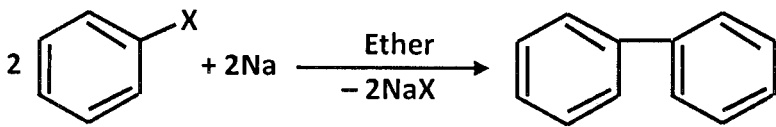


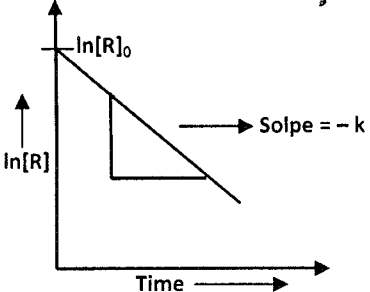
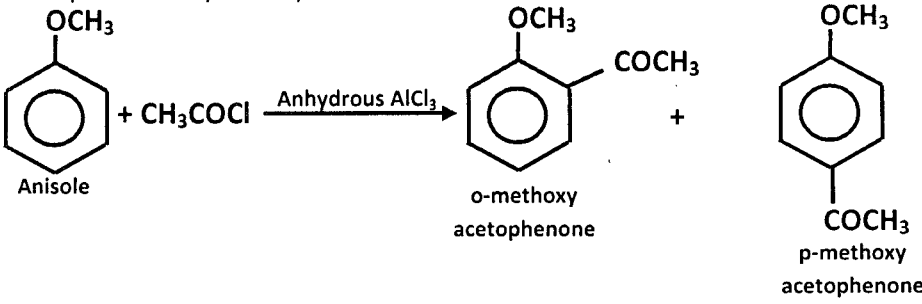


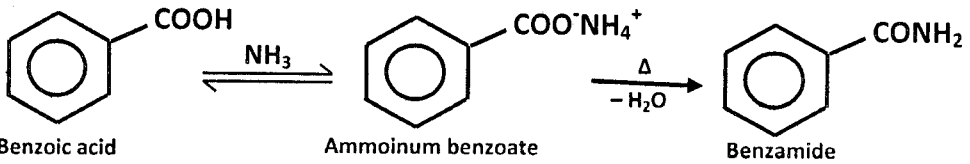
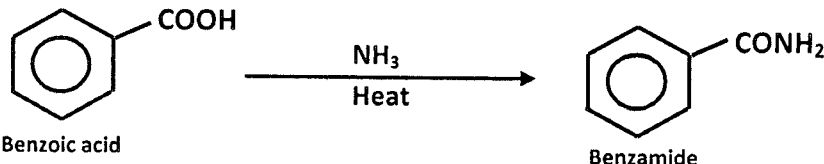
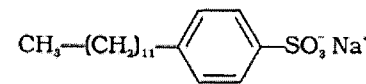
GOVERNMENT OF KARNATAKA
KARNATAKA STATE PRE-UNIVERSITY EDUCATION EXAMINATION BOARD
II YEAR PUC EXAMINATION
Scheme of Valuation

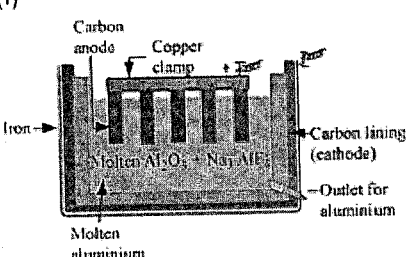
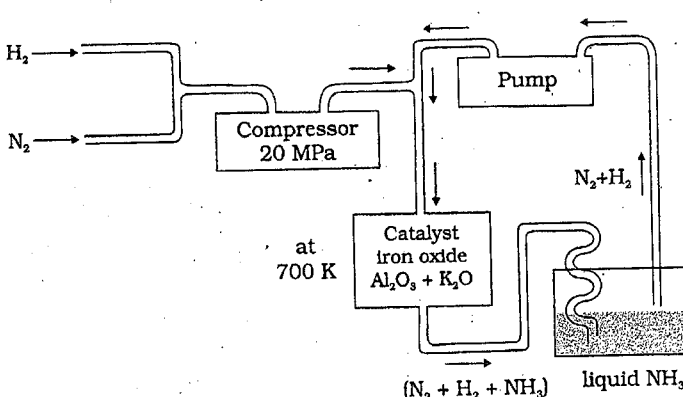
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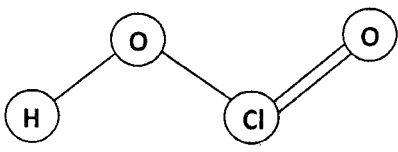
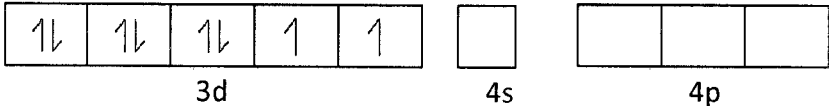
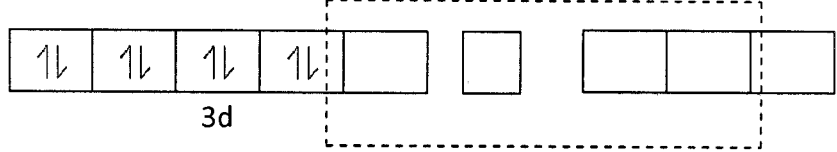
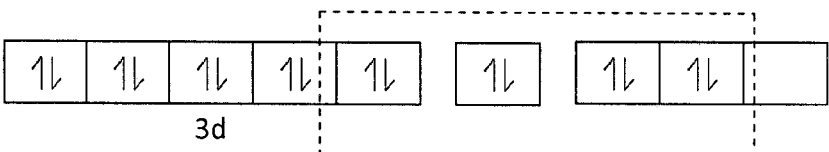
Subject: Chemistry

