

# CLASS XII

## SAMPLE PAPER

### CHEMISTRY

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Time: 3Hrs

Maximum Marks: 70

#### General Instructions:

1. All questions are compulsory.
  2. Question nos.1to 8 are very short answer question and carry 1 marks each.
  3. Question no 9 to 18 are short answer questions and carry 2 marks each.
  4. Question no 19 to 27 are also short answer type questions and carry 3 marks each.
  5. Question no 28to 30 are long answer type and carry 5 marks each.
  6. Use log table if necessary, use of calculator is not allowed.
- =====

**Q. 1. Arrange the following types of interactions in correct order of their increasing strength :**

**Covalent, hydrogen bonding, Vander Waals, dipole dipole**

**Ans.** Vander Waals < dipole dipole < hydrogen bonding < covalent.

**Q. 2. Give reasons :**

**(a) Window glass of old building look milky.**

**b) Window glass of old building is thick at bottom**

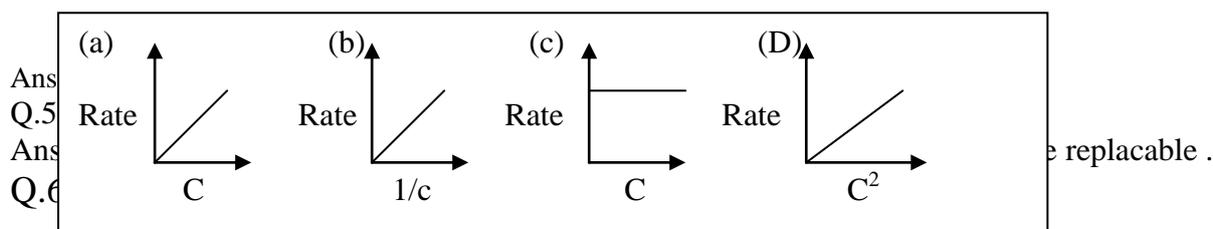
**Ans.** (a) Due to annealing over a number of years glass acquires some crystalline character.

(b) Glass is not a true solid. But a super-cooled liquid of high viscosity. It has the property to flow.

Q3 Define activation energy.

Ans.: It is defined as extra energy to be supplied to the reactants so that they can change into products.

Q4. Which of the following graphs correspond to first order reaction ?



CH<sub>3</sub>Br, CH<sub>2</sub>Br<sub>2</sub>, CHBr<sub>3</sub>  
Ans: CH<sub>3</sub>Br < CH<sub>2</sub>Br<sub>2</sub> < CHBr<sub>3</sub>



Boiling point increases

Boiling point increases due increasing molecular mass

Q7 Name two important use of formaline?

Ans.

**Q. 8. Enumerate two reactions of glucose which cannot be explained by its open chain structure.**

Ans. (i) Glucose does not give Schiff's Test although it contains aldehyde group.

(ii) Glucose does not form crystalline product with NaHSO<sub>3</sub>.

Q9 Analysis shows that nickel oxide has the formula NiO<sub>0.98</sub>O<sub>1.00</sub>. What fractions of nickel exist as Ni<sup>2+</sup> and Ni<sup>3+</sup> ions ?

Ans. NiO<sub>0.98</sub>O<sub>1.00</sub>

Let Ni<sup>2+</sup> be x and Ni<sup>3+</sup> be 0.98 - x

Total charge on compd. is equal to zero.

$$[2 (\text{Ni}^{2+}) + 3 (\text{Ni}^{3+}) - 2 (\text{O}^{2-})] = 0$$

$$2x + 3(0.98 - x) - 2 = 0$$

$$x = 0.94$$

$$\text{Therefore Ni}^{2+} \% = \frac{0.94}{0.98} \times 100 = 96\%$$

$$\text{Ni}^{3+} = 4\%$$

Q10 What do you mean by fuel cell? Write cathode and anode reaction in fuel cell.

