



## CHEMISTRY

### BOOKS - U-LIKE CHEMISTRY (HINGLISH)

### CBSE EXAMINATION PAPER 2020

#### Section A

1. Read the given passage and answer the questions number 1 to 5 that follow :

Colloidal particles always carry an electric charge which may be either positive or negative. For example, when  $AgNO_3$  solution is added to  $KI$  solution, a negatively charged colloidal sol is obtained. The presence of equal and similar charges on colloidal particles provide stability to the colloidal sol and if, somehow, charge is removed, coagulation of sol occurs. Lyophobic sols are readily coagulated as compare to lyophilic sols.

What is the reason for the charge on sol particles ?



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2. Read the given passage and answer the questions number 1 to 5 that follow :

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3. Read the given passage and answer the questions number 1 to 5 that follow :

Colloidal particles always carry an electric charge which may be either

positive or negative. For example, when  $AgNO_3$  solution is added to  $KI$  solution, a negatively charged colloidal sol is obtained. The presence of equal and similar charges on colloidal particles provide stability to the colloidal sol and if, somehow, charge is removed, coagulation of sol occurs. Lyophobic sols are readily coagulated as compare to lyophilic sols. Why a negatively charged sol is obtained on adding  $AgNO_3$  solution to  $KI$  solution ?



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4. Read the given passage and answer the questions number 1 to 5 that follow :

Colloidal particles always carry an electric charge which may be either positive or negative. For example, when  $AgNO_3$  solution is added to  $KI$  solution, a negatively charged colloidal sol is obtained. The presence of equal and similar charges on colloidal particles provide stability to the colloidal sol and if, somehow, charge is removed, coagulation of sol occurs. Lyophobic sols are readily coagulated as compare to lyophilic sols.

Name one method by which coagulation of lyophobic sol can be carried out.

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5. Read the given passage and answer the questions number 1 to 5 that follow :

Colloidal particles always carry an electric charge which may be either positive or negative. For example, when  $AgNO_3$  solution is added to  $KI$  solution, a negatively charged colloidal sol is obtained. The presence of equal and similar charges on colloidal particles provide stability to the colloidal sol and if, somehow, charge is removed, coagulation of sol occurs. Lyophobic sols are readily coagulated as compare to lyophilic sols. Out of  $KI$  or  $K_2SO_4$ , which electrolyte is better in the configuration of positive sol ?

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6. Name the method applied for the concentration of Bauxite ore in the extraction of Aluminium.

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7. Out of



which one is more reactive towards  $S_N1$  reaction?

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8. Write an isomer of  $C_3H_9N$  which gives foul smell of isocyanide when treated with chloroform and ethanolic NaOH.

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9. Which one of the following is an antidepressant drug ?

Chloramphenicol, Luminal, Bithional



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10. Write the name of component of starch which is water soluble.



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11. How many ions are produced from the complex  $[Co(NH_3)_5Cl]Cl_2$  in solution?

A. 4

B. 2

C. 3

D. 5

**Answer: C**



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12. In a lead storage battery

A.  $PbO_2$  is reduced to  $PbSO_4$  at the cathode.

B. Pb is oxidised to  $PbSO_4$  at the anode.

C. Both electrodes are immersed in the same aqueous solution of  $H_2SO_4$ .

D. All the above are true.

**Answer: D**



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13. The slope in the plot of  $\ln[R]$  vs. time gives

(where  $[R]$  is the final concentration of reactant.)

A.  $+k$

B.  $\frac{+k}{2.303}$

C.  $-k$

D.  $\frac{-k}{2.303}$

**Answer: C**

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14. The pair  $[Co(NH_3)_4Cl_2]Br_2$  and  $[Co(NH_3)_4]Cl_2$  will show

A. Linkage isomerism.

B. Hydrate isomerism.

C. Ionisation isomerism.

D. Coordinate isomerism.

**Answer: C**

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15. An  $\alpha$ -helix is a structural feature of

- A. Sucrose.
- B. Polypeptides.
- C. Nucleotides.
- D. Starch.

**Answer: B**



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16. Assertion (A) :  $F_2$  is a strong oxidising agent.

Reason (R) : Electron gain enthalpy of fluorine is less negative.

- A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).
- B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

**Answer: B**

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17. Assertion (A) :  $(CH_3)_3C - O - CH_3$  gives  $(CH_3)_3C - I$  and  $CH_3OH$  on treatment with HI.

Reason (R) : The reaction occurs by  $S_N1$  mechanism.

A. Both Assertion (A) and Reason (R) are correct statements, and

Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but

Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

**Answer: A**



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**18.** Assertion (A) : Transition metals have low melting points.

Reason (R ) : The involvement of greater number of  $(n - 1)d$  and  $ns$  electrons in the interatomic metallic bonding.

A. Both Assertion (A) and Reason (R) are correct statements, and

Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but

Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

**Answer: D**



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19. Assertion (A) : Hydrolysis of an ester follows first order kinetics.

Reason (R) : Concentration of water remains nearly constant during the course of the reaction.