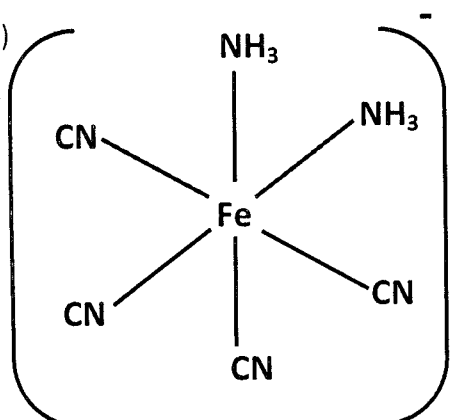
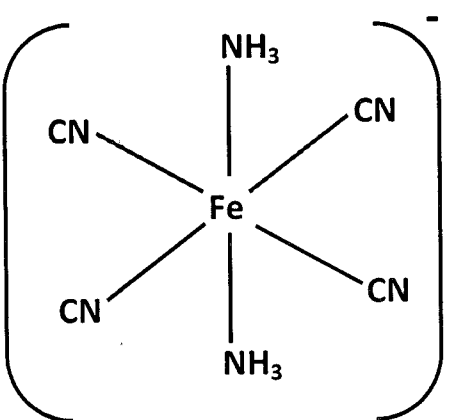
Qn No	PART – A	Marks Allotted
1.	How does molarity change with temperature? Molarity decreases with increase in temperature OR Molarity increases with decrease in temperature OR Molarity varies inversely with temperature OR Inversely proportional	1
2.	10mL of liquid 'A' is mixed with 10mL of liquid 'B', the volume of the resultant solution is 19.9mL. What type of deviation expected from Raoult's law? Negative OR – ve	1
3.	Write the mathematical expression for limiting molar conductivity of sodium chloride (NaCl). $\Lambda_m^0(\text{NaCl}) = \lambda_{\text{Na}^+}^0 + \lambda_{\text{Cl}^-}^0$	1
4.	Define collision frequency The number of collisions per second per unit volume of the reaction mixture	1
5.	Name the adsorbent used to removal of colouring matter from solution. Animal charcoal/Activated charcoal/Charcoal/Activated carbon	1
6.	Give an example of a metal purified by Mond process. Nickel OR Ni	1
7.	Which noble gas is most abundant in atmospheric dry air? Argon OR Ar	1
8.	What is the name of the following reaction?  Fittig's reaction	1
9.	Formaldehyde [HCHO] undergoes Cannizzaro's reaction: Give reason It does not contain α -hydrogen atom	1
10.	Deficiency of which vitamin causes the disease scurvy. 'C' OR Vitamin-C (Ascorbic acid)	1

