Examination Papers, 2017

[All India Set-I, II, III]

Solution based on marking scheme by CBSE.

General Instructions:

(*i*) **All** questions are compulsory.

(*ii*) Questions number **1** to **5** are very-short answer questions and carry **1** mark each.

(*iii*) Questions number **6** to **10** are short-answer questions and carry **2** marks each.

(*iv*) Questions number **11** to **22** are also short-answer questions and carry **3** marks each.

(*v*) Questions number **23** is a value based question and carries **4** marks.

(*vi*) Questions number **24** to **26** are long-answer questions and carry **5** marks each.

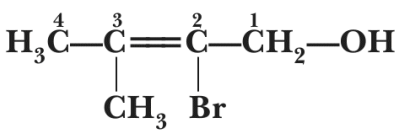
(*vii*) Use log tables, if necessary. Use of calculators is not allowed.

Set-I

1. Write the formula of the compound of phosphorus which is obtained when conc. HNO_3 oxidises P_4. **[1]**

Ans. H_3PO_4 [$P_4 + 20HNO_3(conc.) \longrightarrow 4H_3PO_4 + 20NO_2 + 4H_2O$]

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



Ans. 2-Bromo-3-methyl but-2-en-1-ol

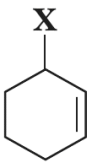
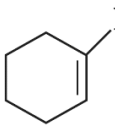
3. What is the effect of adding a catalyst on

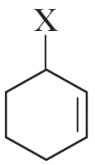
(*a*) Activation energy (E_a), and

(*b*) Gibbs energy (ΔG) of a reaction? **[1]**

Ans. (*a*) E_a decreases, when catalyst is added

(*b*) ΔG remains same, when catalyst is added.

4. **Out of**  **and**  **, which is an example of allylic halide?** **[1]**

Ans.  is an example of allylic halide.

5. **What type of colloid is formed when a liquid is dispersed in a solid? Give an example.** **[1]**

Ans. Gel. Example: cheese, hair gel. (*any one*)

6. **(*a*) Arrange the following compounds in the increasing order of their acid strength:**

***p*-cresol, *p*-nitrophenol, phenol**

(*b*) Write the mechanism (using curved arrow notation) of the following reaction:

$$CH_2{=}CH_2 \xrightarrow{H_3O^+} CH_3{-}CH_2^+ + H_2O$$ **[2]**

Or

Write the structures of the products when Butan-2-ol reacts with the following:

(*a*) CrO_3

(*b*) $SOCl_2$

Ans. (*a*) *p*-cresol < phenol < p-nitrophenol

(*b*) $CH_2{=}CH_2 + H_3O^+ \longrightarrow CH_3{-}CH_2{-}\overset{\oplus}{O}(H){-}H$

Protonated alcohol

$CH_3{-}CH_2{-}\overset{+}{O}(H){-}H \longrightarrow CH_3{-}\overset{\oplus}{C}H_2 + H_2O$

Ethyl carbocation

Or

(*a*) $CH_3{-}\underset{\text{Butan-2-ol}}{\overset{OH}{\overset{|}{C}}H{-}CH_2{-}CH_3} + C_3O_3 \xrightarrow[\text{or Cu/573 k}]{CrO_3} CH_3{-}\underset{\text{Butan-2-one}}{\overset{O}{\overset{\|}{C}}{-}CH_2{-}CH_3} + H_2O$

(*b*) $CH_3{-}\overset{OH}{\overset{|}{C}}H{-}CH_2{-}CH_3 + SOCl_2 \xrightarrow{SOCl_2} CH_3{-}\underset{\text{2-chlorobutane}}{\overset{Cl}{\overset{|}{C}}H{-}CH_2{-}CH_3} + SO_2 + HCl$

7. Calculate the number of unit cells in 8.1 g of aluminium if it crystallizes in a face-centred cubic (f.c.c) structure. (Atomic mass of Al = 27 g mol^{-1}) **[2]**

Ans. Z = 4, M = 27 g mol^{-1}

27 g of Al contains 6.023×10^{23} atoms

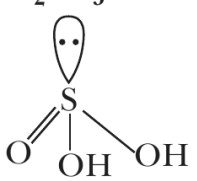
8.1 g of Al contains = $\frac{6.023 \times 10^{23}}{27} \times 8.1 = 18.069 \times 10^{22} = 1.8069 \times 10^{23}$

Number of unit cell cells = $\frac{1.8069 \times 10^{23}}{4} = 0.4517 \times 10^{23} = 4.517 \times 10^{22}$ unit cells.

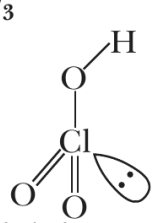
8. Draw the structures of the following:

(*a*) H_2SO_3 (*b*) $HClO_3$ **[2]**

Ans. (*a*)



(*b*)



9. Write the name of the cell which is generally used in hearing aids. Write the reactions taking place at the anode and the cathode of this cell. **[2]**

Ans. Mercury cell

Anode $Zn(Hg) + 2OH^- \longrightarrow ZnO(s) + H_2O + 2e^-$

Cathode $HgO(s) + H_2O(l) + 2e^- \longrightarrow Hg(l) + 2OH^-$

10. Write the structures of the following:

(*a*) Sodium dicyanidoaurate(I)

(*b*) Tetraamminechloridonitrito-N-platinum(IV) sulphate **[2]**

Ans. (*a*) $Na[Au(CN)_2]$

(*b*) $[Pt(NH_3)_4ClNO_2]SO_4$

11. (*a*) Based on the nature of intermolecular forces, classify the following solid: Silicon carbide, Argon

(*b*) ZnO turns yellow on heating. Why?

