

CBSE Class 12 Chemistry 2015 - Set 56/1/1 - 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) Q. No. 1 to 5 are very short answer questions and carry 1 mark each.
- (iii) Q. No. 6 to 10 are short answer questions and carry 2 marks each.
- (iv) Q. No. 11 to 22 are also short answer questions and carry 3 marks each.
- (v) Q. No. 23 is a value based question and carry 4 marks.
- (vi) Q. No. 24 to 26 are long answer questions and carry 5 marks each.
- (vii) Use log tables if necessary, use of calculator is not allowed.

Questions

1. What is the number of atoms per unit cell (z) in a body-centred cubic structure?

2. In reference to surface chemistry, define dialysis.

3. What is the IUPAC name of the complex $[\text{Ni}(\text{NH}_3)_6]\text{Cl}_2$?

4. Draw the structure of 3-methylpentanal.

5. Complete the following reaction equation:
 $\text{C}_6\text{H}_5\text{N}_2\text{Cl} + \text{H}_3\text{PO}_2 + \text{H}_2\text{O} \rightarrow \text{---}$

6. Define osmotic pressure of a solution. How is the osmotic pressure related to the concentration of a solute in a solution?

7. Define the following terms:

- (i) Half-life of a reaction ($t_{1/2}$)
- (ii) Rate constant (k)

8. Draw the structures of the following:

- (i) H_2SO_4
- (ii) XeF_2

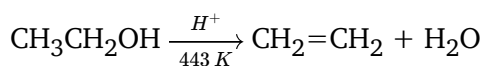
9(a). What is meant by 'disproportionation'? Give an example of a disproportionation reaction in aqueous solution.

OR

9(b). Suggest reasons for the following features of transition metal chemistry:

- (i) The transition metals and their compounds are usually paramagnetic.
- (ii) The transition metals exhibit variable oxidation states.

10. Explain the mechanism of the dehydration step of ethanol:



11. Define the following:

- (i) Schottky defect
- (ii) Frenkel defect
- (iii) F-centre

12. 45 g of ethylene glycol ($\text{C}_2\text{H}_4\text{O}_2$) is mixed with 600 g of water. Calculate

- (i) the freezing point depression and
- (ii) the freezing point of the solution

(Given: K_f of water = $1.86\text{ K kg mol}^{-1}$)

13. The rate constants of a reaction at 500 K and 700 K are 0.02 s^{-1} and 0.07 s^{-1} respectively. Calculate the value of activation energy, E_a . ($R = 8.314\text{ J K}^{-1}\text{ mol}^{-1}$)

14. Define the following terms:

- (i) Electrophoresis
- (ii) Adsorption
- (iii) Shape-selective catalysis

15(a). Outline the principles of refining of metals by the following methods:

- (i) Distillation
- (ii) Zone refining
- (iii) Electrolysis

OR

15(b). Write down the reactions taking place in different zones in the blast furnace during the extraction of iron. How is pig iron different from cast iron?

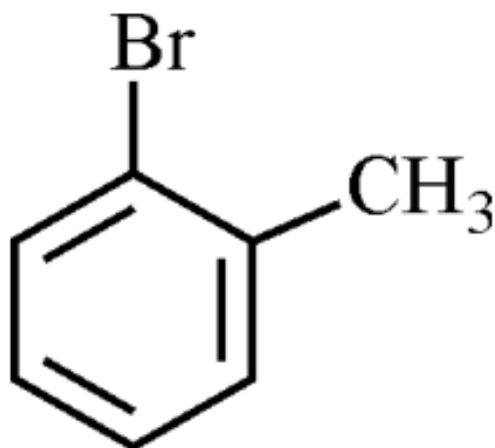
16. What is lanthanoid contraction? What are the consequences of lanthanoid contraction?

