

CBSE Class 12 Chemistry 2014 - Set 56/1/2 - 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 30 questions. All questions are compulsory.
- (ii) All questions are compulsory.
- (iii) Questions number 1 to 8 are very short-answer questions and carry 1 mark each.
- (iv) Questions number 9 to 18 are short-answer questions and carry 2 marks each.
- (v) Questions number 19 to 27 are also short-answer questions and carry 3 marks each.
- (vi) Questions number 28 to 30 are long-answer questions and carry 5 marks each.
- (vii) Use Log Tables, if necessary. Use of calculators is not allowed.

Questions

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

2. Define 'Emulsions'.

3. Draw the structure of XeF_4 .

4. What role is played by CO_2 in getting pure alumina (Al_2O_3) in the extraction of aluminium?

5. Draw the structure of 2-bromopentane.

6. Why do transition elements show variable oxidation states?

7. Out of CH_3-NH_2 and $(\text{CH}_3)_3\text{N}$, which one has higher boiling point?

8. Write the IUPAC name of the following compound.



9. Differentiate between molarity and molality of a solution. How can we change the molality value of a solution into the molarity value?

10. (a) For a reaction, $\text{A} + \text{B} \rightarrow \text{Product}$, the rate law is given by, $\text{Rate} = k[\text{A}]^1[\text{B}]^2$. What is the order of the reaction?

(b) Write the unit of rate constant 'k' for the first order reaction.

11. Describe the underlying principles of the following processes:

(i) Froth floatation process of concentration of ores

(ii) Vapour phase refining of metals

12. Draw the structures of the following compounds:

(i) H_2SO_3

(ii) N_2O_5

13(a). Assign a reason for each of the following observations:

(i) The transition metals (with the exception of Zn, Cd and Hg) are hard and have high melting and boiling points.

(ii) The ionisation enthalpies (first and second) in the first series of the transition elements are found to vary irregularly.

OR

13(b). What is lanthanoid contraction? Write a consequence of lanthanoid contraction.

14. Assign reason for each of the following:

(i) Transition elements exhibit paramagnetic behaviour.

(ii) Co^{2+} is easily oxidised in the presence of a strong ligand.

15. Enumerate the reactions of glucose which cannot be explained by its open chain structure.

16. Write the equations involved in the following reactions:

(i) Williamson ether synthesis

(ii) Kolbe's reaction

17. Answer the following questions:

(i) Why are vitamin A and vitamin C essential for us?

(ii) What is the difference between a nucleoside and a nucleotide?

18. How are the following conversions carried out?

- (i) Propene to Propan-2-ol
- (ii) Ethyl chloride to Ethanal

19. Hydrogen peroxide, H_2O_2 (aq) decomposes to H_2O (l) and O_2 (g) in a reaction that is first order in H_2O_2 and has a rate constant $k = 1.06 \times 10^{-3} \text{ min}^{-1}$.

- (i) How long will it take for 15% of a sample of H_2O_2 to decompose?
- (ii) How long will it take for 85% of the sample to decompose?

20. Some ethylene glycol, $\text{HOCH}_2\text{CH}_2\text{OH}$, is added to your car's cooling system along with 5 kg of water. If the freezing point of the water-glycol solution is -15.0°C , what is the boiling point of the solution?

($K_b = 0.52 \text{ K kg mol}^{-1}$ and $K_f = 1.86 \text{ K kg mol}^{-1}$ for water)

21. The density of copper is 8.95 g cm^{-3} . It has a face centred cubic structure. What is the radius of copper atom?

(Atomic mass Cu = 63.5 g mol^{-1} , $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$)

22. Define the following terms:

- (i) Sorption
- (ii) Tyndall effect
- (iii) Electrophoresis

23. Account for the following:

- (i) Aniline does not give Friedel-Crafts reaction.
- (ii) Ethylamine is soluble in water whereas aniline is not.
- (iii) pK_b of methylamine is less than that of aniline.

24. (a) Which compound in each of the following pairs will react faster in $\text{S}_\text{N}2$ reaction with $-\text{OH}$ group?