(*c*) What is meant by groups 12-16 compounds? Give an example. **[3]**

Ans. (*a*) Silicon carbide is covalent solid.

Argon is molecular solid.

(*b*) $ZnO \longrightarrow Zn^{2+} + \frac{1}{2}O_2 + 2e^-$

Because excess Zn^{2+} move to interstitial sites and the electrons move to neighbouring voids.

(*c*) Solid compounds prepared by combination of group 12 and 16 behave like semiconductors, e.g. ZnS, CdS. Bonds in these compounds have same ionic character along with covalent.

12. (*a*) The cell in which the following reaction occurs:

$2Fe^{3+}$ (*aq*) + $2I^-$ (*aq*) $\longrightarrow$ $2Fe^{2+}$ (*aq*) + I_2 (*s*)

has E°_{cell} = 0.236 V at 298 K. Calculate the standard Gibbs energy of the cell reaction. (Given: 1 F = 96,500 C mol^{-1})

(*b*) How many electrons flow through a metallic wire if a current of 0.5 A is passed for 2 hours? (Given: 1 F = 96,500 C mol^{-1}) **[3]**

E°_{cell} = 0.236 V

Ans. (*a*) At cathode: $2Fe^{3+} + 2e^- \longrightarrow 2Fe^{2+}$

At anode: $2I^- \longrightarrow I_2 + 2e^-$

$$n = 2$$

$$\Delta G^\circ = -nE^\circ F = -2 \times 0.236\ V \times 96500\ J$$

$$= -45548\ J\ mol^{-1} = -45.54\ kJ\ mol^{-1}$$

(*b*) $Q = I \times t = 0.5 \times 2 + 60 \times 60 = 3600\ C$

1.602×10^{-19} C is charge on 1 electron

3600 C is charge on $\frac{1}{1.602 \times 10^{-19}} \times 3600 = 2.25 \times 10^{22}$ electrons

13. (*a*) What type of isomerism is shown by the complex $[Co(NH_3)_5\ (SCN)]^{2+}$?

(*b*) Why is $[NiCl_4]^{2-}$ paramagnetic while $[Ni(CN)_4]^{2-}$ is diamagnetic? (Atomic number of Ni = 28)

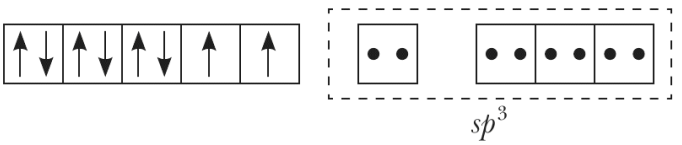
(*c*) Why are low spin tetrahedral complexes rarely observed? **[3]**

Ans. (*a*) Linkage isomerism

(*b*) $[NiCl_4]^{2-}$ has unpaired electrons Cl^- a weak field ligand will not cause pairing of electron whereas $[Ni(CN)_4]^{2-}$ does not have unpaired electrons because CN^- in strong field.

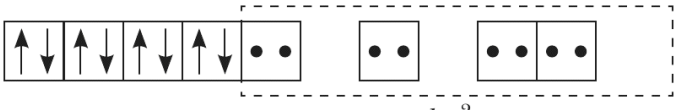
Ni(28) [Ar] 4s2 3d8

Ni^{2+}(28) [Ar] $4s^0 3d^8$,

$[NiCl_4]^{2-}$ 

sp^3

It is sp^3 hybridized, tetrahedral, paramagnetic due to unpaired electrons

$[Ni(CN)_4]^{2-}$ 

dsp^2

It has dsp^2 hybridization, square planar shape shape and dramagnetic due to absence of unpaired electrons.

(*c*) It is because Δt is less because Δt crystal field splitting energy is less. therefore, pairing does not take place and mostly tetrahedral complex are high spin and not low spin.

$$\Delta t = \frac{4}{9}\Delta_0$$

14. Write one difference in each of the following:

(*a*) Multimolecular colloid and Associated colloid

(*b*) Coagulation and Peptization

(*c*) Homogeneous catalysis and Heterogeneous catalysis **[3]**

Or

(*a*) Write the dispersed phase and dispersion medium of milk.

(*b*) Write one similarity between physisorption and chemisorption.

(*c*) Write the chemical method by which $Fe(OH)_3$ sol is prepared from $FeCl_3$.

Ans. (*a*)

Multimolecular colloid	Associated colloid
These consists of small molecules with diameters less than 1 nm Which aggregate to form colloidal solution. e.g. sulphur solution.	These colloids behave like strong electrolyte in low concentration but form colloidal solution in high concentration e.g. soaps and detergents.

(*b*)

Coagulation	Peptization
The process in which a colloidal solution changes into precipitate by adding electrolyte.	The process in which a freshly prepared precipitate is converted into colloidal solution in presence of stabilizing agent.

(*c*)

Homogeneous catalytes	Heterogeneous catalysis
The process in which catalyst and reactant are in same physical state.	The process in whch catalyst and reactants are not in same physical states.