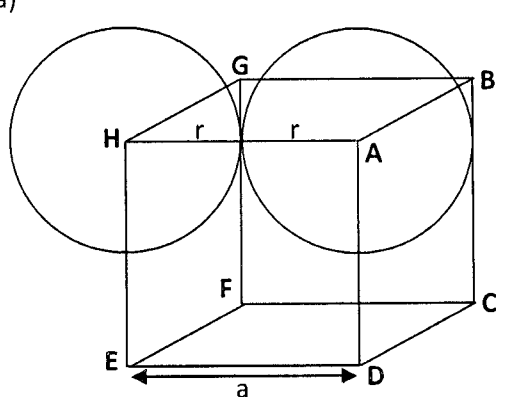
II.	PART – B	Marks									
11	<p>Give the differences between crystalline and amorphous solids with respect to shape and melting point.</p> <table border="1" data-bbox="313 227 1323 448"> <thead> <tr> <th>Property</th> <th>Crystalline solid</th> <th>Amorphous solid</th> </tr> </thead> <tbody> <tr> <td>1. Shape</td> <td>Definite geometrical shape</td> <td>No Definite geometrical shape/Irregular shape</td> </tr> <tr> <td>2. Melting point</td> <td>Sharp(Definite) melting point</td> <td>No sharp(Definite) melting point/Melt over range of temperature</td> </tr> </tbody> </table>	Property	Crystalline solid	Amorphous solid	1. Shape	Definite geometrical shape	No Definite geometrical shape/Irregular shape	2. Melting point	Sharp(Definite) melting point	No sharp(Definite) melting point/Melt over range of temperature	<p>1</p> <p>1</p>
Property	Crystalline solid	Amorphous solid									
1. Shape	Definite geometrical shape	No Definite geometrical shape/Irregular shape									
2. Melting point	Sharp(Definite) melting point	No sharp(Definite) melting point/Melt over range of temperature									
12	<p>Write the cathodic and anodic cell reactions of Hydrogen-Oxygen fuel cell.</p> <p>Cathode: $O_2(g) + 2H_2O(l) + 4e^- \rightarrow 4OH^-(aq)$</p> <p>Anode: $2H_2(g) + 4OH^-(aq) \rightarrow 4H_2O(l) + 4e^-$ OR $H_2(g) + 2OH^-(aq) \rightarrow 2H_2O(l) + 2e^-$</p>	<p>1</p> <p>1</p>									
13.	<p>From the following graph, identify order of reaction and mention the unit of its rate constant.</p>  <p>Order: First/One/1^{st}</p> <p>Unit: $time^{-1}$ (sec^{-1} or min^{-1} or hrs^{-1})</p>	<p>1</p> <p>1</p>									
14.	<p>What is lanthanide contraction? Mention the cause for it.</p> <p>The steady (or gradual) decrease in atomic /ionic radii from lanthanum to lutetium OR Any suitable definition</p> <p>Due to the imperfect shielding of one electron by another in the same sub.shell (same set of orbital's) OR Poor shielding effect of 4f electrons.</p>	<p>1</p> <p>1</p>									
15.	<p>How anisole reacts with acetyl chloride [CH_3COCl] in the presence of anhydrous $AlCl_3$? Write the chemical equation for the reaction.</p> <p>When anisole reacts with acetyl chloride in the presence of anhydrous $AlCl_3$ gives a mixture of o & p – methoxy acetophenone</p>  <p>Explanation</p> <p>Equation</p> <p>OR</p> <p>Self explanatory equation</p> <p>If only para methoxy acetophenone is written, award mark <i>para methoxy</i></p>	<p>1</p> <p>1</p> <p>2</p>									

<p>16</p>	<p>What is the action of ammonia [NH₃] on benzoic acid? Write equation. When ammonia reacts with benzoic acid, ammonium benzoate is formed which on heating gives benzamide</p> <div style="text-align: center;">  <p>Benzoic acid $\xrightarrow{\text{NH}_3}$ Ammonium benzoate $\xrightarrow[\text{-H}_2\text{O}]{\Delta}$ Benzamide</p> </div> <p>OR</p> <div style="text-align: center;">  <p>Benzoic acid $\xrightarrow[\text{Heat}]{\text{NH}_3}$ Benzamide</p> </div> <p>Benzoic acid Explanation Equation – OR Self explanatory equation</p>	<p>1 1 2</p>
<p>17</p>	<p>Give an example for i) Non-narcotic analgesics ii) Antiseptics</p> <p>i) Aspirin(2-acetoxy benzoic acid) OR Paracetamol(OR 4-acetamidophenol) OR Diclofenac sodium OR Diclofenac potassium OR Any suitable example</p> <p>ii) Furacine OR Soframycine OR Dettol (OR chloroxyleneol and terpineol) OR Bithionol OR Tincture of iodine (2 – 3% iodine solution in alcohol) OR Iodoformic acid in dilute aqueous solution OR 0.2% phenol OR Hydrogen peroxide OR Hexachlorophene OR Amyl metacresol(5-methyl-2-pentyl phenol OR gentian violet OR methylene blue OR Savlon OR Salol(phenyl salicylate) OR Mercurochrome solution OR KMnO₄ in dilute solution OR Any suitable example</p>	<p>1 1</p>
<p>18</p>	<p>What are anionic detergents? Give an example. Sodium salts of sulphonated long chain alcohols or hydrocarbons OR Detergents whose cleaning action is due to anion present in it.</p> <p>Example: Sodium lauryl sulphate OR $\text{CH}_3(\text{CH}_2)_{10}\text{CH}_2\text{O}-\text{S}(=\text{O})_2-\text{ONa}$</p> <div style="text-align: center;">  <p>Sodium dodecyl benzene sulphonate OR $\text{CH}_3-(\text{CH}_2)_{11}-\text{C}_6\text{H}_4-\text{SO}_3^- \text{Na}^+$</p> </div> <p>OR Any suitable example</p>	<p>1 1</p>