- (i) CH_3Br or CH_3I
- (ii) $(\text{CH}_3)_3\text{CCl}$ or CH_3Cl

(b) Write the product of the following reactions:

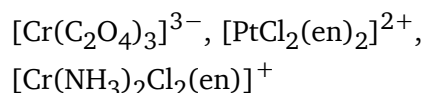
- (i) $\text{CH}_3-\text{Cl} + \text{KCN} \rightarrow ?$
- (ii) Chlorobenzene + $\text{CH}_3-\text{Cl} \xrightarrow{(\text{anhyd. AlCl}_3)}$
 $? + ?$

25(a). Write down the IUPAC name for each of the following complexes:

- (i) $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$
- (ii) $\text{K}_3[\text{Fe}(\text{CN})_6]$
- (iii) $[\text{NiCl}_4]^{2-}$

OR

25(b). Draw the structures of optical isomers of each of the following complex ions:



26. What are the following? Give one example of each.

- (i) Sweetening agents
- (ii) Food preservatives
- (iii) Antibiotics

27. Give the names of the monomers of the following polymers:

- (i) Neoprene
- (ii) Polystyrene
- (iii) Polypropene

28(a). (a) Define the terms conductivity and molar conductivity for the solution of an electrolyte. Comment on their variation with temperature.

(b) The measured resistance of a conductivity cell was 100 ohm. Calculate (i) the specific conductance and (ii) the molar conductance of the solution.

(Molar mass of KCl = 74.5 g mol^{-1} and cell constant = 1.25 cm^{-1})

OR

28(b). (a) Predict the products of electrolysis in each of the following:

(i) An aqueous solution of AgNO_3 with platinum electrodes.

(ii) An aqueous solution of H_2SO_4 with platinum electrodes.

(b) Estimate the minimum potential difference needed to reduce Al_2O_3 at 500°C . The Gibbs energy change for the decomposition reaction $\frac{2}{3}\text{Al}_2\text{O}_3 \rightarrow \frac{4}{3}\text{Al} + \text{O}_2$ is 960 kJ. ($F = 96500 \text{ C mol}^{-1}$)

29(a). (a) Describe:

(i) Aldol condensation

(ii) Cannizzaro reaction

(b) Describe a chemical test to distinguish between:

(i) Ethanal and Propanal

(ii) Benzaldehyde and Acetophenone

(iii) Propan-2-one and Propan-3-one

OR

29(b). (a) Draw the structures of the following compounds:

(i) 4-Chloropentan-2-one

(ii) But-2-en-1-al

(b) Write the product(s) in the following:

(i) $\text{CH}_3\text{COOH} \xrightarrow{(\text{Br}_2/\text{P})} ?$

(ii) $\text{CH}_3\text{CHO} \xrightarrow{(\text{LiAlH}_4)} ?$

(iii) $\text{CH}_3\text{COCH}_3 \xrightarrow{(\text{Zn-Hg} / \text{conc. HCl})} ?$

30(a). (a) Complete the following chemical equations:

(i) $\text{P}_4 + \text{NaOH} + \text{H}_2\text{O} \rightarrow$

(ii) $\text{XeF}_4 + \text{O}_2\text{F}_2 \rightarrow$

(b) How would you account for the following situations?

(i) The acidic strength of these compounds increases in the following order: $\text{PH}_3 < \text{H}_2\text{S} < \text{HCl}$

(ii) The oxidising power of oxoacids of chlorine follows the order: $\text{HClO}_4 < \text{HClO}_3 < \text{HClO}_2 < \text{HClO}$

(iii) In vapour state sulphur exhibits paramagnetic behaviour.

OR

30(b). (a) Using VSEPR theory predict the probable structures of the following:

(i) N_2O_3

(ii) BrF_3

(b) Arrange the following groups of substances in the order of the property indicated against each group:

(i) NH_3 , PH_3 , AsH_3 , SbH_3 – increasing order of boiling points.

(ii) O, S, Se, Te – increasing order of electron gain enthalpy with negative sign.

(iii) F_2 , Cl_2 , Br_2 , I_2 – increasing order of bond dissociation enthalpy.

- End of Question Paper -