A. Both Assertion (A) and Reason (R) are correct statements, and

Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but

Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

**Answer: A**



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20. Assertion (A) : Benzoic acid does not undergo Friedal-Crafts reaction.

Reason (R) : The carboxyl group is activating and undergo electrophilic

substitution reaction.

- A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).
- B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).
- C. Assertion (A) is correct, but Reason (R) is incorrect statement.
- D. Assertion (A) is incorrect, but Reason (R) is correct statement.

**Answer: C**

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## Section B

1. What happens when

(i) a pressure greater than the osmotic pressure is applied on the

solution side separated from solvent by a semipermeable membrane ?

(ii) acetone is added to pure ethanol ?

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2. Write the principle of the following refining methods :

(a) vapour phase refining

(b) chromatography

OR

Write chemical equations involved to obtain :

(i)  $Cu$  from  $Cu_2S$

(ii)  $Ag$  from  $[Ag(CN)_2]^-$  complex

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3. Write the balanced chemical equations involved in the preparation of  $KMnO_4$  from pyrolusite ore ( $MnO_2$ ).

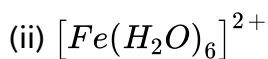
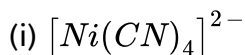
OR

Write the balanced ionic equations showing the oxidising action of

acidified dichromate  $[Cr_2O_7^{2-}]$  solution with (i) Iron (II) Ion and (ii) Tin (II) ion.

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4. Write the IUPAC names and hybridisation of the following complexes :



(Given : Atomic number  $Ni = 28$ ,  $Fe = 26$ )

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5. Define the following terms with a suitable example in each:

(i) Antibiotics (ii) Antiseptics

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6. Write the reactions showing the presence of following in the open structure of glucose :

(i) A carbonyl group (ii) Straight chain with six carbon atoms

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7. State Henry's law. Calculate the solubility of  $CO_2$  in water at 298 K under 760 mm Hg. [ $K_H$  for  $CO_2$  in water at 298K is  $1.25 \times 10^6$  mm Hg]

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## Section C

1. The freezing point of a solution containing 5g of benzoic acid ( $M = 122 \text{ g mol}^{-1}$ ) in 35g of benzene is depressed by 2.94 K. What is the percentage association of benzoic acid if it forms a dimer in solution. [ $K_f$  for benzene =  $4.9 \text{ K kg mol}^{-1}$  ]

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2. The rate constant for the first order decomposition of  $N_2O_5$  is given by the following equation:  $k = (2.5 \times 10^{14} s^{-1}) e^{(-25000K) / T}$

Calculate  $E_a$  for this reaction and rate constant if its half-life period be 300 minutes.

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3. Write the name and structures of monomer(s) in the following polymers :

(i) Nylon 6 (ii) PVC (iii) Neoprene

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4. Following ions are given :

$Cr^{2+}$ ,  $Cu^{2+}$ ,  $Cu^+$ ,  $Fe^{2+}$ ,  $Fe^{3+}$ ,  $Mn^{3+}$

Identify the ion which is

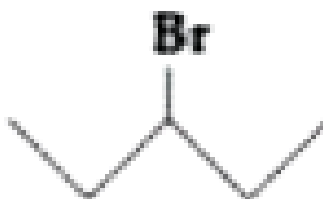
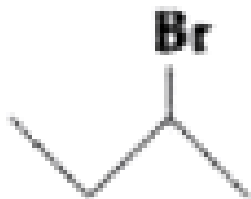
- (i) a strong reducing agent.
- (ii) unstable in aqueous solution.
- (iii) a strong oxidising agent.

Give suitable reason in each.

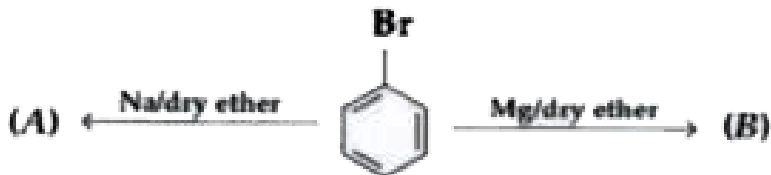
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5. (i) Write the structure of major alkene formed by  $\beta$ -elimination of 2, 2, 3-trimethyl-3-bromopentane with sodium ethoxide in ethanol.

(ii) Which one of the compounds in the following pairs is chiral ?



(iii) Identify (A) and (B) in the following :



OR

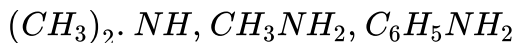
How can you convert the following ?