17. Indicate the types of isomerism exhibited by the following complexes:

- (i) $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)]^{2+}$
- (ii) $[\text{Co}(\text{en})_3]\text{Cl}_3$ (en = ethylene diamine)
- (iii) $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$

18. Name the following according to the IUPAC system:

- (i) $\text{CH}_3-\text{CH}(\text{OH})-\text{CH}_2-\text{CH}_3$
- (ii)



- (iii) $\text{CH}_3-\text{C}(\text{CH}_3)_2-\text{CH}_2-\text{Cl}$

19. How are the following conversions carried out?

- (i) Propene to propan-2-ol
- (ii) Benzyl chloride to benzyl alcohol
- (iii) Anisole to p-bromoanisole

20. An aromatic compound 'A' on treatment with aqueous ammonia and heating forms compound 'B' which on heating with Br_2 and KOH forms a compound 'C' of molecular formula $\text{C}_6\text{H}_7\text{N}$. Write the structures and IUPAC names of compounds A, B and C.

21. How are vitamins classified? Name the vitamin responsible for the coagulation of blood.

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

- (i) Buna-S
- (ii) Neoprene
- (iii) Teflon

23. Ramesh went to a departmental store to purchase groceries. On one of the shelves he noticed sugar-free tablets. He decided to buy them for his grandfather who was a diabetic. There were three types of sugar-free tablets. Ramesh decided to buy sucralose which was good for his grandfather's health.

- (i) Name another sugar-free tablet which Ramesh did not buy.
- (ii) Was it right to purchase such medicines without doctor's prescription?
- (iii) What quality of Ramesh is reflected above?

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

- (i) Molar conductivity (Λ_m)
 - (ii) Secondary batteries
 - (iii) Fuel cell
- (b) State the following laws:
- (i) Faraday's first law of electrolysis
 - (ii) Kohlrausch's law of independent migration of ions

OR

24(b). (a) Define the term degree of dissociation. Write an expression that relates the molar conductivity of a weak electrolyte to its degree of dissociation.

(b) For the cell reaction



Calculate the equilibrium constant at 25°C. How much maximum work would be obtained by operation of this cell?

$$E^\circ_{\text{Ni}^{2+}/\text{Ni}} = 0.25 \text{ V}, E^\circ_{\text{Ag}^+/\text{Ag}} = 0.80 \text{ V}$$

25(a). (a) Complete the following chemical reaction equations:

- (i) $\text{Cu} + \text{HNO}_3 \text{ (dilute)} \rightarrow$
- (ii) $\text{P}_4 + \text{NaOH} + \text{H}_2\text{O} \rightarrow$

- (b) (i) Why does $\text{R}_3\text{P}=\text{O}$ exist but $\text{R}_3\text{N}=\text{O}$ does not? (R = alkyl group)
- (ii) Why is dioxygen a gas but sulphur a solid?
- (iii) Why are halogens coloured?

OR

25(b). (a) Write balanced equations for the following reactions:

- (i) Chlorine reacts with dry slaked lime.
 - (ii) Carbon reacts with concentrated H_2SO_4 .
- (b) Describe the contact process for the manufacture of sulphuric acid with special reference to the reaction conditions, catalyst used and the yield in the process.

26(a). (a) Describe the following giving chemical equations:

- (i) Decarboxylation reaction
 - (ii) Friedel-Crafts reaction
- (b) How will you bring about the following conversions?
- (i) Benzoic acid to benzaldehyde
 - (ii) Benzene to m-nitroacetophenone
 - (iii) Ethanol to 3-hydroxybutanal

OR

26(b). (a) Describe the following reactions:

- (i) Acetylation
 - (ii) Aldol condensation
- (b) Write the main product of the following reactions:
- (i) $\text{CH}_3\text{COCH}_3 \rightarrow (\text{LiAlH}_4) \rightarrow ?$
 - (ii) $\text{Benzaldehyde} \rightarrow (\text{HNO}_3/\text{H}_2\text{SO}_4, 273-283 \text{ K}) \rightarrow ?$
 - (iii) $\text{CH}_3\text{COOH} \rightarrow (\text{PCl}_5) \rightarrow ?$

- End of Question Paper -