Ans:- Fuel Cell:- These are electrical cells which can convert the energy of combustion of a fuel like (H<sub>2</sub>, CO etc.) directly into electrical energy

Ex:-H<sub>2</sub>-O<sub>2</sub> fuel cell. Reaction :-

Anode reaction:- H<sub>2</sub>(g)+2OH<sup>-</sup>(aq) --- 2H<sub>2</sub>O+2e...X 2

Cathode reaction:- O<sub>2</sub>(g) +2H<sub>2</sub>O+4e ---- 4OH<sup>-</sup>

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Overall reaction :-2H<sub>2</sub>(g) + O<sub>2</sub>(g) ----- 2H<sub>2</sub>O(l)

**Q. 11.(a) Out of PO<sub>4</sub><sup>3-</sup>, SO<sub>4</sub><sup>2-</sup>, Cl<sup>-</sup>, which will act as the best coagulating agent for Fe(OH)<sub>3</sub> ?**

**Ans.** PO<sub>4</sub><sup>3-</sup>.

(b) Explain the following terms : (i) Electrophoresis, (ii) Coagulation, (iii) Dialysis  
(IV) Tyndal Effect

**Ans.:** (i) Electrophoresis :- The immigration of colloidal solute towards oppositely charged electrode under an electric potential is called Electrophoresis.

(ii) Coagulation :- The process of settling down of colloidal particles is known as coagulation.

(iii) Dialysis :- It is a process of removing dissolved impurities from colloidal solution by means of diffusion through a suitable membrane.

(iv) Tyndal effect :- The scattering of light in colloidal solution by colloidal solute is known as Tyndal effect.

**Q12** What is observed

(i) When a beam of light is passed through a colloidal sol

(ii) An electrolyte, NaCl is added to hydrated ferric oxide sol.

(iii) Electric current is passed through colloidal sol.

**Ans.:** (i) Tyndal Effect  
(ii) Coagulation  
(iii) Electrophoresis  
(iv)

Q.13. Find hybridization and DRAW shape i) XeF<sub>2</sub> ii) XeO<sub>3</sub> iii) XeF<sub>4</sub>

Ans: i) sp<sup>3d</sup>, Linear

ii) sp<sup>3</sup>, Pyramidal

iii) sp<sup>3d<sup>2</sup></sup>, Square planar

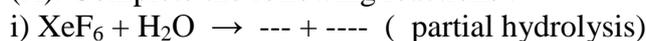
Q.14(a) Are all the five bonds in PCl<sub>5</sub> molecule equivalent ?

Ans –  $\text{PCl}_5$  has a trigonal bipyramidal structure and the three equatorial p-cl bonds are equivalent . while the

two axial bonds are different and longer than equatorial bonds.

OR

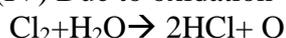
(A). Complete the following reactions :-



IV. Give reason for bleaching action of  $\text{Cl}_2$



(IV) Due to oxidation



Coloured substance + O  $\rightarrow$  colourless substance

OR

(A) Nitrogen shows anomalous behaviour in the group. Why?

Ans: i) Small size

ii) High electro negativity

iii) Absence of vacant d-orbital.

(B). How is the presence of  $\text{SO}_2$  detected ?

Ans : 1. It has pungent characteristic smell .

2. It decolourises  $\text{KMnO}_4$  solution

3. It turns acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  green

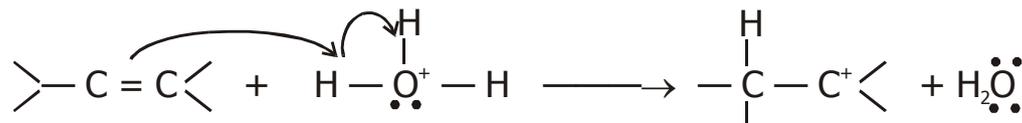
Q 15 (a) **Why are dipole moments of phenols smaller than dipole moments of alcohols ?**

**Ans.** Due to electron-withdrawing effect of the benzene ring, the C — O bond in phenol is less polar but in case of methanol due to electron-donating effect of —  $\text{CH}_3$  group, C — O bond is more polar.