- (i) But-1-ene to 1-iodobutane
- (ii) Benzene to acetophenone
- (iii) Ethanol to propanenitrile

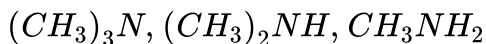
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6. Arrange the following compounds as directed :

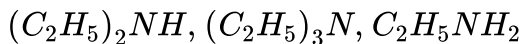
(i) In increasing order of solubility in water :



(ii) In decreasing order of basic strength in aqueous solution :

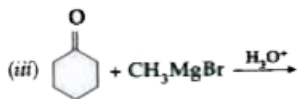
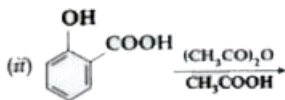
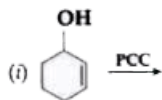


(iii) In increasing order of boiling point :



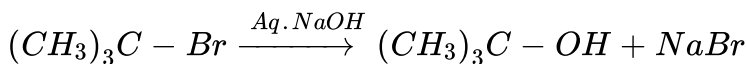
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7. Write the product(s) of the following reaction :



OR

(a) Write the mechanism of the following  $S_N1$  reaction :



(b) Write the equation for the preparation of 2-methyl-2-methoxypropane by Williamson synthesis.

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## Section D

1. (a) The electrical resistance of a column of  $0.05M KOH$  solution of length 50 cm and area of cross-section  $0.625cm^2$  is  $5 \times 10^3$  ohm. Calculate its resistivity, conductivity and molar conductivity.

(b) Predict the products of electrolysis of an aqueous solution of  $CuCl_2$

with platinum electrodes.

[Given \_\_\_\_\_ :]

$$E_{Cu^{2+}/Cu}^{\circ} = +0.34V, E_{\left(\frac{1}{2}Cl_2/Cl^{-}\right)}^{\circ} = +1.36V, E_{H^{+}/H_2(g),Pt}^{\circ} = 0.00V,$$

]

OR

(a) Calculate e.m.f. of the following cell :



$$[\text{Given : } E_{Zn^{2+}/Zn}^{\circ} = -0.76V, E_{Ag^{+}/Ag}^{\circ} = +0.80V, \log 10 = 1]$$

(b) X and Y are two electrolytes. On dilution molar conductivity of 'X' increases 2.5 times while that Y increases 25 times. Which of the two is a weak electrolyte and why ?

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2. (a) An organic compound (A) having molecular formula  $C_4H_8O$  gives orange red precipitate with 2, 4-DNP reagent. It does not reduce Tollens' reagent but gives yellow precipitate of iodoform on heating with  $NaOH$  and  $I_2$ . Compound (A) on reduction with  $NaBH_4$  gives compound (B) which undergoes dehydration reaction on heating with cone.  $H_2SO_4$  to

form compound (C). Compound (C) on ozonolysis gives two molecules of ethanal.

Identify (A), (B) and (C) and write their structures. Write the reactions of compound (A) with (i)  $NaOH / I_2$  and (ii)  $NaBH_4$ .

(b) Give reasons :

(i) Oxidation of propanal is easier than propanone.

(ii)  $\alpha$ -hydrogen of aldehydes and ketones is acidic in nature.

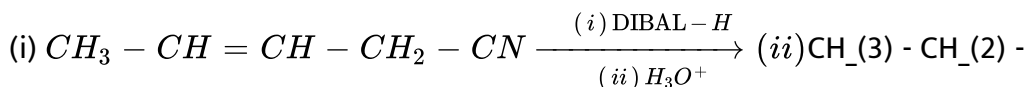
Or

(a) Draw structures of the following derivatives :

(i) Cyanohydrin of cyclobutanone

(ii) Hemiacetal of ethanal

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



OH overset(CrO<sub>2</sub>) (to)

(c) How can you distinguish between propanal and propanone ?



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3. (a) Account for the following :

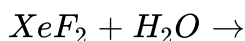
(i) Tendency to show - 2 oxidation state decreases from oxygen to tellurium.

(ii) Acidic character increases from HF to HI.

(iii) Moist  $SO_2$  gas acts as a reducing agent.

(b) Draw the structure of an oxoacid of phosphorus containing P - O - P linkage.

(c) Complete the following equation :



OR

(a) Among the hydrides of group 16, write the hydride

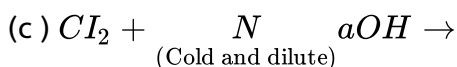
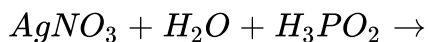
(i) which is a strong reducing agent ?

(ii) which has maximum bond angle ?

(iii) which is most thermally stable ?

Give suitable reason in each.

(b) Complete the following equations :





## Section A

1. Read the given passage and answer the question number 1 to 5 that follows:

The halogens have the smallest atomic radii in their respective periods.

The atomic radius of fluorine is extremely small. All halogens exhibit -1 oxidation state. They are strong oxidising agents and have maximum negative electron gain enthalpy. Among halogens, ionisation enthalpy is higher for fluorine than expected whereas bond dissociation enthalpy, m.p and b.p and electron gain enthalpy are quite lower than expected. Halogens react with hydrogen to give hydrogen halides (HX) and combine amongst themselves to form a number of compounds of the type  $XX'$ ,  $XX'_3$ ,  $XX'_5$  and  $XX'_7$  called inter-halogens.

Why halogens have maximum negative electron gain enthalpy?





2. Read the given passage and answer the question number 1 to 5 that follows:

The halogens have the smallest atomic radii in their respective periods.