III.	PART - C	Marks
19	<p>During the extraction of aluminium by Hall-Heroult process</p> <p>i) Write neat labeled diagram of electrolytic cell. ii) Write overall cell reaction. iii) At which electrode oxygen gas is liberated?</p> <p>(i)</p>  <p>(ii) $2\text{Al}_2\text{O}_3 + 3\text{C} \rightarrow 4\text{Al} + 3\text{CO}_2$ (iii) Anode OR Positive electrode</p>	<p>1</p> <p>1</p> <p>1</p>
20	<p>In the manufacture of ammonia by Haber's process, write the flow chart and chemical equations with optimum conditions.</p>  <p>$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g}), \Delta H_f^\circ = -46 \text{ kJ/mol}$</p> <p>The most favorable condition according to Le-Chatelier's principle</p> <ol style="list-style-type: none"> 1. The temperature is about 770K (low temp) 2. The pressure is about $200 \times 10^5 \text{ pa}$ (high pressure) 3. Iron oxide catalyst with small amounts $\text{K}_2\text{O}/\text{Al}_2\text{O}_3$ promoter <p>OR</p> <p>$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \xrightarrow[\text{Iron oxide \& } \text{K}_2\text{O}/\text{Al}_2\text{O}_3]{770\text{K, } 200 \text{ bar}} 2\text{NH}_3(\text{g}), \Delta H_f^\circ = -46 \text{ kJ/mol}$</p>	<p>1</p> <p>1</p> <p>1</p> <p>2</p>
21	<p>i) Mention any two reasons for the anomalous behavior of oxygen. ii) Write the balanced chemical equation for the action of concentrated sulphuric acid on copper metal.</p> <p>(i) Small size, High electro negativity, Absence of d-orbitals, High ionization enthalpy (any two)</p> <p>(ii) $\text{Cu} + 2\text{H}_2\text{SO}_4 \longrightarrow \text{CuSO}_4 + \text{SO}_2 + 2\text{H}_2\text{O}$</p>	<p>2</p> <p>1</p>

22	<p>i) Complete the following equations.</p> <p>a) $2\text{NaOH} + \text{Cl}_2 \xrightarrow{\text{(cold and dil)}}$</p> <p>b) $\text{Cl}_2 + 3\text{F}_2 \xrightarrow{\text{exces}}$</p> <p>ii) Write the structure of chlorous acid[HOCIO]</p> <p>(i) a) $\text{NaCl} + \text{NaOCl} + \text{H}_2\text{O}$ b) 2ClF_3</p> <p>(ii)</p> 	1 1 1
23	<p>i) a) Calculate the spin only magnetic moment of Fe^{2+}. [Atomic number of iron = 26]</p> <p>b) Which element of 3d series exhibits maximum oxidation state?</p> <p>a) $\mu = \sqrt{n(n+2)}$ $\mu = \sqrt{4(4+2)} = 4.90 \text{ BM}$</p> <p>b) Manganese (or) Mn</p>	1 1 1
24	<p>How is KMnO_4 [Potassium permanganate] is prepared from MnO_2? Write equations.</p> <p>Step 1 :The finely powdered MnO_2 (pyrolusite) is fused with KOH (potassium hydroxide) in the presence of excess air & an oxidizing agent like KNO_3, to get green coloured potassium manganate.</p> <p>$2\text{MnO}_2 + 4\text{KOH} + \text{O}_2 \longrightarrow 2\text{K}_2\text{MnO}_4 + 2\text{H}_2\text{O}$</p> <p>Step 2 : Potassium manganate in acidic or neutral medium undergoes disproportionate to give permanganate</p> <p>$3\text{MnO}_4^{2-} + 4\text{H}^+ \longrightarrow 2\text{MnO}_4^- + \text{MnO}_2 + \text{H}_2\text{O}$</p>	1 1 1
25	<p>Explain hybridization, geometry and magnetic property of $[\text{Ni}(\text{CN})_4]^{2-}$</p> <p>Electronic configuration of $\text{Ni}^{2+} = [\text{Ar}]3d^84s^0$</p>  <p>In the presence of strong ligand CN^- ion, the electronic configuration</p>  <p>One 3d, one 4s & two 4p orbitals undergoes <u>dsp^2 hybridization</u> to give four equivalent vacant hybrid orbitals</p> <p>These four hybrid orbitals are occupied by four lone pairs of electrons from four CN^- ligands to form $[\text{Ni}(\text{CN})_4]^{2-}$</p>  <p>Since the hybridization is <u>dsp^2</u>, the geometry is <u>Square planar</u>.</p> <p>The complex is <u>diamagnetic</u> due to the absence of unpaired electrons</p>	1 1

