

CHEMISTRY

PAPER & SOLUTION

Code : SS-41-Chem

Time : 3 $\frac{1}{4}$ Hours

M.M. 56

GENERAL INSTRUCTIONS TO THE EXAMINEES :

- Candidate must write first his / her Roll No. on the question paper compulsorily.
- All the questions are compulsory.
- Write the answer to each question in the given answer-book only.
- For questions having more than one part the answers to those parts are to be written together in continuity.
- If there is any error / difference / contradiction in Hindi & English versions of the question paper, the question of Hindi version should be treated valid.
- | Q. Nos. | Marks per questions |
|---------|---------------------|
| 1 – 13 | 1 |
| 14 – 24 | 2 |
| 25 – 27 | 3 |
| 28 – 30 | 4 |
- Question Nos. 21, 27, 28, 29 and 30 have internal choices.

SECTION-A

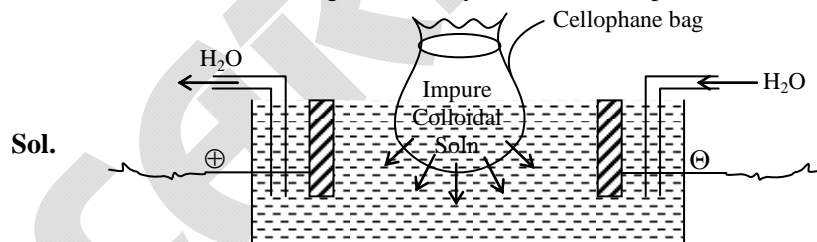
Q.1 Which type of semiconductor is formed when Arsenic is doped with Germanium ? [1]

Sol. When As is doped with Ge p type semiconductor is formed.

Q.2 Write definition of osmotic pressure. [1]

Sol. When two liquids of different conc. are separated by SPM, solvent flows from low conc. to high conc., amount of external pressure required to be applied on conc. side to stop movement of solvent is known as osmotic pressure.

Q.3 Draw a labelled diagram of dialysis method, for purification of colloidal solutions. [1]



To enhance process of dialysis electric field is applied it is known as electro dialysis.

Q.4 Write electronic configuration of Chromium (Z = 24). [1]

Sol. Cr(24) = $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$

Q.5 Write name and symbol of one transurenic element. [1]

Sol. Element formed by decomposition of uranium is known as transurenic element ${}_{93}\text{Np}$ Neptunium.



Q.6 Write general oxidation state of Lanthanoids. [1]

Sol. General oxidation state of lanthanides is +3

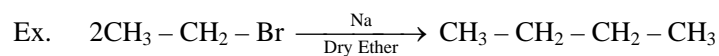
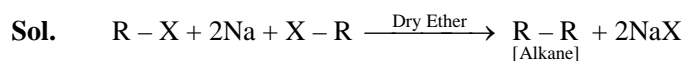
Q.7 Write IUPAC name of the following complex compound.



[1]

Sol. Potassium trioxalatoferate (III)

Q.8 Write chemical equation of Wurtz reaction. [1]



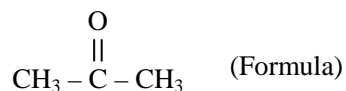
(n-butane)

Q.9 Write full name of DDT. [1]

Sol. DDT \Rightarrow Dichloro-Diphenyl Trichloroethane

Q.10 Write IUPAC name and chemical formula of Acetone. [1]

Sol.



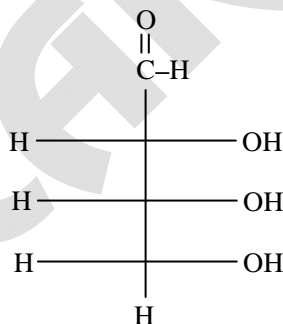
Propan-2-one (IUPAC Name)

Q.11 Write the formula to determine 'weight average molecular weight' of polymers. [1]

$$\text{Sol. } (\overline{M}_n) = \frac{\sum n_1 m_1^2}{\sum n_1 m_1}$$

Q.12 Write Fischer Projection Formula of erythrose sugar. [1]

Sol.



Q.13 Which chemical substance is found in musk, excreted by male musk deer ? [1]

Sol. Pheromones

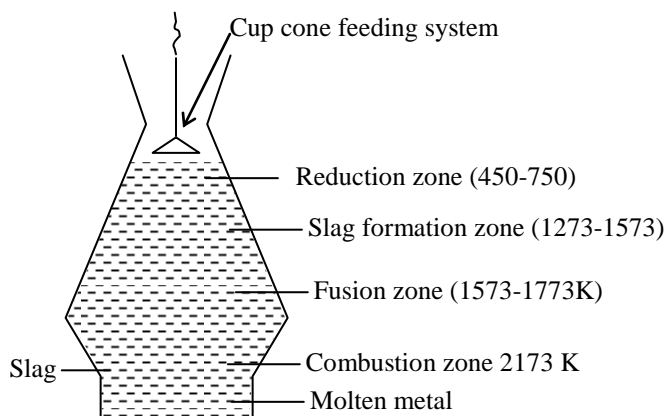
SECTION-B

Q.14 (A) Draw a neat and labelled diagram of "blast furnace".