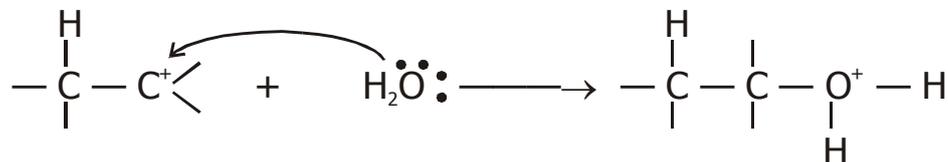
(b) **Write the mechanism of hydration of ethene to yield ethanol.**



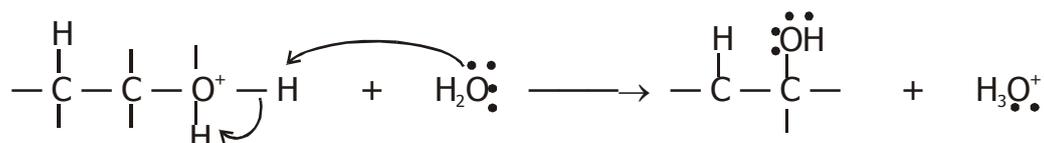
**Step (i) :** — Protonation of alkene to form carbocation by electrophilic attack :



**Step (ii) :** — Nucleophilic attack of water on carbocation :



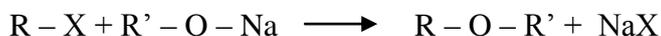
**Step (iii) :** — Deprotonation to form an alcohol :



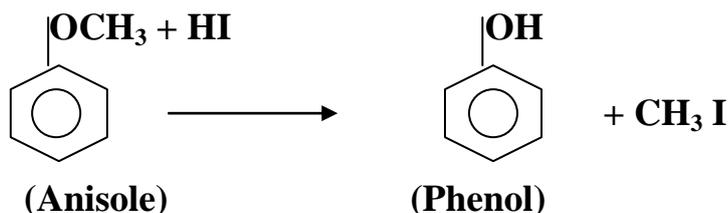
Q16(a) Discuss Williamson synthesis.

(b) Convert **anisole** to **phenol**?

Ans:- (a) In this method symmetrical and unsymmetrical ethers are formed. In this synthesis an alkyl is allowed to react with sodium alkoxide.



(b) Ans:-



Q. 17 (a)  $\text{CH}_3\text{CONH}_2$  is a weaker base than  $\text{CH}_3\text{CH}_2\text{NH}_2$ .

Ans. Due to resonance, the lone pair of electrons on the nitrogen atom in  $\text{CH}_3\text{CONH}_2$  is delocalised over the keto group. There is no such effect in  $\text{CH}_3\text{CH}_2\text{NH}_2$ . Due to reduction in electron density on N of  $\text{CH}_3\text{CONH}_2$ , it is a weaker base than  $\text{CH}_3\text{CH}_2\text{NH}_2$ .

Q. 18 Give the structures of A, B and C in the following compounds :





**Ans.** (i) Carbylamine test :



(pungent smelling)

2° amines do not give this test.

Q19(a) State two important use of salt bridge? (1)

(b) Q1. Define molar conductivity. How does it varies with dilution ?

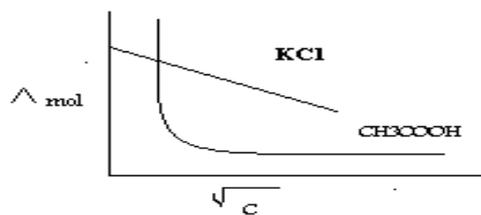
Ans:- Molar conductivity:-

It is the product of specific conductivity and volume of solution containing 1 g molecular mass of the electrolyte.

$$\Lambda_{mol} = \frac{K \times 1000}{C}$$

Unit=  $Sm^2 mol^{-1}$

\* Variation :-



Strong Electrolyte:-Molar conductivity increases slowly with decrease in concentration.

Weak Electrolyte:- Molar Conductivity increases sharply for weak electrolyte on dilution

Or

(a) Write the chemistry of recharging the lead storage battery, highlighting all the materials that are involved during recharging.

Ans SEE NCERT TEXT BOOK PAGE NO.87

(b) If  $\Lambda_m^0$  for NaCl, HCl, NaAc are 126.4, 425.9, 91.0  $\text{Scm}^2\text{mol}^{-1}$ . Calculate  $\Lambda^0$  for HAc.