Or

(*a*) In milk, liquid is dispersed in liquid, i.e. protein, fats lactose are dispersed in water.

(*b*) Both physisorption and chemisorption are exothermic i.e. heat is evolved. Both increase with in surface area.

(*c*) **Hydrolysis:** $FeCl_3$ is hydrolysed to get $Fe(OH)_3$ and $FeCl_3$ acts as peptising agent.

$$FeCl_3 + 3H_2O \xrightarrow{\text{Hydrolysis}} Fe(OH)_3 + 3HCl$$

15. A first order reaction taken 20 minutes for 25% decomposition. Calculate the time when 75% of the reaction will be completed. [3]

(Given: log 2 = 0.3010, log 3 = 0.4771, log 4 = 0.6021)

$$k = \frac{2.303}{t}\log\frac{[R]_0}{[R]}$$

Ans. t = 20 min, R = (100 – 25)% = 75 % of $[R]_0$

$$k = \frac{2.303}{20}\log\frac{[R]_0}{\frac{75}{100}[R]_0} = \frac{2.303}{20}(\log 4 - \log 3)$$

$$= \frac{2.303}{20}(0.6021 - 0.4771)$$

$$k = \frac{2.303}{20} \times 0.1250 \text{ mm}^{-1}$$

$$= \frac{0.2878}{20} = 1.439 \times 10^{-2} \text{ min}^{-1}$$

For 75 % completion of reaction:

$[R] = (100 - 75) = 25$ % of $[R_0]$

$$t = \frac{2.303}{k}\log\frac{[R_0]}{\frac{25}{100}[R]_0}$$

$$t = \frac{2.303}{k}\log 4$$

$$t = \frac{2.303}{1.436\times10^{-2}} \times 0.6021 = \frac{1.386}{1.436}\times10^{2} = \frac{138.6}{1.436} = 96.51 \text{ min}$$

16. The following compounds are given to you:

2-bromopentane, 2-bromo-2-methylbutane, 1-Bromopentane

(*a*) Write the compound which is most reactive towards S_N2 reaction.

(*b*) Write the compound which is most reactive towards β-elimination reaction.

(*c*) Write the compound which is most reactive towards β-elimination reaction. [3]

Ans. (*a*) 1-Bromopentane is most reactive towards S_N2 mechanism because it is 1° halide with least stearic hinderence.

(*b*) 2-Bromopentane is optically active because of presence of chiral 'C' atom.

(*c*) 2-Bromo-2-methyl butane is most reactive towards β-elimination because it is 3° halide.

17. Write the principle of the following:

(*a*) Zone refining

(*b*) Forth floatation process

(*c*) Chromatography **[3]**

Ans. (*a*) **Zone refining:** It is based on principle that impurities are more soluble in melt than pure metal.

(*b*) **Forth floatation process:** Sulphide ores are wet by oil whereas gangue particles are wet by water.

(*c*) **Chromatography:** It is based on principle of differential adsorption, i.e. difference substances get adsorbed on same adsorbent to different extent, therefore, get separated.

18. Write the structures of compounds A, B and C in the following reactions:

(*a*) $\mathbf{CH_3—COOH \xrightarrow{NH_3/\Delta} A \xrightarrow{Br_2/KOH(aq)} B \xrightarrow{CHCl_3 + alc.\ KOH} C}$

(*b*) $\mathbf{C_6H_5N_2^+BF_4^- \xrightarrow[\Delta]{NaNO_2/Cu} A \xrightarrow{Fe/HCl} B \xrightarrow{CH_3COCl\ /\ pyridine} C}$ **[3]**

Ans. (*a*) $CH_3—COOH \xrightarrow{NH_3/A} \underset{\text{'A'}}{CH_3CONH_2} \xrightarrow{Br_2/KOH} \underset{\text{'B'}}{CH_3NH_2} \xrightarrow[alc.KOH]{CHCl_3} \underset{\text{'C'}}{CH_3N{\equiv}C}$

(*b*) $C_6H_5N_2^+BF_4^- \xrightarrow[\Delta]{NaNO_2/Cu} \underset{\text{'A'}}{C_6H_5NO_2} \xrightarrow{Fe/HCl} \underset{\text{'B'}}{C_6H_5NH_2} \xrightarrow[pyridine]{CH_3COCl} \underset{\text{'C'}}{C_6H_5NHCOCH_3}$

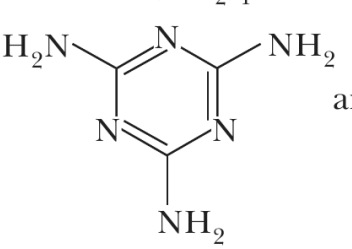
19. Write the structures of the monomers used for getting the following polymers:

(*a*) Nylon-6,6

(*b*) Melamine-formaldehyde polymer

(*c*) Buna-S **[3]**

Ans. (*a*) $HO—\overset{O}{\overset{\|}{C}}—(CH_2)_4—\overset{O}{\overset{\|}{C}}—OH$ and $H_2N—(CH_2)_6—NH_2$

(*b*)  and $H—\overset{O}{\overset{\|}{C}}—H$

(*c*) $CH_2{=}CH—CH{=}CH_2$ and $CH_2{=}CH—C_6H_5$

20. Define the following

(*a*) Anionic detergents

(*b*) Limited spectrum antibiotics

(*c*) Antiseptics **[3]**

Ans. (*a*) **Anionic detergents:** These detergents have large part of molecules which is anionic. These are sodium salt of sulphonated long chains of alcohols or hydrocarbon, e.g. $CH_3(CH_2)_{10}CH_2OSO_3^-Na^+$ (Sodium lauryl sulphate)

(*b*) **Limited spectrum antibiotic:** Those antibiotics which are affective against either gram positive or gram negative bacteria, e.g. penicillin.