The atomic radius of fluorine is extremely small. All halogens exhibit -1 oxidation state. They are strong oxidising agents and have maximum negative electron gain enthalpy. Among halogens, ionisation enthalpy is higher for fluorine than expected whereas bond dissociation enthalpy, m.p and b.p and electron gain enthalpy are quite lower than expected. Halogens react with hydrogen to give hydrogen halides (HX) and combine amongst themselves to form a number of compounds of the type,  $XX'$ ,  $XX'_3$ ,  $XX'_5$  and  $XX'_7$  called inter-halogens.

Why fluorine shows anomalous behaviour as compared to other halogens?



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3. Read the given passage and answer the question number 1 to 5 that follows:

The halogens have the smallest atomic radii in their respective periods.

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Arrange the hydrogen halides (HF to HI) in the decreasing order of their reducing character.



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4. Read the given passage and answer the question number 1 to 5 that follows:

The halogens have the smallest atomic radii in their respective periods.

The atomic radius of fluorine is extremely small. All halogens exhibit -1 oxidation state. They are strong oxidising agents and have maximum negative electron gain enthalpy. Among halogens, ionisation

enthalpy are higher for fluorine than expected whereas bond dissociation enthalpy, m.p and b.p and electron gain enthalpy are quite lower than expected. Halogens react with hydrogen to give hydrogen halides (HX) and combine amongst themselves to form a number of compounds of the type,  $XX'$ ,  $XX'_3$ ,  $XX'_5$  and  $XX'_7$  called inter-halogens.

Why fluorine is a stronger oxidising agent than chlorine.



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5. Read the given passage and answer the question number 1 to 5 that follows:

The halogens have the smallest atomic radii in their respective periods.

The atomic radius of fluorine is extremely small. All halogens exhibit -1 oxidation state. They are strong oxidising agents and have maximum negative electron gain enthalpy. Among halogens, bond dissociation enthalpy are higher for fluorine than expected whereas bond dissociation enthalpy, m.p and b.p and electron gain enthalpy are quite lower than expected. Halogens react with hydrogen to give hydrogen halides (HX) and combine amongst themselves to form a number of compounds of

the type,  $XX'$ ,  $XX'_3$ ,  $XX'_5$  and  $XX'_7$  called inter-halogens.

What are the sizes of X and X' in the interhalogen compounds?

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6. Name the cell used in hearing aids and watches.

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7. How much charge in terms of Faraday is required to reduce one mol of  $MnO_4^-$  to  $Mn^{2+}$ ?

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8. Write the slope value obtained in the plot of  $\log [R_0] / [R]$  vs time for a first order reaction.

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9. Name the sweetening agent used in the cooking of sweets for a diabetic patient.

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10. Name the polymer which is used for making electrical switches and combs.

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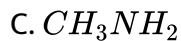
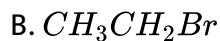
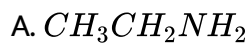
11. The conversion of an alkyl halide into an alcohol by aqueous NaOH is classified as

- A. a dehydrohalogenation reaction
- B. a substitution reaction
- C. an addition reaction
- D. a dehydration reaction

**Answer:**

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12.  $CH_3CONH_2$  on reaction with NaOH and  $Br_2$  in alcoholic medium gives



**Answer:**

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13. Amino acids are

A. acidic

B. basic

C. amphoteric

D. neutral

**Answer:**

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**14.** Assertion (A): Conductivity of an electrolyte increases with decrease in concentration.

Reason (R ): Number of ions per unit volume decreases on dilution.

A. Both Assertion (A) and Reason (R ) are correct statements, and

Reason ( R) is the correct explanation of the Assertion (A)

B. Both Assertion (A ) and Reason ( R) are correct statements, but

Reason ( R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R ) is incorrect statement

D. Assertion (A) is incorrect, but Reason (R ) is correct statement.

**Answer: A**



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**15.** Assertion (A): The C-O-C bond angle in ethers is slightly less than tetrahedral angle.

Reason (R ): Due to the repulsive interaction between the two alkyl groups in ethers.

A. Both Assertion (A) and Reason (R ) are correct statements, and

Reason ( R) is the correct explanation of the Assertion (A)

B. Both Assertion (A ) and Reason ( R) are correct statements, but

Reason ( R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R ) is incorrect statement

D. Assertion (A) is incorrect, but Reason (R ) is correct statement.



**Answer: C**



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**16.** Assertion (A): Low spin tetrahedral complexes are rarely observed.

Reason (R ): Crystal field splitting energy is less than pairing energy for tetrahedral complexes.

A. Both Assertion (A) and Reason (R ) are correct statements, and

Reason ( R) is the correct explanation of the Assertion (A)

B. Both Assertion (A ) and Reason ( R) are correct statements, but

Reason ( R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R ) is incorrect statement

D. Assertion (A) is incorrect, but Reason (R ) is correct statement.

**Answer: B**



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17. Assertion (A): Elevation in boiling point is a colligative property.

Reason (R ): Elevation in boiling point is directly proportional to molarity.