Ans: see n.c.e.r.t text book page no 82

Q20(A) Give an expression that shows that half-life period for first-order reaction is independent of initial concentration of reacting species? (2)

**(b) Write two differences between order and molecularity?**

**Ans (a) see text book**

Ans. (b)

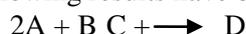
Order of reaction	Molecularity
1. It is defined as sum of powers to which concentration terms are raised in rate law	1. It is the number of molecules taking part in chemical reaction.
2. It is determined experimentally	2. It is determined theoretically
3. It can be zero or even in fraction	3. It is always in whole number except Zero.
4. Order of complex reaction can be determined,	4. Molecularity of complex reaction can not be determined.

OR

(a) The rate of chemical reaction is doubled for an increase of 10K in an absolute temperature from 298 K. Calculate  $E_a$ ?

Ans see NCERT TEXT BOOK PAGE NO.116

(b) The following results have been obtained during the kinetic studies of the reaction.



Experimental	[A] M	[B] M	Initial rate of formation of D/ $\text{M min}^{-1}$
1	0.1	0.1	$6.0 \times 10^{-3}$
2	0.3	0.2	$7.2 \times 10^{-2}$
3	0.3	0.4	$2.88 \times 10^{-1}$
4	0.4	0.1	$2.4 \times 10^{-2}$

Determine the rate law and the rate constant for the reaction.

Ans.:

$$\frac{dx}{dt} = K[A]^x[B]^y \text{ ----- (1)}$$

$$7.2 \times 10^{-2} = K[0.3]^x[0.4]^y \text{ -----(2)}$$

Dividing (1)/(2), we get,

$$\frac{1}{4} = \frac{1}{2^y} \Rightarrow 2^y = 2^2$$

$$\Rightarrow y = 2$$

$$6.0 \times 10^{-3} = K[0.1]^x[0.1]^y \text{ ----- (3)}$$

$$2.40 \times 10^{-2} = K[0.4]^x[0.1]^y \text{ ----- (4)}$$

Dividing (3) by (2), we get,

$$\frac{1}{4} = \frac{1}{4^x} \therefore x = 1$$

$$\frac{dx}{dt} = K[A]^x[B]^y = K[A]^1[B]^2$$

$$6.0 \times 10^{-3} = K[0.1]^1[0.1]^2$$

$$K = 6.0 M^{-2} S^{-1}$$

(C) Calculate the half life of a first order reaction from their rate constants given below :

(a)  $200 S^{-1}$  (b)  $2 Min^{-1}$  (c)  $4 year^{-1}$

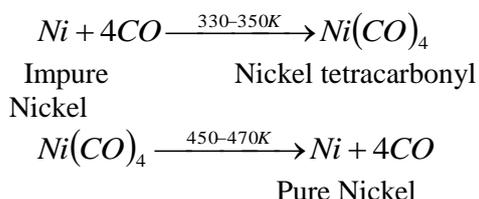
Ans.: (a)  $t_{1/2} = \frac{0.693}{K} = \frac{0.693}{200 S^{-1}} = 3.465 \times 10^{-3} Sec.$

(b)  $t_{1/2} = \frac{0.693}{2 Min^{-1}} = 3.465 min = 0.35 min ..$

ALSO TRY TO SOVE NCERT TEXT BOOK QUESTION OF EXCERSICE Q.N.4.18

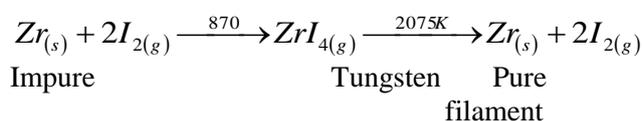
**Q.21.** (A). Name the method used for refining of (i) Nickel (ii) Zirconium  
 (B). The Extarction of Au by leaching with NaCN involves both Oxidation and Reduction. Justify giving equations.

Ans. ; (A) [ i ] **Mond Process** : It is used to refine Nickel metal. When impure Nickel is heated in a current of CO at 330-350 K, it forms volatile nickel tetracarbonyl complex leaving behind the impurities. This complex again on heating at higher (450-470K) it undergoes thermal decomposition giving pure Nickel.