(*c*) **Antiseptics:** Those chemical which kill or supress the growth of microorganism on cuts or wound without harming the living tissues, e.g dettol.

21. Give reasons for the following:

(*a*) Red phosphorus is less reactive than white phosphorus.

(*b*) Electron gain enthalpies of halogens are largely negative.

(*c*) N_2O_5 is more acidic than N_2O_3. **[3]**

Ans. (*a*) Red P_4 is polymeric and has more bond dissociation enthalpy than white P_4 which is monomeric.

(*b*) It is because halogens are smaller in size and have high effective nuclear charge. They attain stable electronic configuration on gaining one electron.

(*c*) Higher the oxidation state, more will be acidic character. Oxidation state of N is N_2O_5 is +5 whereas oxidation state of N in N_2O_3 is +3. Due to this reason N_2O_5 is more acidic than N_2O_3

22. Give reasons for the following

(*a*) Acetylation of aniline reduces its activation effect.

(*b*) CH_3NH_2 is more basic than $C_6H_5NH_2$.

(*c*) Although —NH_2 is o/p directing group, yet aniline on nitration gives a significant amount of *m*-nitroaniline. **[3]**

Ans. (*a*) $CH_3—\overset{\overset{O}{\|}}{C}—$ group is electron withdrawing, it reduces activation effect of —NH_2 group because it reduces electron density on nitrogen as well as benzene ring.

(*b*) It is because —CH_3 group is electron releasing and C_6H_5— group is electron withdrawing. CH_3— group increases electron density on 'N', whereas C_6H_5 reduces electron density on 'N'.

(*c*) It is because —NH_2 group gets protonated, $\overset{\oplus}{N}H_3$ is electron withdrawing and *m*-directing. NH_3 decreases electron density at *o* and *p*, therefore, electrophile will attack at *m*-position.

23. After watching a programme on TV about the presence of carcinogens (cancer causing agents) Potassium bromate and Potassium iodate in bread and other bakery products, Rupali a Class XII student decided to make others aware about the adverse effects of these carcinogens in foods. She consulted the school principal and requested him to instruct the canteen contractor to stop selling sandwiches, pizzas, burgers and other bakery products to the students. The principal took an immediate action and instructed the canteen contractor to replace the bakery products with some protein and vitamin rich food like fruits, salads, sprouts, etc. The decision was welcomed by the parents and the students.

After reading the above passage, answer the following questions:

(*a*) What are the values (at least two) displayed by Rupali?

(*b*) Which polysaccharide component of carbohydrates is commonly present in bread?

(*c*) Write the two types of secondary structures of proteins.

(*d*) Give two examples of water soluble vitamins. [4]

Ans. (*a*) Rupali is concerned about health of her fellow students and has sound knowledge of chemistry.

(*b*) Starch

(*c*) α-helix and β-pleated structure

(*d*) Vitamin B and C are water soluble.

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

(*i*) Transition metals show variable oxidation states.

(*ii*) Zn, Cd and Hg are soft metals.

(*iii*) E° value for the Mn^{3+}/Mn^{2+} couple is highly positive (+ 1.57 V) as compared to Cr^{3+}/Cr^{2+}.

(*b*) Write one similarity and one difference between the chemistry of lanthanoid and actinoid elements. [5]

Or

(*a*) Following are the transition metal ions of 3d series:

Ti^{4+}, V^{2+}, Mn^{3+}, Cr^{3+}

(Atomic numbers: Ti = 22, V = 23, Mn = 25, Cr = 24)

Answer the following:

(*i*) Which ion is most stable in an aqueous solution and why?

(*ii*) Which ion is a strong oxidising agent and why?

(*iii*) Which ion is colourless and why?

(*b*) Complete the following equations:

(*i*) $2MnO_4^- + 16H^+ + 5S^{2-} \longrightarrow$

(*ii*) $KMnO_4 \xrightarrow{\text{heat}}$

Ans. (*a*) (*i*) It is because electrons from both *s* and *d*-orbitals take part in bond formation. e.g. Mn has outer electronic configuration $4s^2 3d^5$, it shows +2 +3, +4, +6, +7 oxidation state due to participation of both 4*d* and 3*d* electrons.

(*ii*) It is because of weak metallic bond due to absence of unpaired electrons. Unpaired electrons form additional $d\pi$-$d\pi$ (*pi*, π) bond which is not possible in Zn, Cd, Hg. It is also due to large size of their atoms due to which metallic bond is weak.

(*iii*) It is because Mn^{2+} is more stable than Cr^{2+} due to half filled ($3d^5$) orbitals. Half filled orbitals ($3d^5$) is more stable than $3d^4$ in Cr^{2+}.