A. Both Assertion (A) and Reason (R ) are correct statements, and

Reason ( R) is the correct explanation of the Assertion (A)

B. Both Assertion (A ) and Reason ( R) are correct statements, but

Reason ( R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R ) is incorrect statement

D. Assertion (A) is incorrect, but Reason (R ) is correct statement.

**Answer: A**



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18. Assertion (A): Oxidation of ketones is easier than aldehydes.

Reason ( R ) : C-C bond of ketomes is stronger than C-H bond of aldehydes.

- A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A)
- B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)
- C. Assertion (A) is correct, but Reason (R) is incorrect statement
- D. Assertion (A) is incorrect, but Reason (R) is correct statement.

**Answer: D**

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## Section B

1. State Raoult's law for a solution containing volatile components. What is the similarity between Raoult's law and Henry's law?

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2. Write the role of

(a) Dilute NaCN in the extraction of gold.

(b) CO in the extraction of Iron.



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3. How is leaching carried out in the case of low grade copper ores? Name the method used for refining fo copper metal.



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4. Define adsorption with an example. What is the role of adsorption in heterogeneous catalysis?



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5. Define Brownian movement. What is the cause of Brownian movement in colloidal particles? How is it responsible for the stability of colloidal

Sol?

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6. Write the IUPAC name and hybridisation of the complex  $[Fe(CN)_6]^{3-}$

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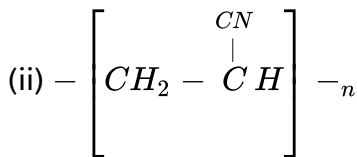
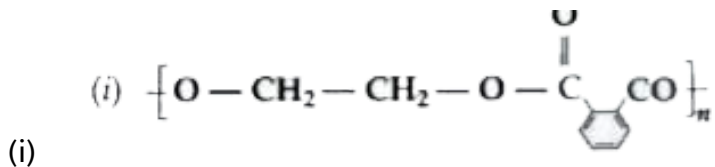
7. What is the difference between an ambidentate ligand and a chelating ligand?

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8. How do antiseptics differ from disinfectants? Name a substance which can be used as a disinfectant as well as an antiseptic.

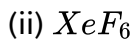
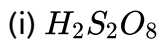
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9. Identify the monomers in the following polymers:



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10. Draw the structures of the following:



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1. A 0.01m aqueous solution of  $AlCl_3$  freezes at  $-0.068^\circ C$  Calculate the percentage of dissociation.

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2. When a steady current of 2A was passed through two electrolytic cells A and B containing electrolytes  $ZnSO_4$  and  $CuSO_4$  connected in series, 2g of cu were deposited at the cathode of cell B. How long did the current flow? What mass of Zn was deposited at cathode of cell A?

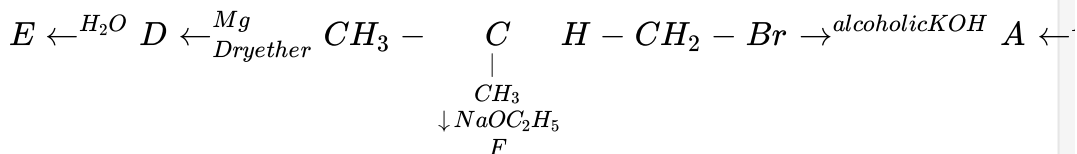
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3. Differentiate between following:

- (i) Amylose and amylopectin.
- (ii) Globular protein and Fibrous protein
- (iii) Nucleotide and Nucleoside.

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4. Identify A,B,C,D,E and F in the following:



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5. Give the structures of final products expected from the following reactions:

(i) Hydroboration of propene followed by oxidation with  $H_2O_2$  in alkaline medium.

(ii) Dehydration of  $(CH_3)_3C - OH$  by heating it with 20%  $H_3PO_4$  at 358k.

(iii) Heating of



With HI.

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6. How can you convert the following?

(i) Phenol to o-hydroxybenzaldehyde.

(ii) Methanal to ethanol

(iii) Phenol to phenyl ethanoate.

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7. Give reasons:

(i) Aniline does not undergo Friedal Crafts reaction.

(ii) Aromatic primary amines cannot be prepared by Gabriel,s phthalimide synthesis.

(ii) Aliphatic amines are stronger bases than ammonia.

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8. Write three differences between lyophobic sol and lyophilic sol.

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9. Define the following terms:

- (i) Protective colloid
- (ii) Zeta potential
- (iii) Emulsifying agent

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## Section D

1. (a) Give reasons:

- (i) Transition metals and their compounds show catalytic activities.
- (ii) Separation of a mixture of Lanthanoid elements is difficult.
- (iii) Zn, Cd and Hg are soft and have low melting point.

(b) Write the preparation of the following:

- (i)  $Na_2Cr_2O_7$  from  $Na_2CrO_4$
- (ii)  $K_2MnO_4$  from  $MnO_2$

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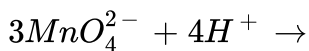
2. (a) Account for the following

(i)  $Ti^{3+}$  is coloured whereas  $Sc^{3+}$  is colourless in aqueous solution.