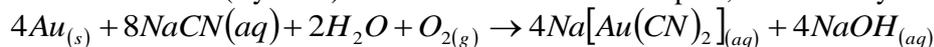


[ ii ] **Van Arkel method** : This method is very useful for preparing ultra pure metals by removing all the Oxygen and Nitrogen present in the form of impurity in certain metals such as Zirconium and titanium which are used in space technology.

In this method, crude Zirconium is heated in a evacuated vessels with iodine at 870 K, the covalent volatile  $ZrI_4$  thus formed is separated. It is then decomposed by heating over a tungsten filament at 2075 K to give pure Zirconium.



(B) During the leaching process, Au is first oxidized to  $Au^+$  by Oxygen ( $O_2$ ) of the air which then combines with  $CN^-$  (Cyanide) ion to form the soluble complex, Sodium dicyanoaurate(I).



Impure Soluble Complex

Gold is then extracted from this complex, by displacement method using a more electropositive Zinc metal, In this reaction, Zn acts as a reducing agent. It reduces  $Au^+$  Au while it itself gets oxidized to  $Zn^{2+}$  which combines with  $CN^-$  ions to form soluble complex, sodium tetracyanozincate(II)

Q.22 (1)GIVE THE METHIOD OF PREP.OF  $XeOF_4$  &  $XeO_3$  FROM  $XeF_6$

(2)DRAW THE STRUCTURE OF 1) $H_2SO_5$  2) $H_2S_2O_8$

3) $HOCIO_3$  4)  $BrF_3$  5) $XeF_6$

3) DESCRIBE THE MANUFACTHRING OF  $H_2SO_4$  BY CONTACT PROCESS?

OR

1) WHY DOES  $R_3P=O$  EXIST BUT  $R_3N=O$  DOES NOT ?

2)  $O_3$  ACT AS POWER OXIDISING AGENT

3) GIVE REASON, WHICH PREMPTEED BARTTLET TO PREPARE 1<sup>ST</sup> NOBAL GAS COMPOUND.

Ans: see NCERT TEXT BOOK

Q23

1)WRITE IUPAC NAME OF A)  $[Ni(NH_3)_6]Cl_2$  B)  $[CO(NH_3)_4(H_2O)Cl]Cl_2$   
C)  $[COCl_2(CN)_2]Cl$

2) DISCUSS THE SPLITING OF AT ORBITAL IN OCTAHEDRAL AND

### TETRAHEDRAL COMPLEXES

**(3) Which vitamin is a complex compound of cobalt ?**

Vitamin B<sub>12</sub>

OR

- 1) DISCUS THE ROLE OF COORDINATION COMP. IN
  - a) BIOLOGICAL SYSTEM
  - b) ANALYTICAL CHEM.
- 2) DISCUSS NATURE OF BONDING IN METAL CARBONYL?
- 3) COMPARE THE FOLL COMPLEX WITH RESPECT TO STRUCTURAL SHAPE OF UNIT ,MAGNETIC BEHAVIOUR & HYBRID ORBITAL INVOLVED IN UNIT [ NiCl<sub>4</sub>]<sup>2-</sup>, [CO(CN)<sub>6</sub>]<sup>3-</sup>

Ans: SEE NCERT TEXT BOOK

Q24 (1) Write four difference between SN 1 and SN 2 type reaction

ANS; SEE NCERT TEXT BOOK

(2) Haloalkane react with KCN to form alkylcyanides as a main product while AgCN form isocyanide as a chief product explain?

ANS: SEE TEXT BOOK

(3) Explain why: -

- (a) H<sub>2</sub>SO<sub>4</sub> cannot be used along with KI in the conversion of an alcohol to an alkyl halide.
- (b) Alkyl halide though polar are immiscible with water.

Ans: -

- (a) H<sub>2</sub>SO<sub>4</sub> converts KI to corresponding HI and then oxidise it into iodine.
- (b) When halo alkane interacts with water molecule , less amount of energy is released which is not sufficient to break the original H-bond between water molecule and to form new H-bond with halo alkane and water.