(*b*) Similarity

(*i*) In both *f*-orbital is progressively filled

(*ii*) Both show contraction in atomic and ionic size.

(*iii*) In both +3 most stable oxidation state. (*any one*)

Differences

(*i*) All actinoids are radioactive, only one lanthanoid is radioactive

(*ii*) Actinoids show +3, +4, +5, +6, +7 oxidation state where as lanthanoid show +2, +3, +4 oxidation states only. (*any one*)

Or

(*a*) (*i*) Cr^{3+} is most stable in aqueous solution due to half filled t_{2g}^3 orbital, smaller size and high hydration enthalpy.

(*ii*) Mn^{3+} is strong oxidising agent because it can one electrons to form Mn^{2+} when is more stable ($3d^5$).

(*iii*) Ti^{4+} is colourless because it does not have unpaired electrons and cannot undergo *d*-*d* transitions.

(*b*) (*i*) $2MnO_4^- + 16\ H^+ + 5\ s^{2-} \longrightarrow 2Mn^{2+} + 8H_2O + 5\ s$

(*ii*) $2KMnO_4 \xrightarrow{\text{Heat}} K_2MnO_4 + MnO_2 + O_2$

25. **(*a*) A 10% solution (by mass) of sucrose in water has a freezing point of 269.15 K. Calculate the freezing point of 10% glucose in water if the freezing point of pure water is 273.15 K.**

Give:

(Molar mass of sucrose = 342 mol^{-1})

(Molar mass of glucose = 180 mol^{-1})

(*b*) Define the following terms:

(*i*) Molality (*m*)

(*ii*) Abnormal molar mass **[5]**

Or

(*a*) 30 g of urea (m = 60 g mol^{-1}) is dissolved in 846 g of water. Calculate the vapour pressure of water for this solution if vapour pressure of pure water at 298 K is 23.8 mm Hg.

(*b*) Write two difference between ideal solutions and non-ideal solution.

Ans. (*a*) W_B = Mass of sucrose = 10 g, W_A = Mass of water = 10 g

$$\Delta T_f = K_f \times \frac{W_B}{M_B} \times \frac{1000}{W_A}$$

$$\Delta T_f = 273.15 - 269.15 = 4.0\ K$$

$$4.0 = K_f \times \frac{10}{342} \times \frac{1000}{90} \quad \ldots(i)$$

$$\Delta T_f = K_f \times \frac{10}{180} \times \frac{1000}{90} \quad \ldots(ii)$$

Dividing (*i*) by (*ii*) we get

$$\frac{4.0}{\Delta T_f} = \frac{180}{342}$$

$$\Delta T_f = \frac{4 \times 342}{180} = 7.6\ K$$

Freezing point = 273.15 – 7.60 = 265.55 K

(*b*) (*i*) **Molality**(*m*) is defined as number of moles of solute dissolved per kilogram of the solvent.

$$m = \frac{W_B}{M_B} \times \frac{1}{W_A\ in\ Kg}$$

(*ii*) **Abnormal molar mass:** The molar mass determined with the help of colligative property either due to association or dissociation of solute is called abnormal molar mass. It is generally different from the expected value when solute behaves normally, i.e. does not undergo association or dissociation, therefore, called 'abnormal'.

Or

(*a*)

$$\frac{P_A^0 - P_A}{P_A^0} = x_B = \frac{\frac{W_B}{M_B}}{\frac{W_B}{M_B} + \frac{W_A}{M_A}}$$

$$1 - \frac{P_A}{P_A^0} = \frac{\frac{W_B}{M_B}}{\frac{W_A}{M_A}} \qquad \left[\because \frac{W_B}{M_B} << \frac{W_A}{M_A}\right]$$

$$1 - \frac{P_A}{23.8} = \frac{\frac{30}{60}}{\frac{846}{18}}$$

$$1 - \frac{P_A}{23.8} = \frac{1}{2} \times \frac{18}{846}$$

$$\frac{P_A}{23.8} = 1 - \frac{9}{846} = \frac{837}{846}$$

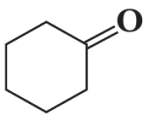
$$P_A = \frac{837}{846} \times 23.8$$

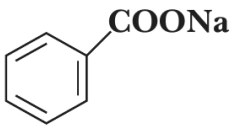
$$= \frac{19920.6}{846} = 23.54 \text{ mm of Hg.}$$

(*b*)

Ideal solution	Non-ideal solution
(*i*) If obey Raoult's law at every range of concentration (at all values of concentration) (*ii*) $\Delta H_{mix} = 0$, $\Delta V_{mix} = 0$	(*i*) If does not obey Raoult's law. (*ii*) $\Delta H_{mix} \neq 0$, $\Delta V_{mix} \neq 0$

26. (*a*) **Write the product(s) in the following reactions:**

(*i*)  **+ HCN ⟶ ?**

(*ii*)  **+ NaOH $\xrightarrow[\Delta]{CaO}$?**

(*iii*) $CH_3—CH=CH—CN \xrightarrow[(b)\ H_2O]{(a)\ DIBAL\text{-}H} ?$

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

(*i*) **Butanal and Butan-2-one**

(*ii*) **Benzoic acid and Phenol** **[5]**

Or

(*a*) **Write the reactions involved in the following:**

(*i*) **Etard reaction**

(*ii*) **Stephen reduction**

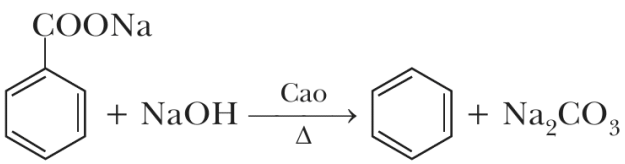
(*b*) **How will you convert the following in not more than two steps:**