(ii)  $Cr^{2+}$  is a strong reducing agent.

(b) Write two similarities between chemistry of lanthanoids and actinoids.

(c) Complete the following ionic equation:



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3. Write the products formed when benzaldehyde reacts with the following

reagents:

(i)  $CH_3CHO$  is present in the presence of dilute NaOH



(iii) Conc. NaOH

(b) Distinguish between the following:

(i)



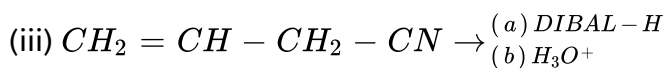
(ii) Benzaldehyde and Benzoic acid.

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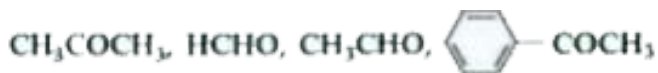
4. Write the final products in the following:



(i)



(b) Arrange the following in the increasing order of their reactivity towards nucleophilic addition reaction:



(c) Draw the structure of 2,4-DNP derivative of acetaldehyde.

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5. A first order reaction is 25% complete in 40 minutes. Calculate the value of rate constant. In what time will the reaction be 80% completed?

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6. Define order of reaction. Write the condition under which a bimolecular reaction follows first order kinetics.

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7. (a) A first order reaction is 50% complete in 30 minutes at 300K and in 10 minutes at 320k. Calculate activation energy ( $E_a$ ) for the reaction.

(b) Write the two conditions for collisions to be effective reaction.

(c) How order of reaction and molecularity differ towards a complex reaction?

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### 1. Read the given passage and answer the questions

The substitution reaction of alkyl halide mainly occurs by  $S_N1$  or  $S_N2$  mechanism. Whatever mechanism alkyl halides follow for the substitution reaction to occur, the polarity of the carbon halogen bond is responsible for these substitution reactions. The rates of  $S_N1$  reactions are governed by the stability of carbocation whereas for  $S_N2$  reactions steric factor is the deciding factor. If the starting material is a chiral compound, we may end up with an inverted product or racemic mixture depending upon the type of mechanism followed by alkyl halide. Cleavage of ethers with HI is also governed by steric factor and stability of carbocation, which indicates that in organic chemistry, these two major factors help us in deciding the kind of product formed.

Q. Predict the stereochemistry of the product formed if an optically active alkyl halide undergoes substitution by  $S_N2$  mechanism.



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## 2. Read the given passage and answer the questions

The substitution reaction of alkyl halide mainly occurs by  $S_N1$  or  $S_N2$  mechanism. Whatever mechanism alkyl halides follow for the substitution reaction to occur, the polarity of the carbon halogen bond is responsible for these substitution reactions. The rates of  $S_N1$  reactions are governed by the stability of carbocation whereas for  $S_N2$  reactions steric factor is the deciding factor. If the starting material is a chiral compound, we may end up with an inverted product or racemic mixture depending upon the type of mechanism followed by alkyl halide. Cleavage of ethers with HI is also governed by steric factor and stability of carbocation, which indicates that in organic chemistry, these two major factors help us in deciding the kind of product formed.

Q. Write the structures of the products formed when anisole is treated with HI.



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## 3. Read the given passage and answer the questions

The substitution reaction of alkyl halide mainly occurs by  $S_N1$  or  $S_N2$

mechanism. Whatever mechanism alkyl halides follow for the substitution reaction to occur, the polarity of the carbon halogen bond is responsible for these substitution reactions. The rates of  $S_N1$  reactions are governed by the stability of carbocation whereas for  $S_N2$  reactions steric factor is the deciding factor. If the starting material is a chiral compound, we may end up with an inverted product or racemic mixture depending upon the type of mechanism followed by alkyl halide. Cleavage of ethers with HI is also governed by steric factor and stability of carbocation, which indicates that in organic chemistry, these two major factors help us in deciding the kind of product formed.

Q. Predict the major product formed when 2-Bromobutane undergoes a reaction with alcoholic KOH.



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#### 4. Read the given passage and answer the questions

The substitution reaction of alkyl halide mainly occurs by  $S_N1$  or  $S_N2$  mechanism. Whatever mechanism alkyl halides follow for the substitution reaction to occur, the polarity of the carbon halogen bond is responsible



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Q. Name the instrument used for measuring the angle by which the plane, polarised light is rotated.



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5. Read the given passage and answer the questions

The substitution reaction of alkyl halide mainly occurs by  $S_N1$  or  $S_N2$  mechanism. Whatever mechanism alkyl halides follow for the substitution reaction to occur, the polarity of the carbon halogen bond is responsible for these substitution reactions. The rates of  $S_N1$  reactions are governed by the stability of carbocation whereas for  $S_N2$  reactions steric factor is

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Q. Give one use of  $CHI_3$ .



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6. Which structural unit present in a detergent makes it non-biodegradable?



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7. Give the structure of the monomer of polypropene.