OR

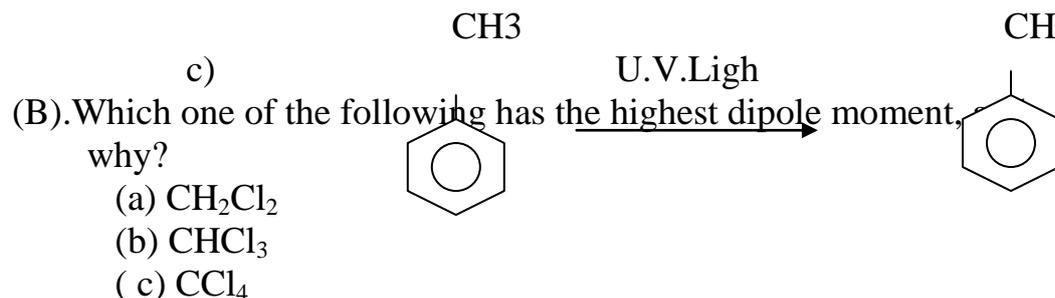
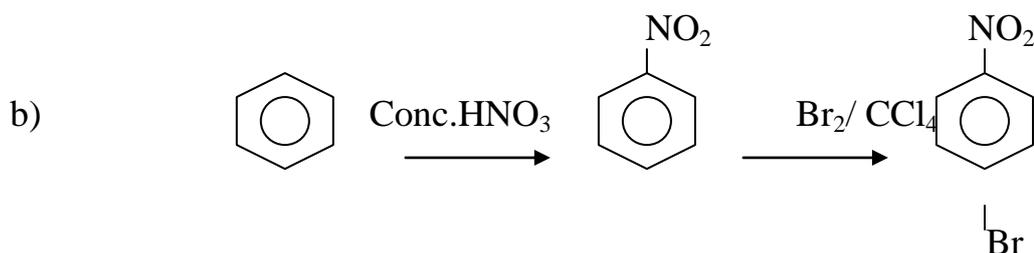
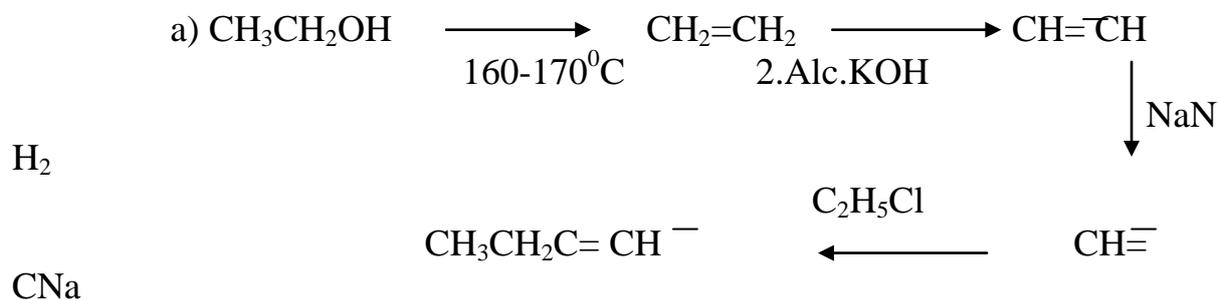
(A) How can the following interconversions are carried out

- (a) Ethanol to but-1-yne
- (b) Benzene to 4-bromo nitro benzene
- (c) Toluene to benzyl alcohol

Ans:-

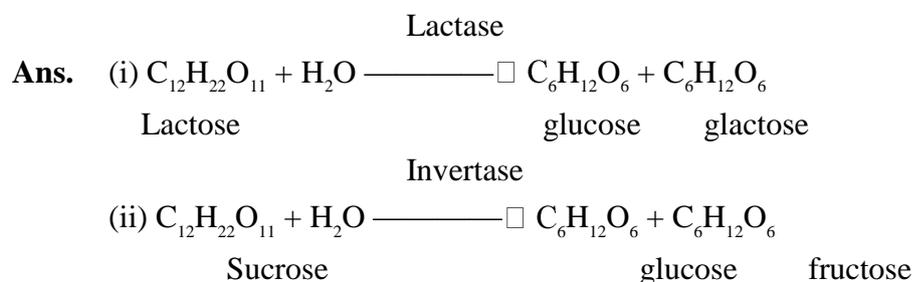
Conc. H<sub>2</sub>SO<sub>4</sub>

1. Br<sub>2</sub>



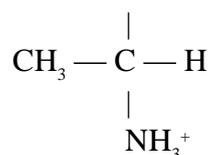
Ans:-  $\text{CH}_2\text{Cl}_2$  has the highest dipole moment since both the Cl- atoms are present on one side (on the head) of c - atom and therefore cause a maximum dipole moment. In  $\text{CHCl}_3$  and  $\text{CCl}_4$ , two Cl - atoms and four Cl - atoms cancel out their dipole moments.