26	<p>i) Write cis and trans isomeric structures of $[\text{Fe}(\text{NH}_3)_2(\text{CN})_4]^-$</p> <p>ii) What is the co-ordination number of Fe in $[\text{FeCl}_2(\text{en})_2]\text{Cl}$</p> <p>(i)</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>cis</p> </div> <div style="text-align: center;">  <p>trans</p> </div> </div> <p>(ii) six (or) 6</p>	<p>2</p> <p>1</p>
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IV	PART - D	Marks
27	<p>a) Calculate packing efficiency in Simple cubic lattice.</p> <p>b) An element having atomic mass 63.1 g/mol has face centred cubic unit cell with edge length 3.608×10^{-8} cm. Calculate the density of unit cell. [Given: $N_A = 6.022 \times 10^{23}$ atoms/mol]</p> <p>a)</p> <div style="text-align: center;">  </div> <p>In simple cubic unit cell, the number of particle is one i.e. considered as one sphere.</p> <p>The volume of one particle (1 sphere) = $\frac{4}{3}\pi r^3$ -----(1)</p> <p>Let the edge length of the cube = a</p> <p>Radius of each particle(sphere) = r</p> <p>a = 2r</p> <p>The volume of the unit cell = $a^3 = (2r)^3 = 8r^3$</p> <p>Packing efficiency = $\frac{\text{volume occupied by 1 spheres}}{\text{Total volume of the unit cell}} \times 100$ OR $\frac{Z \times \text{Volume of a particle}}{\text{volume of the unit cell}} \times 100$</p> <p>Packing efficiency = $\frac{\frac{4}{3}\pi r^3}{8r^3} \times 100 = 52.4\%$</p>	<p>1</p> <p>1</p> <p>1</p>

	<p>b) $d = \frac{ZM}{a^3 N_A}$</p> $d = \frac{4 \text{ atoms} \times 63.1 \text{ g/mol}}{(3.608 \times 10^{-8} \text{ cm})^3 \times (6.022 \times 10^{23}) \text{ atoms/mol}}$ $d = 8.92 \text{ g cm}^{-3}$	1 1
28	<p>a) 1.0g of a non-electrolyte solute dissolved in 50g of benzene lowered the freezing point of benzene by 0.4K. Find the molar mass of the solute. [Given: Freezing point depression constant of benzene = 5.12 K kg mol⁻¹].</p> <p>b) How solubility of a gas in liquid varies with i) Temperature and ii) Pressure?</p> <p>a) $M_2 = \frac{k_f \times w_2 \times 1000}{\Delta T_f \times w_1}$</p> $M_2 = \frac{5.12 \text{ K kg mol}^{-1} \times 1.0 \text{ g} \times 1000 \text{ g kg}^{-1}}{0.4 \times 50 \text{ g}}$ $M_2 = 256 \text{ g mol}^{-1}$ <p>b)(i) Solubility decreases with increase in temperature OR Solubility increases with decrease in temperature OR Solubility varies inversely with temperature</p> <p>(ii) Solubility increases with increase in pressure OR Solubility decreases with decrease in pressure OR Solubility varies directly with pressure</p>	1 1 1 1 1
29	<p>a) The electrode potential for the Daniel cell given below is 1.1V $\text{Zn(s)} \text{Zn}^{2+}(\text{aq}) \text{Cu}^{2+}(\text{aq}) \text{Cu(s)}$. Write overall cell reaction and calculate the standard Gibb's energy for the reaction. [F = 96487 c/mol]</p> <p>b) Mention any two factors which affect the conductivity of electrolytic solution.</p> <p>a) $\text{Zn(s)} + \text{Cu}^{2+}(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + \text{Cu(s)}$</p> $\Delta G^0 = -nFE_{\text{Cell}}^0$ $\Delta G^0 = -2 \times 96487 \times 1.1 = -21227 \text{ J/mol OR } -212.27 \text{ kJ/mol}$ <p>b) 1. The nature of the electrolyte 2. Temperature 3. Concentration of the electrolyte 4. Size of the ions produced and their solvation 5. The nature of the solvent and its viscosity (Any two)</p>	1 1 1 2