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8. Identify which liquid will have a higher vapour pressure at  $90^{\circ}C$  if the boiling points of two liquids A and B are  $140^{\circ}C$  and  $180^{\circ}C$ , respectively.

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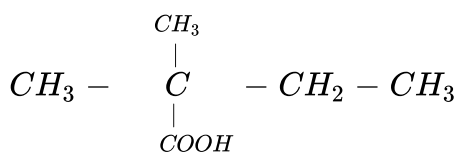
9. Will the rate constant of the reaction depend upon T if the  $E_{\text{act}}$  (activation energy) of the reaction is zero?

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10. Out of zinc and tin, whose coating is better to protect iron objects?

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11. What is the correct IUPAC name of the given compound?



A. 2, 2-Dimethylbutanoic acid

B. 2-Carboxyl-2-methylbutane

C. 2-Ethyl-2-methylpropanoic acid

D. 3-Methylbutane carboxylic acid

**Answer: A**

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**12.** Out of the following transition elements, the maximum number of oxidation states are shown by

A.  $Sc(Z = 21)$

B.  $Cr(Z = 24)$

C.  $Mn(Z = 25)$

D.  $Fe(Z = 26)$

**Answer: C**

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13. Hardening of leather in tanning industry is based on

- A. Electrophoresis
- B. Electro-osmosis
- C. Mutual coagulation
- D. Tyndall effect

**Answer: C**

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14. Out of the following, the strongest base in aqueous solution is

- A. Methylamine
- B. Dimethylamine
- C. Trimethylamine

D. Aniline

**Answer: B**



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15. Iodoform test is not given by

A. Hexan-2-one

B. Hexan-3-one

C. Ethanol

D. Ethanal

**Answer: B**



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1. Assertion (A) : The molecularity of the reaction  $H_2 + Br_2 \rightarrow 2HBr$  appears to be 2.

Reason (R) : Two molecules of the reactants are involved in the given elementary reaction.

A. Both Assertion (A) and Reason (R) are correct statements, and

Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but

Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

**Answer: A**



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2. Assertion (A) : Linkage isomerism arises in coordination compounds because of ambidentate ligand.

Reason (R) : Ambidentate ligand like  $NO_2$  has two different donor atoms i.e., N and O.

- A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).
- B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).
- C. Assertion (A) is correct, but Reason (R) is incorrect statement.
- D. Assertion (A) is incorrect, but Reason (R) is correct statement.

**Answer: A**

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3. Assertion (A) : Au and Ag are extracted by leaching their ores with a dil. Solution of NaCN.

Reason (R) : Impurities associated with these ores dissolve in NaCN.



- A. Both Assertion (A) and Reason (R ) are correct statements, and Reason (R ) is the correct explanation of the Assertion (A).
- B. Both Assertion (A) and Reason (R ) are correct statements, but Reason (R ) is not the correct explanation of the Asseriton (A).
- C. Assertion (A) is correct, but Reason (R ) is incorrect statement.
- D. Assertion (A) is incorrect, but Reason (R ) is correct statement.

**Answer: C**

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4. Assertion (A) : F-F bond in  $F_2$  molecule is weak.

Reason (R ) : F atom is small in size.

- A. Both Assertion (A) and Reason (R ) are correct statements, and Reason (R ) is the correct explanation of the Assertion (A).

- B. Both Assertion (A) and Reason (R ) are correct statements, but Reason (R ) is not the correct explanation of the Asseriton (A).
- C. Assertion (A) is correct, but Reason (R ) is incorrect statement.
- D. Assertion (A) is incorrect, but Reason (R ) is correct statement.

**Answer: A**

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5. Assertion (A) : Sucrose is a non-reducing sugar.

Reason (R ) : Sucrose has glycosidic linkage.

- A. Both Assertion (A) and Reason (R ) are correct statements, and Reason (R ) is the correct explanation of the Assertion (A).
- B. Both Assertion (A) and Reason (R ) are correct statements, but Reason (R ) is not the correct explanation of the Asseriton (A).
- C. Assertion (A) is correct, but Reason (R ) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R ) is correct statement.

**Answer: A**

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## Section B

1. Analyse the given graph, drawn between concentration of reactant vs. time.

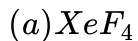


(a) Predict the order of reaction.

(b) Theoretically, can the concentration of the reactant reduce to zero after infinite time? Explain.

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2. Draw the shape of the following molecules:



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3. Define the following terms:

(a) Tranquilizers

(b) Antiseptic



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4. Explain the cleansing actin of soapes.



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5. Give the formulae of the following compounds:

(a) Potassium trioxalatoaluminate (III)

(b) Tetraammineaquachloridocobalt(III) chloride

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6. For a 5% solution of urea (Molar mass = 60 g/mol), calculate the osmotic pressure at 300 K.  $[R = 0.0821 \text{ L atm K}^{-1}\text{mol}^{-1}]$

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7. Visha took two aqueous solutions - one containing 7.5 g of urea (Molar mass = 60 g/mol) and the other containing 42.75g of substance Z in 100 g of water, respectively. It was observed that both the solutions froze at the same temperature. Calculate the molar mass of Z.