Q25(A) What are the products of hydrolysis of (i) lactose (ii) sucrose. Also name the enzyme used for reaction.



(B) Write the structure of Zwitter ion formed from Alanine.





or

(a) **Why can't vitamin C be stored in our body? Or Why except B<sub>12</sub> or vitamin B and C can't be stored in our body?**

Ans: Vitamin B except B<sub>12</sub> & C are water soluble vitamins. Therefore these vitamins are regularly supplied from outside because they are readily excreted in urine and can't be store in our body.

(b) **What are essential and non essential amino acid. Give two example of each**

Ans: see NCERT TEXT BOOK

**Q26 (a) Name the polymer used for making medicinal Capsule.**

Ans. PHBVUC Polyhydroxy butyrate-CO-□-hydroxy valerated

(b) Differentiate between thermo plastic and thermo setting Plastic.

Ans:

<u>Thermo Plastic Polymer</u>	<u>Thermo setting Polymer</u>
1. Linear or slightly branched long chain molecules	1. Cross linked or heavy branched molecule
2. Posses intermediate inter molecular force of attraction.	2. This can not be reused
3. Ex. Polythene, Polystyrene	3. Ex. Bakelite, Urea-Formaldehyde resins

(c) **Arrange the following polymer in increasing order of their molecular forces :**

(a) **nylon-6, 6, Buna-S, polythene.**

(b) **nylon-6, Neoprene, polyvinyl chloride.**

Ans. (a) Buna S < Polythene < Nylon-6, 6.

(c) Neoprene < Polyvinyl Chloride < Nylon-6.

OR

(a) Prepare P.H.B.V. Write its fullform .what is its use?

(b) What are Biodegradable polymer ? give one example?

Ans: SEE NCERT TEXT BOOK

Q27

(A) Which artificial sweetner has the highest sweetness value ?

Ans. Alitame.

(B) Why is bithional added to soap ?

Ans. Acts as an antiseptic and reduces the odours produced by bacterial decomposition of organic matter on the skin.

(C) What is the purpose of adding antioxidants to food ? Give two examples of antioxidants.

Ans. They are added to prevent oxidation of fats and oils present in food thus preventing food from becoming rancid.

Eg. BHA (Butylated hydroxy anisole)

BHT (Butylated hydroxy toluene)

OR

(A). What is tincture iodine ? What is its use ?

Ans. Alcoholic Solution of  $I_2$ .

Used as an antiseptic

(B)What do you understand by Broadspectrum antibiotics. Give example

Ans:Chloramphenicol

(c)What are biodegradable and non biodegradable detergent.Give one example of each?

Ans: see NCERT text book

Q28 EXPLAIN WITH REASON

- 1) THE ENTHALPY OF ATOMISATION OF T.M ARE HIGH
- 2) CHEMISTRY OF ALL THE LANTHANOIDS IS QUITE SIMILAR
- 3) INDICTE THE STEPS FOR THE PREPERATION OF:
  - A)  $K_2Cr_2O_7$  FROM ITS ORE CHROMITE ORE
  - B)  $KMnO_4$  FROM PYROLUSITE ORE

4) Mn(II) SHOW MAX. PARAMAGNETIC CHARACTER AMONG DIVALENT ION OF 1ST T. SERIES WHY

5) NAME A MEMBER OF LANTHANOID SERIES WHICH IS WELL KNOWN TO EXHIBIT +4 O.S

OR

- 1)  $K_2[PtCl_6]$  IS A WELL KNOWN COMP. WHERE AS THE CORRESPONDING Ni,COMP. IS NOT KNOWN GIVE REASON FOR IT
- 2) COMPARE THE CHEMISTRY OF THE ACTINOIDS WITH LANTHANOIDS WITH REFERENCE TO A) E - CONF B) OXIDATION STATE C) CHEMICAL STATE
- 3) T.M EXHIBITS HIGHEST O.S IN OXIDE & FLUORIDES
- (4) Give the answer :

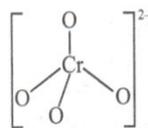
Actinoid contraction is greater from element to element than Lanthanoid contraction. (FOR ANSWERS SEE NCERT TEXT BOOK)

(5) Why are Zn , Cd , Hg are not regarded as transition metals ?

