

CBSE
Class XII Chemistry
Board Paper – 2019

Time: 3 Hours

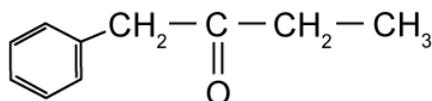
Total Marks: 70

General Instructions:

- All questions are compulsory.
- Section A: Questions numbers **1** to **5** are very short answer questions and carry **1** mark each.
- Section B: Questions numbers **6** to **12** are short answer questions and carry **2** marks each.
- Section C: Questions numbers **13** to **24** are also short answer questions and carry **3** marks each.
- Section D: Questions numbers **25** In **27** are long answer questions and carry **5** marks each.
- There is no overall choice. However, an internal choice has been provided in two questions of one mark, two questions of two marks, four questions of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.
- Use log tables if necessary. Use of a calculator is **not** allowed.

SECTION A

1. Write the IUPAC name of the following compound: [1]



2. Why is chloroform kept in dark-coloured bottles? [1]

3. Write the IUPAC name of the complex $[\text{Co}(\text{en})_2\text{Cl}_2]^+$ [1]

OR

Using IUPAC norms, write the formula of sodium tetrachloridonickelate(II).

4. What is the difference between a glycosidic linkage and a peptide linkage? [1]

OR

What is the difference between Nucleotide and Nucleoside?

5. Arrange the following in the increasing order of their acidic character: [1]
Ethanol, Phenol, Water

SECTION B

- 6.** [2]
- (a) Out of 0.1 molal aqueous solution of glucose and 0.1 molal aqueous solution of KCl, which one will have higher boiling point and why?
- (b) Predict whether van't Hoff factor(i) is less than one or greater than one in the following:
- (i) CH₃COOH dissolved in water
- (ii) CH₃COOH dissolved in benzene

- 7.** What happens when AgCl is doped with CdCl₂? What is the name of this defect? [2]

OR

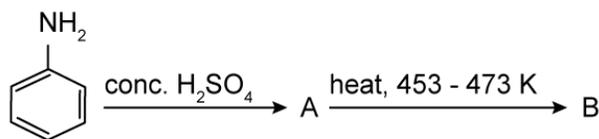
What type of defect is shown by NaCl in

- (a) Stoichiometric defects
- (b) Non-stoichiometric defects
- 8.** Complete and balance the following equations: [2]
- (a) NH₃ (excess) + Cl₂ \longrightarrow
- (b) XeF₆ + 2H₂O \longrightarrow

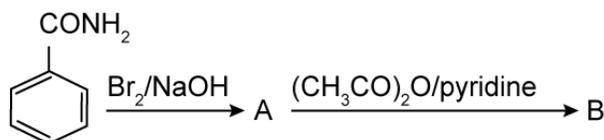
- 9.** Write any two oxoacids of sulphur and draw their structures. [2]

- 10.** Write the name of two fuels other than hydrogen used in a fuel cell. Write two advantages of a fuel cell over an ordinary cell. [2]

- 11.** Write the structures of compounds A and B in each of the following reactions: [2]
- (a)



(b)



- 12.** Account for the following: [2]
- (a) Gabriel phthalimide synthesis is not preferred for preparing aromatic primary amines.

- (b) On reaction with benzene sulphonyl chloride, the primary amine yields a product soluble in alkali, whereas the secondary amine yields a product insoluble in alkali.

SECTION C

13. [3]

- (a) Following reaction takes place in the cell:



Calculate $\Delta_r G^\circ$ of the reaction.

[Given $E^\circ_{(\text{Zn}^{2+}/\text{Zn})} = -0.76\text{V}$, $E^\circ_{(\text{Ag}^+/\text{Ag})} = 0.80\text{V}$, $1\text{F} = 96,600\text{C mol}^{-1}$]

- (b) How can you determine limiting molar conductivity (Λ°_m) for a strong electrolyte and a weak electrolyte?

14. Define the following with a suitable example of each: [3]

- (a) Coagulation
(b) Multimolecular colloid
(c) Gel

OR

- (a) Out of starch and ferric hydroxide sol, which one can easily be coagulated and why?
(b) What is observed when an emulsion is centrifuged?
(c) What is the role of promoters and poisons in catalysis?

15. [3]

- (a) An element crystallises in a bcc lattice with a cell edge of $3 \times 10^{-8}\text{cm}$. The density of the element is 6.89g cm^{-3} . Calculate the molar mass of the element ($N_A = 6.022 \times 10^{23}\text{mol}^{-1}$).
(b) What type of semiconductor is obtained when
(i) Ge is doped with In
(ii) Si is doped with P

16. A 0.1 M solution of Na_2SO_4 is dissolved to the extent of 95%. What would be its osmotic pressure at 27°C ? ($R = 0.0821\text{L atm K}^{-1}\text{mol}^{-1}$) [3]

17. Write down the reactions taking place in a blast furnace related to the metallurgy of iron in the temperature range 500–800 K. What is the role of limestone in the metallurgy of iron? [3]

OR

What happens when

- (a) Silver is leached with NaCN in the presence of air?

- (b) Copper matte is charged into a silica-lined converter and a hot air blast is blown?
- (c) NaCN is added in an ore containing PbS and ZnS during concentration by the froth flotation method?

- 18.** Give reasons for the following: [3]
- (a) Acidic character decreases from N_2O_3 to Bi_2O_3 .
- (b) All the P–Cl bonds in PCl_5 are not equivalent.
- (c) HF is a weaker acid than HCl in an aqueous solution.

- 19.** Write the structures of monomers used to obtain the following polymers : [3]
- (a) Natural rubber
- (b) PVC
- (c) Nylon-6.6

OR

Write the mechanism of free radical polymerisation of ethane.

