pd-BaSO_4} A \xrightarrow{dil.\ NaOH} B \xrightarrow{\Delta} C \xrightarrow{CH_3MgBr/H_3O^+} D$

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

CH_3CHO, CH_3CH_2OH, CH_3OCH_3, CH_3COOH

25(a). (a) Explain why on addition of 1 mol glucose to 1 litre water the boiling point of water increases.

(b) Henry's law constant for CO_2 in water is 1.67 $\times$ 10^8 Pa at 298 K. Calculate the number of moles of CO_2 in 500 ml of soda water when packed under 2.53 $\times$ 10^5 Pa at the same temperature.

OR

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

(i) Ideal solution

(ii) Osmotic pressure.

(b) Calculate the boiling point elevation for a solution prepared by adding 10 g $CaCl_2$ to 200 g of water, assuming that $CaCl_2$ is completely dissociated. (K_b for water = 0.512 K kg mol^{-1}; Molar mass of $CaCl_2$ = 111 g mol^{-1})

26(a). (a) When concentrated sulphuric acid was added to an unknown salt present in a test tube a brown gas (A) was evolved. This gas intensified when copper turnings were added to this test tube. On cooling the gas (A) changed into a colourless solid (B). Identify (A) and (B). Write chemical reactions involved.

(b) Draw structure of $XeOF_4$.

OR

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

(i) Reducing character decreases from SO_2 to TeO_2.

(ii) $HClO_3$ is a stronger acid than HClO.

(iii) Xenon forms compounds with fluorine and oxygen only.

(b) Complete the following equations:

(i) $4NaCl + MnO_2 + 4H_2SO_4 \rightarrow$?

(ii) $6XeF_4 + 12H_2O \rightarrow$?

- End of Question Paper -