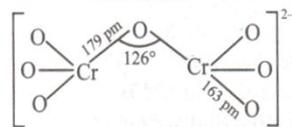
Ans: It is because neither they nor their ions have incompletely filled d- orbitals .

(6) draw its structure of  $Cr_2O_7^{2-}$  ion and Draw structure of  $CrO_4^{2-}$  also .

Ans-



Chromate ion



Dichromate ion

Q.29) An organic compound (A) with molecular formula  $C_8H_8O$  forms an orange-red precipitate with 2,4-DNP reagent and gives a yellow precipitate on heating with iodine in the presence of sodium hydroxide. It neither reduces Tollens reagent or Fehling reagent, nor does it decolorize bromine water or Bayer's reagent. On drastic oxidation with a chromic acid it gives a carboxylic acid (B) having molecular formula  $C_7H_6O_2$ . Identify (A) and (B) and explain the reaction involved?

OR

(A) Describe the following: 1. Cannizzaro reaction 2. decarboxylation

(B) An organic compound contains 69.77% carbon, 11.63% hydrogen & the rest is oxygen. The molecular mass of the compound is 86. It does not reduce Tollens reagent. But forms an additional compound with sodium hydrogen sulphate and

give +ve test .On vigorous oxidation it gave ethanoic acid and propanoic acid. Write possible structure of compound.

ANS:

SEE NCERT ALDEHYDES KETON CARBOXYLIC ACID TEXT BOOK

Q30. 2 g of benzoic acid ( $C_6H_5COOH$ ) dissolved in 25 g of benzene shows a depression in freezing point equal to 1.62 K. Molal depression constant for benzene is  $4.9 K kg mol^{-1}$ . what is the percentage association of acid if it forms dimer in soln.?

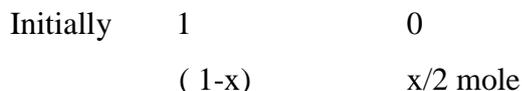
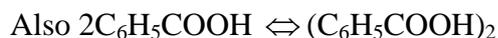
Ans:-

Given that

$$W_B=2g, K_f=4.9 K kg mol^{-1}, W_A=25 g, \Delta T_f = 1.62K$$

We have

$$M_B = \frac{W_B \times 1000 \times K_f}{\Delta T_f \times W_A} = \frac{2 \times 1000 \times 4.9}{1.62 \times 25} = 241.98 g mol^{-1}$$



$$\text{Total no. of particles at equilibrium.} = (1-x) + \frac{x}{2} = 1 - \frac{x}{2}$$

$$\therefore i = 1 - \frac{x}{2}$$

$$\begin{aligned} \text{Now } i &= (\text{Normal molecular mass} / \text{Abnormal molecular mass}) \\ &= 122 / 241.98 \end{aligned}$$

$$\text{Thus } 122 / 241.98 = 1 - x/2$$

$$\text{Or } x/2 = 1 - (122 / 241.98) = 0.4958$$

$$\text{So } x = 0.9916$$

The degree of association of benzoic acid in benzene is 99.16 %

(B) State Henry's law. Give two important applications

Or

(a) WHAT IS MEANT BY +VE & -VE DEVIATION FROM RAOULT'S LAW &

& HOW IS THE SIGN OF  $\Delta_{mix}$  RELATED TO +VE & -VE DEVIATION FROM  
RAOULTSS LAW

(b) DEF: A) MOLE FRACTION B) MOLALITY C) MOLARITY

(c) Give an expression for depression in freezing point for the calculation of molar mass of  
solute

ANS: SEE NCERT TEXT BOOK

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