(*i*) **Benzoic acid to Benzaldehyde**

(*ii*) **Acetophenone to Benzoic acid**

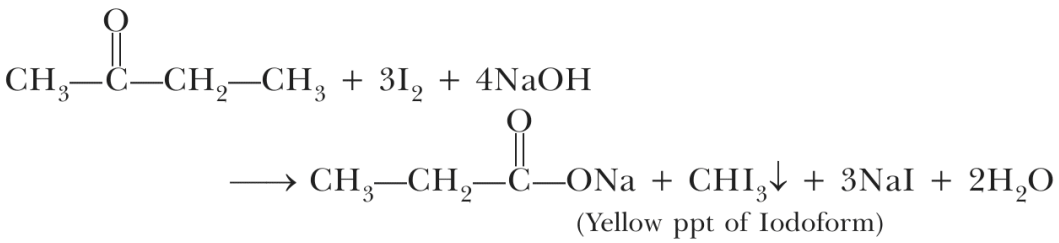
(*iii*) **Ethanoic acid to 2-Hydroxyethanoic acid**

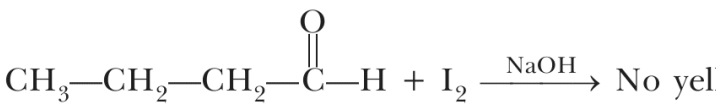
Ans. (*a*) (*i*) 

(*ii*) 

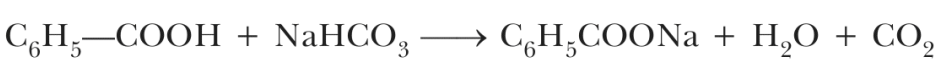
(*iii*) $CH_3—CH=CH—CN \xrightarrow[(b)\ H_2O]{(a)\ DIBAL\text{-}H} CH_3—CH=CH—\overset{\overset{O}{\|}}{C}—H$

(*b*) (*i*) Add I_2 and NaOH. Butanal will not react. 2-butanone will give yellow ppt of iodoform.



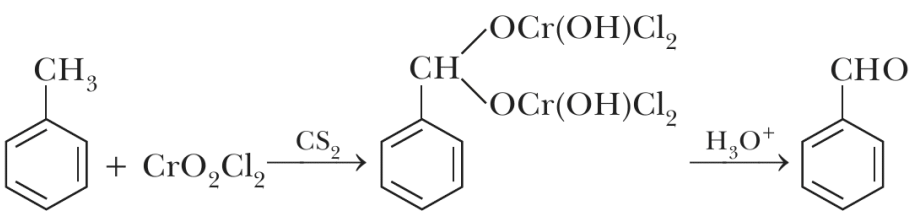


(*ii*) Add $NaHCO_3$ to each. Phenol will not react. Benzoic acid will give brisk effervescence due to CO_2.

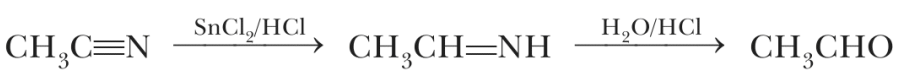


Or

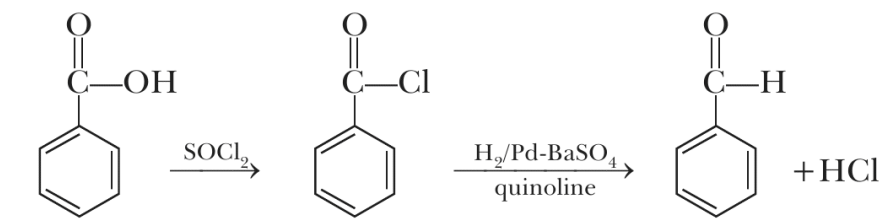
(*a*) (*i*) Etard reaction



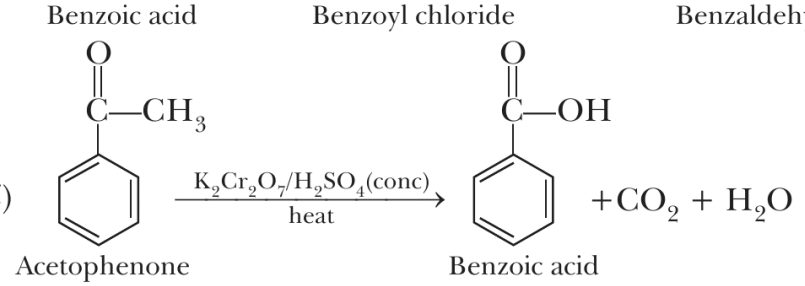
(*ii*) Stephan's reaction



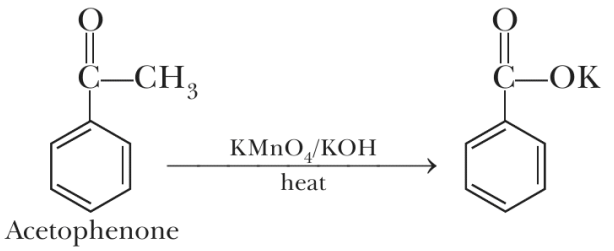
(*b*) (*i*)