30.

a) Derive an integrated rate equation for rate constant of a zero order reaction

b) Write

i) Arrhenius equation

ii) The formula to calculate half life period of zero order reaction

a) Let us consider the following reaction which is of zero order.



The rate is given by

$$\frac{-d[R]}{dt} = k[R]^0$$

$$\frac{-d[R]}{dt} = k$$

$$-d[R] = kdt$$

$$d[R] = -kdt$$

on integration

$$\int d[R] = -k \int dt$$

$$[R] = -kt + I \longrightarrow (1)$$

Where, I is integration constant

When $t = 0$ $[R] = [R]_0$ where R_0 is initial concentration of the reactant

$$[R]_0 = -k \times 0 + I$$

$$[R]_0 = I$$

 \therefore equation (1) becomes

$$[R] = -kt + [R]_0$$

$$kt = [R]_0 - [R]$$

$$k = \frac{[R]_0 - [R]}{t} \longrightarrow (2)$$

b) (i) $k = Ae^{-\frac{E_a}{RT}}$ OR Any other suitable form of equation

$$(ii) t_{1/2} = \frac{[R]_0}{2k}$$

1

1

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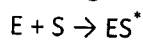
31.

- a) Give any two differences between lyophilic and lyophobic colloids
 b) Write the two steps involved in the mechanism of enzyme catalyzed reaction.
 c) What is the entropy change (ΔS) for adsorption?

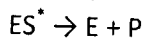
a) Any two

Property	Lyophilic colloids	Lyophobic colloids
1. Affinity	There is an affinity b/w dispersed phase & dispersion medium	There is no affinity b/w dispersed phase & dispersion medium
2. Preparation	Easily prepared by direct mixing of dispersed phase & dispersion medium	Preparation is difficult & Special techniques are required
3. Reversibility	Reversible	Irreversible
4. Stability	More stable	Less stable
5. Action of electrolyte (Coagulation)	Large quantities of electrolytes are required to bring coagulation not easily coagulated	Small quantities of electrolytes are sufficient to bring coagulation and easily coagulated
6. Action of light (Tyndall effect)	They do not scatter light	They scatter light
7. Charge	They may or may not carry charge	They always carry + ^{ve} or - ^{ve} charge
8. Solvation (Hydration)	Easily solvated	Not easily solvated
9. Viscosity	More than that of the medium	Nearly same as that of medium
10. Surface tension	Less than that of the medium	Nearly same as that of medium

b) Step 1: Binding of enzyme to substrate to form an activated complex



Step 2: Decomposition of the activated complex to form product

c) Decreases OR $\Delta S = -ve$ OR $\Delta S < 0$ OR ΔS is negative

2

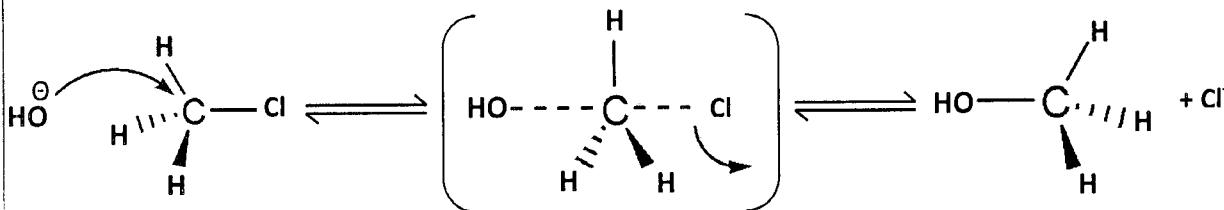
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- 32 a) Write S_N^2 mechanism for the conversion of methyl chloride to methyl alcohol
 b) Aryl halides are extremely less reactive towards nucleophilic substitution reactions. Give any two reasons.
 c) What is asymmetric carbon?

a) S_N^2 mechanism follows 2^{nd} order kinetics & the mechanism is only one step.