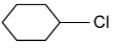
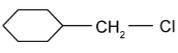
- 20.** [3]
- (a) Why are metal hydroxides a better alternative than sodium hydrogen carbonate in antacids?
- (b) Why is aspirin used in the prevention of heart attacks?
- (c) Why do antihistamines not affect the secretion of acid in the stomach?

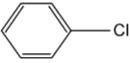
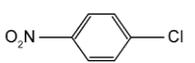
OR

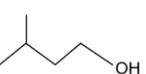
Define the following terms with a suitable example of each:

- (a) Tranquillisers
- (b) Antibiotics
- (c) Non-ionic detergents

- 21.** [3]

(a) Out of  and , which one is more reactive towards the S_N2 reaction and why?

(b) Out of  and , which one is more reactive towards the nucleophilic substitution reaction and why?

(c) Out of  and , which one is optically active and why?

- 22.** What happens when [3]

- (a) Sodium phenoxide is treated with CH_3Cl
 (b) $\text{CH}_2=\text{CH}-\text{CH}_2-\text{OH}$ is oxidised by PCC
 (c) Phenol is treated with $\text{CH}_3\text{COCl}/\text{anhydrous AlCl}_3$
 Write chemical equations in support of your answer.

23. [3]

- (a) Give one chemical test as evidence to show that $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5(\text{SO}_4)]\text{Cl}$ are ionisation isomers.
 (b) $[\text{NiCl}_4]^{2-}$ is paramagnetic, while $[\text{Ni}(\text{CO})_4]$ is diamagnetic though both are tetrahedral. Why? (Atomic no. of Ni = 28)
 (c) Write the electronic configuration of Fe(III) on the basis of crystal field theory when it forms an octahedral complex in the presence of (i) strong field ligand and (ii) weak field ligand. (Atomic no of Fe = 26)

24. Define the following terms with a suitable example of each: [3]

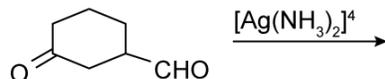
- (a) Tertiary structure of protein
 (b) Essential amino acids
 (c) Disaccharides

SECTION D

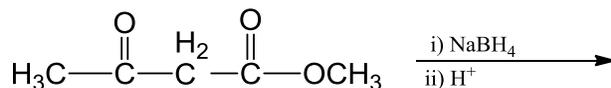
25. [5]

- (a) Predict the main product of the following reactions:

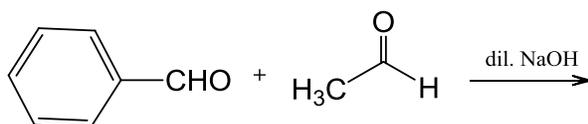
(i)



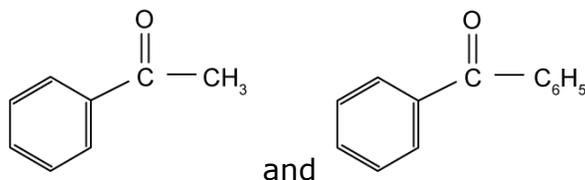
(ii)



(iii)



- (b) Give a simple chemical test to distinguish between



- (c) Why is alpha (α) hydrogen of carbonyl compounds acidic in nature?

OR

- (a) Write the main product formed when propanal reacts with the following reagents:
- 2 moles of CH_3OH in the presence of dry HCl
 - Dilute NaOH
 - $\text{H}_2\text{N}-\text{NH}_2$ followed by heating with KOH in ethylene glycol
- (b) Arrange the following compounds in the increasing order of their property as indicated:
- $\text{F}-\text{CH}_2\text{COOH}$, $\text{O}_2\text{N}-\text{CH}_2\text{COOH}$, CH_3COOH , HCOOH – acid character
 - Acetone, Acetaldehyde, Benzaldehyde, Acetophenone – reactivity towards addition of HCN

26.

[5]

- (a) Account for the following:
- Manganese shows the maximum number of oxidation states in the 3d series.
 - E° value for $\text{Mn}^{3+}/\text{Mn}^{2+}$ couple is much more positive than that for $\text{Cr}^{3+}/\text{Cr}^{2+}$.
 - Ti^{4+} is colourless, whereas V^{1+} is coloured in an aqueous solution.
- (b) Write the chemical equations for the preparation of KMnO_4 from MnO_2 . Why does the purple colour of acidified permanganate solution decolourise when it oxidises Fe^{2+} to Fe^{3+} ?

OR

- Write one difference between transition elements and p-block elements with reference to variability of oxidation states.
- Why do transition metals exhibit higher enthalpies of atomisation?
- Name an element of the lanthanoid series which is well known to show +4 oxidation state. Is it a strong oxidising agent or reducing agent?
- What is lanthanoid contraction? Write its one consequence.
- Write the ionic equation showing the oxidation of Fe(II) salt by acidified dichromate solution.

27.

[5]

- Define order of reaction. How does the order of a reaction differ from molecularity for a complex reaction?
- A first order reaction is 50% complete in 25 minutes. Calculate the time for 80% completion of the reaction.

OR

- The decomposition of hydrocarbon has value of rate constant as $2.5 \times 10^4 \text{ s}^{-1}$ at 27°C . At what temperature would the rate constant be $7.5 \times 10^6 \text{ s}^{-1}$ if energy of activation is $19.147 \times 10^3 \text{ J mol}^{-1}$?
- Write a condition under which a bimolecular reaction is kinetically first order. Give an example of such a reaction.
(Given: $\log 2 = 0.3010$, $\log 3 = 0.4771$, $\log 5 = 0.6990$)