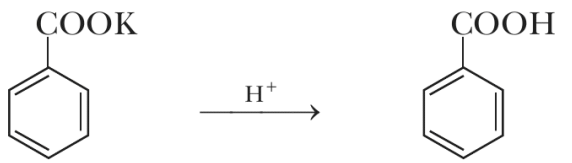
(*ii*)



or



Acetophenone



Benzoic acid

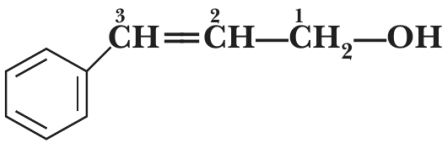
(*iii*) $CH_3COOH \xrightarrow{\text{red } P_4/Cl_2} CH_3(Cl)—COOH \xrightarrow{KOH\ (aq)} CH_2(OH)—COOH$

Ethanoic acid

2-Hydroxyethanoic acid

Set-II [UNCOMMON QUESTIONS TO SET-I]

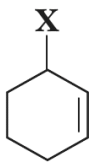
3. Write the IUPAC name of the following compound: **[1]**

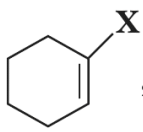


Ans. 3-Phenyl prop-2-en-1-ol

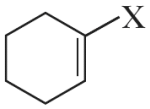
4. Write the formula of the compound of sulphur which is obtained when conc. HNO_3 oxidises S_8. **[1]**

Ans. H_2SO_4

5. Out of 

and 

, which is an example of vinylic halide? **[1]**

Ans. 

is an example of vinylic halide.

6. Using IUPAC norms write the formulae for the following:

(*a*) Tris(ethane-1,2-diamine) chromiun(III) chloride

(*b*) Potassium tetrahydroxozincate(II) **[2]**

Ans. (*a*) $[Cr(en)_3]Cl_3$

(*b*) $K_2[Zn(OH)_4]$

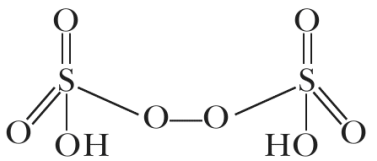
7. Draw the structures of the following:

(*a*) $H_2S_2O_8$

(*b*) ClF_3 **[2]**

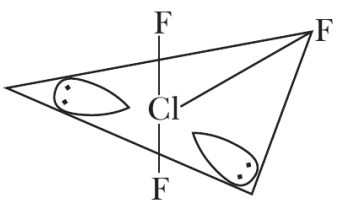
Ans. The structures of the

(*a*) $H_2S_2O_8$



$(H_2S_2O_8)$

(*b*) ClF_3



8. Write the name of the cell which is generally used in inverters. Write the reactions taking place at the anode and he cathode of this cell. **[2]**

Ans. Lead storage battery is used in inverters.

At anode: $Pb(s) + SO_4^{2-}(aq) \longrightarrow PbSO_4(s) + 2e^-$

At cathode: $PbO_2(s) + 4H^+ + SO_4^{2-} + 2e^- \longrightarrow PbSO_4(s) + 2H_2O$

11. (*a*) Write the principle of vapour phase refining.

(*b*) Write the role of dilute NaCN in the extraction of silver.

(*c*) What is the role of collectors in the froth floatation process? Give an example of a collector. **[3]**

Ans. (*a*) In vapour phase refining impure metal reacts with suitable reagent to form volatile compound and collected else where, it is then thermally decomposed to give pure metal.

(*b*) It forms a complex with Ag_2S which on reduction gives Ag metal.

$Ag_2S + 4NaCN \longrightarrow 2Na[Ag(CN)_2] + Na_2S$

(*c*) Collector enhances the non-wettability of sulphide ore by giving the hydrophobic (water repellent) properties, e.g. pine oil, fatty acids and xanthates.

16. Define the following:

(*a*) Anionic detergents

(*b*) Narrow spectrum antibiotics

(*c*) Antacids **[3]**

Ans. (*a*) **Anionic detergents:** These detergents have large part of molecules which is anionic. There are sodium salt of sulphonated long chain alcohols or hydrocarbons, e.g. $CH_3(CH_2)_{10}CH_2OSO_3^-Na^+$

(*b*) **Narrow spectrum antibiotic:** Those antibiotics which are affective against either gram positive or gram negative bacteria, e.g. penicillin.

(*c*) **Antacids:** Drugs which neutralize excess of acid and raise the pH to appropriate level in stomach are called antacids, e.g. $NaHCO_3$, Milk of magnesia.

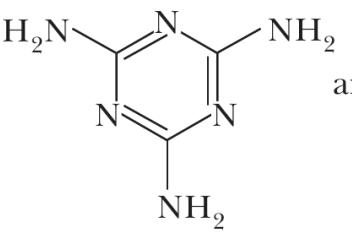
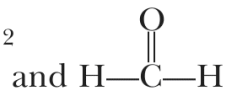
17. Write the structures of the monomers used for getting the following polymers:

(*a*) Polyvinyl chloride (PVC)

(*b*) Melamine-formaldehyde polymer

(*c*) Buna-N **[3]**

Ans. (*a*) $CH_2{=}CHCl$

(*b*)  and 

(*c*) $CH_2{=}CH{-}CH{=}CH_2$ and $CH{=}CHCN$

22. (*a*) Based on the nature of intermolecular forces, classify the following solids: Benzene, Silver

(*b*) AgCl shows Frenkel defect while NaCl does not. Give reason.