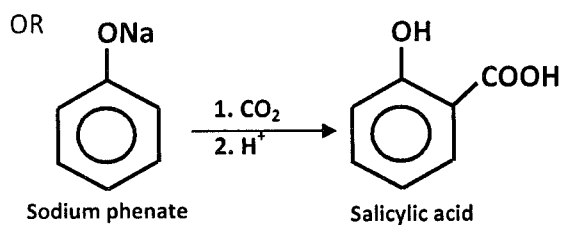
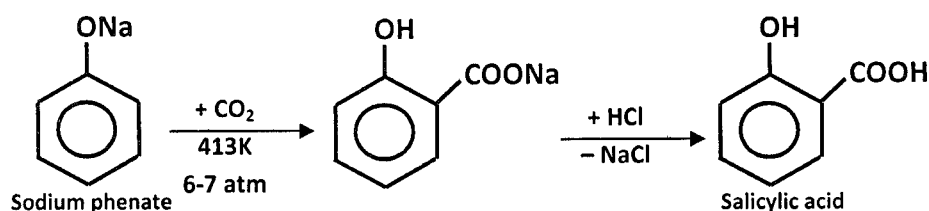
- b) 1. C - X bond acquires double bond character due to resonance
 2. Difference in hybridization of carbon atom in C - X bond: In haloarene the C- atom attached to halogen is sp^2 hybridized i.e. greater 's' character is more electronegative and can hold the electron pair of C - X more tightly.
 3. Instability of phenyl cation
 4. Because of possible repulsion due to electron rich arene.
 5. Energy of activation for displacement of halogen atom is more

(Any Two)

c) Carbon atom is bonded to four different atoms or groups.

- 33 a) Explain Kolbe reaction with equation.
 b) Write the three steps involved in the mechanism of acid catalysed dehydration of ethanol to ethene.

a) When sodium phenate heated with carbon dioxide at 413K under 6-7 atm pressure followed by acidification with HCl, salicylic acid is formed.



Explanation

Equation

OR

Self explanatory equation

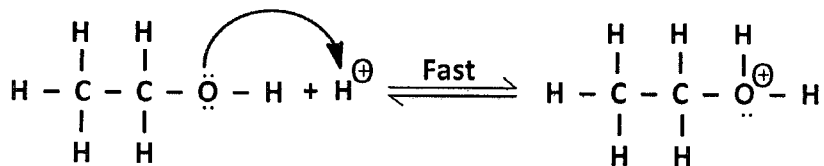
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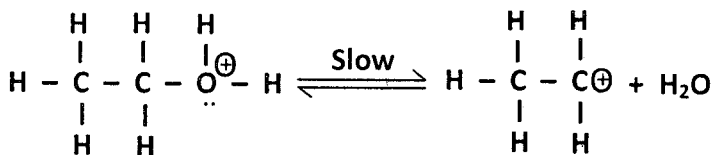
2

b) Step 1: Formation of protonated alcohol –



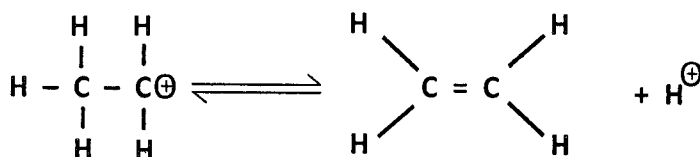
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Step 2: Formation of carbocation –



1

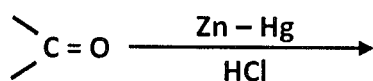
Step 3: Elimination of proton –



34.

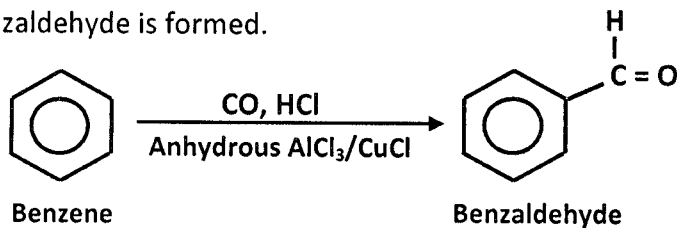
a) How benzene is converted into benzaldehyde by Gattermann-Koch reaction? Write equation

b) Complete and name the following reaction.



c) What is the effect of electron withdrawing group on the acidity of carboxylic acid.

a) When benzene is treated with carbon monoxide & HCl in the presence of Anhydrous AlCl_3 , benzaldehyde is formed.



