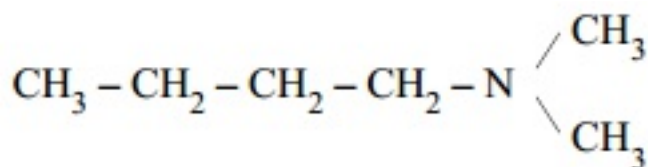


**CBSE Class 12 Chemistry (Theory)**  
**Outside Delhi Compartment 2017 Set 1**

**General Instructions:**

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

1. What type of stoichiometric defect is shown by ZnS?
2. What are emulsions? Give one example.
3. Write IUPAC name of the complex:  $[\text{CoCl}_2(\text{en})_2]^+$ .
4. What happens when phenol is oxidized by  $\text{Na}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4$ ?
5. Write IUPAC name of the following compound:



6. Following reactions can occur at cathode during the electrolysis of aqueous silver nitrate solution using Pt electrodes:  
 $\text{Ag}^+_{(\text{aq})} + \text{e}^- \rightarrow \text{Ag}(\text{s}); E^\circ = 0.80\text{V}$   
 $\text{H}^+_{\text{aq}} + \text{e}^- \rightarrow \frac{1}{2} \text{H}_{2(\text{g})}; E^\circ = 0.00\text{V}$   
On the basis of their standard electrode potential values, which reaction is feasible at cathode and why?
7. “Orthophosphoric acid ( $\text{H}_3\text{PO}_4$ ) is not a reducing agent whereas hypophosphorous acid ( $\text{H}_3\text{PO}_2$ ) is a strong reducing agent.” Explain and justify the above statement with the help of a suitable example.
8. a. Explain why  $\text{H}_2$  and  $\text{O}_2$  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

Derive integrated rate equation for rate constant of a first order reaction.

9. Explain the following observations:
- Copper atom has completely filled d orbitals ( $3d^{10}$ ) in its ground state, yet it is regarded as a transition element.
  - $Cr^{2+}$  is a stronger reducing agent than  $Fe^{2+}$  in aqueous solutions.
10. How will you carry out the following conversions:
- 2-Bromopropane to 1-bromopropane
  - Benzene to p-chloronitrobenzene
11. An element exists in bcc lattice with a cell edge of 288 pm. Calculate its molar mass if its density is  $7.2 \text{ g/cm}^3$ .
12. Calculate  $\Delta_r G^\circ$  and  $\log K_c$  for the following reaction at 298 K.
- $$2Cr_{(s)} + 3Cd_{(aq)}^{2+} \rightarrow 2Cr_{(aq)}^{3+} + 3Cd_{(s)}$$
- [Given:  $E^\circ_{\text{cell}} = +0.34 \text{ V}$ ,  $IF = 96500 \text{ C mol}^{-1}$ ]
13. For a first order reaction, show that time required for 99% completion is twice the time required for completion of 90% reaction.
14. Explain the following phenomenon giving reasons:
- Tyndall effect
  - Brownian movement
  - Physical adsorption decreases with increase in temperature.
15. a. Write the principle involved in the following:
- Zone refining of metals
  - Electrolytic refining
- b. Name the metal refined by each of the following processes:
- Mond Process
  - van Arkel Method
16. 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

- a. Give reasons for the following:
    - i. Compounds of transition elements are generally coloured.
    - ii.  $\text{MnO}$  is basic while  $\text{Mn}_2\text{O}_7$  is acidic.
  - b. Calculate the magnetic moment of a divalent ion in aqueous medium if its atomic number is 26.
17. For the complex ion  $[\text{Fe}(\text{en})_2\text{Cl}_2]^+$  write the hybridization type and magnetic behaviour. Draw one of the geometrical isomer of the complex ion which is optically active. [Atomic No.: Fe = 26]
18. 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  $\text{S}_{\text{N}}2$  displacement:  
 2-Bromo-2-Methylbutane, 1-Bromopentane, 2-Bromopentane
19. a. Why phenol is more acidic than ethanol?
- b. Write the mechanism of acid dehydration of ethanol to yield ether:
- $$2\text{CH}_3\text{CH}_2\text{OH} \xrightarrow[\text{413K}]{\text{H}^+} \text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$$
20. Identify A, B and C in the following reactions:
- i.  $\text{CH}_3\text{CH}_2\text{Cl} \xrightarrow{\text{KCN}} \text{A} \xrightarrow{\text{H}_2/\text{Ni}} \text{B} \xrightarrow{\text{CH}_3\text{COCl}/\text{Base}} \text{C}$
  - ii.  $\text{C}_6\text{H}_5\text{N}_2^+ 2\text{Cl}^- \xrightarrow{\text{HBF}_4} \text{A} \xrightarrow[\Delta]{\text{NaNO}_2/\text{Cu}} \text{B} \xrightarrow{\text{Sn}/\text{HCl}} \text{C}$
21. 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.
22. 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?

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:

- Name the polymer which is biodegradable. Write the structures of monomers and the repeating unit.
  - Write two uses of this polymer.
  - Write any two values shown by Irfan.
24. 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  $\text{CO}_2$  in water is  $1.67 \times 10^8$  Pa at 298 K. Calculate the number of moles of  $\text{CO}_2$  in 500 ml of soda water when packed under  $2.53 \times 10^5$  Pa at the

OR

- Define the following terms:
    - Ideal solution
    - Osmotic pressure.
  - Calculate the boiling point elevation for a solution prepared by adding 10 g  $\text{CaCl}_2$  to 200 g of water, assuming that  $\text{CaCl}_2$  is completely dissociated. same temperature.  
( $K_b$  for water =  $0.512 \text{ K kg mol}^{-1}$ ; Molar mass of  $\text{CaCl}_2$  =  $111 \text{ g mol}^{-1}$ )
25. 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  $\text{XeOF}_4$ .

OR

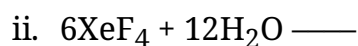
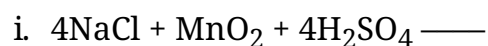
a. Account for the following:

I. Reducing character decreases from  $\text{SO}_2$  to  $\text{TeO}_2$ .

II.  $\text{HClO}_3$  is a stronger acid than  $\text{HClO}$ .

III. Xenon forms compounds with fluorine and oxygen only.

b. Complete the following equations:



26. 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.

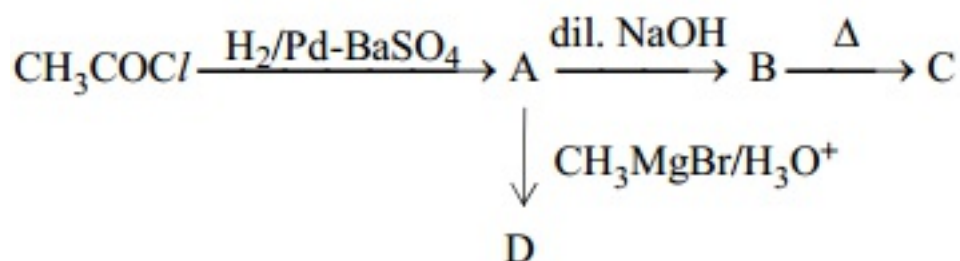
b. Give simple chemical test to distinguish between the following pairs of compounds:

i. Acetophenone and benzaldehyde

ii. Benzoic acid and ethylbenzoate

OR

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



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