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8. Write the names and structures of monomers in the following polymers:

(a) Nylon 6, 6

(b) Buna-S

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9. What happens when

(a) Butanone is treated with methylmagnesium bromide and then hydrolysed, and

(b) Sodium benzoate is heated with soda lime?

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## Section C

1. Calculate the mass of ascorbic acid (Molar mass =  $176 \text{ g mol}^{-1}$ ) to be dissolved in 75 g of acetic acid, to lower its freezing point by  $1.5^\circ \text{C}$ .  $[K_f = 3.9 \text{K kg mol}^{-1}]$

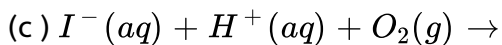
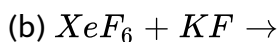
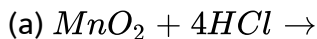
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2. Account for the following:

- (a) Sulphurous acid is a reducing agent.
- (b) Fluorine forms only one oxoacid.
- (c) Boiling point of noble gases increases from He to Rn.

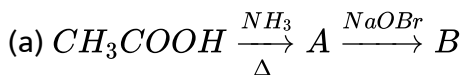
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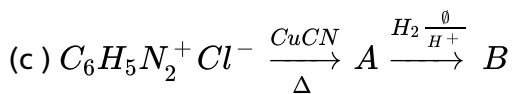
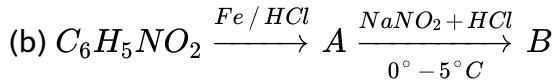
3. Complete the following chemical reactions:



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4. Give the structures of A and B in the following sequence of reactions:





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5. (a) How will you distinguish between the following pairs of compounds:

(i) Aniline and Ethanamine

(ii) Aniline and N-methylaniline

(b) Arrange the following compounds in decreasing order of their boiling points:

Butanol, Butanamine, Butane



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6. Give the plausible explanation for the following:

(a) Glucose doesn't give 2, 4-DNP test.

(b) The two strands in DNA are not identical but are complementary.



(c) Starch and cellulose both contain glucose unit as monomer, yet they are structurally different.

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7. How will the rate of reaction be affected when

- (a) surface area of the reactant is increased,
- (b) temperature of the reaction is decreased, and
- (c) catalyst is added in a reversible reaction?

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8. (a) Compare physisorption and chemisorption on the basis of

- (i) specificity, and
  - (ii) enthalpy of adsorption.
- (b) Differentiate between adsorption and absorption.

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9. Explain the role of the following :

(a) CO in the refining of Ni.

(b) Limestone in the metallurgy of Fe.

(c) Depressant in the froth floatation method.



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## Section D

1. (a) Out of t-butyl alcohol and n-butanol, which one will undergo acid catalysed dehydration faster and why?

(b) Carry out the following conversions:

(i) Phenol to Salicylaldehyde

(ii) t-butylchloride to t-butyl ethyl ether

(iii) Propene to Propanol



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2. (a) Give the mechanism for the formation of ethanol from ethene.

(b) Predict the reagent for carrying out of following conversions:

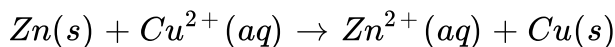
(i) Phenol to benzoquinone

(ii) Anisole to p-bromoanisole

(iii) Phenol to 2, 4, 6-tribromophenol

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3. (a) Calculate  $\Delta G^\circ$  for the reaction



Given :  $E^\circ$  for  $\text{Zn}^{2+} / \text{Zn} = -0.76\text{V}$  and

$E^\circ$  for  $\text{Cu}^{2+} / \text{Cu} = +0.34\text{V}$

$R = 8.314\text{JK}^{-1}\text{mol}^{-1}$

$F = 96500\text{C mol}^{-1}$ .

(b) Give two advantages of fuel cells.

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4. (a) Out of the following pairs, predict with reason which pair will allow greater conduction of electricity:

(i) Silver wire at  $30^{\circ}C$  or silver at  $60^{\circ}C$ .

(ii)  $0.1\text{ M }CH_3COOH$  solution or  $1\text{ M }CH_3COOH$  solution.

(iii)  $KCl$  solution at  $20^{\circ}C$  or  $KCl$  solution at  $50^{\circ}C$ .

Give two points of differences between electrochemical and electrolytic cells.



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5. (a) Account for the following:

(i) Copper (I) compounds are white whereas Copper (II) compounds are coloured.

(ii) Chromates change their colour when kept in an acidic solution.

(iii)  $Zn$ ,  $Cd$ ,  $Hg$  are considered as d-block elements but not as transition elements.

(b) Calculate the spin only moment of  $Co^{2+}$  ( $Z = 27$ ) by writing the electronic configuration of  $Co$  and  $Co^{2+}$ .



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6. (a) Give three points of difference between lanthanoids and actinoids.
- (b) Give reason and select one atom/ion which will exhibit asked property:
- (i)  $Sc^{3+}$  or  $Cr^{3+}$  (Exhibit diamagnetic behaviour)
- (ii) Cr or Cu (High melting and boiling point)



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