1

Explanation

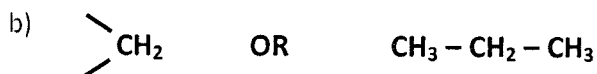
1

Equation

OR

2

Self explanatory equation



1

1

Clemmensen reduction

1

c) Increases

35

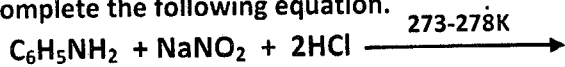
a) How primary amine is prepared by Hoffmann bromamide degradation? Write equation.

b) i) Write IUPAC name of $\text{CH}_3\text{CH}_2\text{NH}_2$

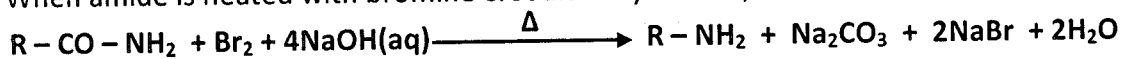
ii) Arrange the following amines in the order of their increasing basic strength in aqueous solution.

$(\text{CH}_3)_3\text{N}$, $(\text{CH}_3)_2\text{NH}$, CH_3NH_2

c) Complete the following equation.



a) When amide is heated with bromine & sodium hydroxide, 1° -amine is formed.



Explanation

Equation

OR

Self explanatory equation

b) (i) Ethanamine

(ii) $(\text{CH}_3)_3\text{N} < \text{CH}_3\text{NH}_2 < (\text{CH}_3)_2\text{NH}$

c) $\text{C}_6\text{H}_5\text{N}_2^+\text{Cl}^- + \text{NaCl} + 2\text{H}_2\text{O}$

1

1

2

1

1

1

36

a) Write the Haworth structure of maltose.

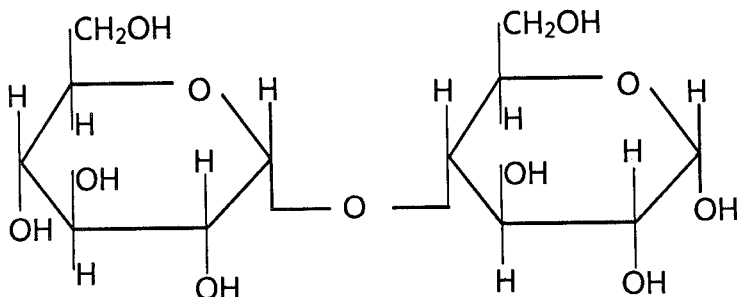
b) Give an example for

i) Globular proteins.

ii) Naturally occurring optically inactive amino acid.

c) Name the nucleic acid which is responsible for genetic information.

a)



2

b) i) Haemoglobin OR Albumin OR Insulin OR thyroglobulin OR fibrinogen OR venoms (of snake, scorpion, wasp, bees) OR Any suitable example

ii) Glycine

1

1

c) DNA (or) Deoxyribo nucleic acid

1

17

a) Explain the preparation of Buna-N with equation.

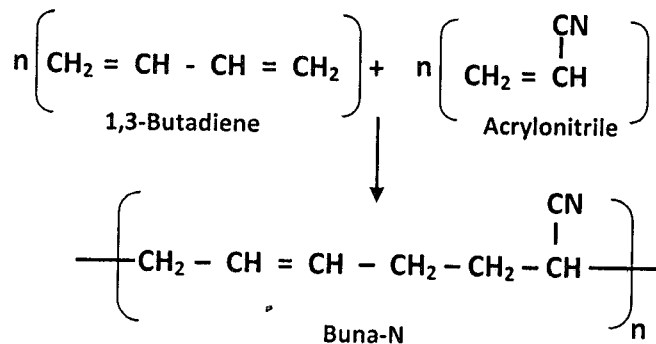
b) Name the monomer present in the following polymer

i) Poly vinyl chloride,

ii) Natural rubber.

c) Give an example of biodegradable polymer.

a) by co-polymerization of 1,3-butadiene and acrylo nitrile in the presence of peroxide or sodium catalyst.



Explanation

Equation

OR

Self explanatory equation

b)(i) Vinyl chloride OR Chloroethene

(ii) Isoprene OR 2-methyl-1,3-butadiene

c) Poly β -hydroxybutyrate-co- β -hydroxy valerate (PHBV) OR Nylon 2- Nylon 6 OR polyglycolic acid(PGA) OR polylactic acid (PLA) OR polycaprolactone(PCL) OR Any natural polymer

1

1

2

1

1

1