(*c*) What type of semiconductor is formed when Ge is doped with Al? **[3]**

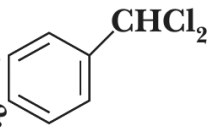
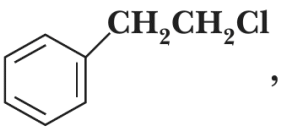
Ans. (*a*) Benzene: Molesular solid.

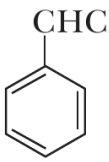
Silver: Metallic solid.

(*b*) AgCl shows frenkel defect as there is a difference in size of Ag^+ and Cl^- ions whereas both ions of Na^+ and Cl^- are of same size and do not fit into voids and do not show this defect.

(*c*) Ge belongs to group 14th whereas Al belongs to group 13th. Hence, the form *p*-type semiconductor.

Set-III [UNCOMMON QUESTIONS TO SET-I & SET-II]

1. Out of  **and**  **, which is an example of a benzylic halide?** **[1]**

Ans.  is benzylic halide.

3. Write the formula of the compound of iodine which is obtained when conc. HNO_3 oxidises I_2. **[1]**

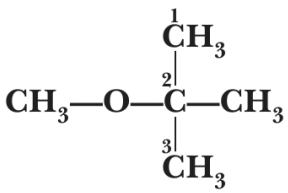
Ans. HIO_3

$I_2 + 10HNO_3(conc.) \longrightarrow 2HIO_3 + 10NO_2 + 4H_2O$

4. What type of colloid is formed when a gas is dispersed in a liquid? Give an example. **[1]**

Ans. Aerosols. For example: lemonade froth, whipped cream, etc.

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

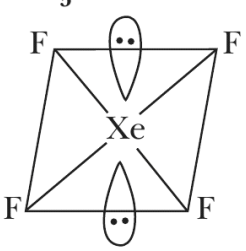


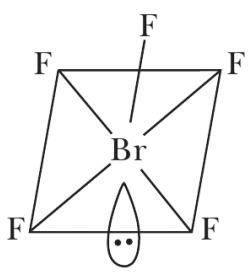
Ans. 2-methoxy-2-methyl propane

6. Draw the structures of the following:

(*a*) XeF_4

(*b*) BrF_5 **[2]**

Ans. (*a*) 

(*b*) 

7. Write the name of the cell which is generally used in transistors. Write the reactions taking place at the anode and the cathode of this cell. [2]

Ans. Dry cell

At anode: $Zn \longrightarrow Zn^{2+} + 2e^-$ (Oxidation)

At cathode: $NH_4^+ + MnO_2 + e^- \longrightarrow MnO(OH) + NH_3$ (Reduction)

9. Using IUPAC norms write the formulae for the following:

(*a*) Potassium trioxalatoaluminate(III)

(*b*) Dichloridobis(ethane-1,2-diamine)cobalt(III) [2]

Ans. (*a*) $K_3[Al(C_2O_4)_3]$

(*b*) $[CoCl_2(en)_2]^+$

14. (*a*) Based on the nature of intermolecular forces, classify the following solids: Sodium sulphate, Hydrogen

(*b*) What happens when $CdCl_2$ is dopped with AgCl?

(*c*) Why do ferrimagnetic substances show better magnetism than antiferromagnetic substances? [3]

Ans. (*a*) Sodium sulphate is ionic solid, hydrogen is molecular solid.

(*b*) Cation vacancies are created, conductance increases.

(*c*) Ferrimagnetic substance have small net magnetic moment whereas antiferromagnetic substance have zero net magnetic moment.

15. (*a*) Write the principle of electrolytic refining.

(*b*) Why does copper obtained in the extraction from copper pyrites have a blistered appearance?

(*c*) What is the role of depressants in the froth floatation process? [3]

Ans. (*a*) Impure metal acts as anode and changes into metal ions. These are deposited when electric current is passed on cathode and change into pure metal.

(*b*) It is due to sulphur dioxide which causes blisters on the surface of copper.

(*c*) Depressants like NaCN help to separate ZnS and Pbs. It allows Pbs to enter the froth but does not ZnS to enter froth.

19. Define the following:

(*a*) Cationic detergents

(*b*) Broad spectrum antibiotics

(*c*) Tranquilizers [3]

Ans. (*a*) **Cationic detergents:** Cationic detergent are quarternary ammonium salts of long chain tertiary aminies with acetates, chlorides or bromides as anions. Their catonic part is involved in cleansing action. For example: cetyldrimethylammonium bromide.

(*b*) **Broad spectrum antibiotic:** Those antibiotics which kill or inhibit a wide range of gram positive and gram negative bacteria. For example: Tetracyclin, chloramphenicol.

(*c*) **Tranquilizers:** Those chemical compounds which are used for treatment of stress and mild or severe mental diseases. For example: Seconal, biominal.