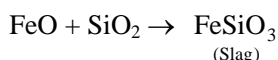
(B) What is the role of Silica in the copper metallurgy ?

[1+1=2]

Sol. (A)



(B) SiO_2 is used as flux which remove FeO into slag FeSiO_3



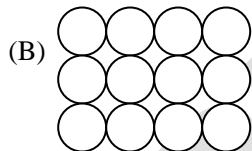
Q.15 (A) Copper shows electrical conductance in solid as well as molten state whereas copper chloride shows electrical conductance only in molten state. Give reason.

(B) Draw a diagram of "two dimension square closed packing".

[1+1=2]

Sol. (A) In case of Cu metal free e^- are present which conduct electricity in both states.

Where as in CuCl_2 ions conduct electricity which become free under molten state only.



Q.16 (A) Generally solubility of gases in liquids is decreases as increasing temperature. Give reason.

(B) How many gram of NaCl is required to make 200 mL aqueous solution of 5% (w/v) NaCl. [1+1=2]

Sol. (A) Dissolution of gas in the liquid is an exothermic process with increase in temp. solubility decreases.

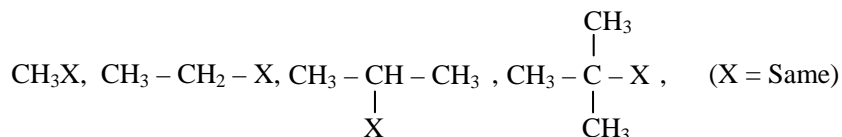
$$(B) \% \frac{W}{V} = \frac{\text{Mass of solute(g)} \times 100}{\text{Vol. in (ml)}}$$

$$5 = \frac{x}{200} \times 100$$

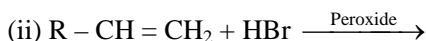
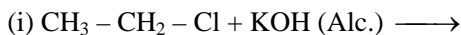
$$x = 10 \text{ g}$$



Q.19 (A) Arrange the following alkyl halides in ascending order of their reactivity towards S_N^1 reaction

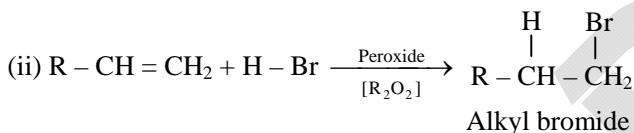
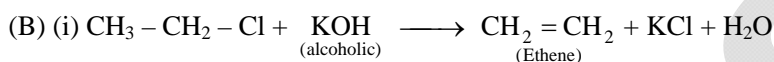
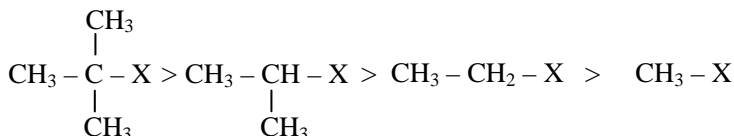
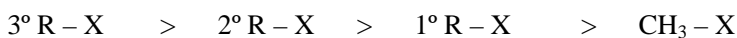


(B) Complete the following chemical reactions and write the products.



[1+1=2]

Sol. (A) Ascending order of their reactivity towards S_N^1



← Anti Markovni Koff's Rule →

Q.20 A solution of copper sulphate electrolysed for 20 minute with a current of 1.5 Ampere. Calculate the mass of copper deposited at the cathode. ($F = 96500 \text{ C}$) [2]

Sol. $W = \frac{E}{F} It$

$$= \frac{63.5}{2 \times 96500} \times 1.5 \times 20 \times 60 = 0.592 \text{ g.}$$

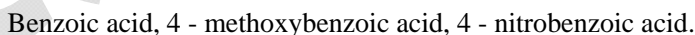
Q.21 (A) Arrange the following compounds in the descending order of their reactivity towards nucleophilic substitution reaction.



(B) Alkanoic acid have highest boiling points. Explain.

OR

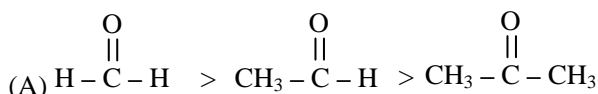
(A) Arrange the following carboxylic acid in ascending order of their acidity.



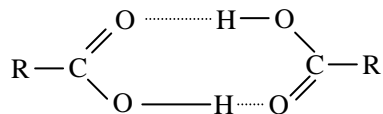
(B) How will you distinguish between Aldehyde and Ketone by chemical test ?

[1+1=2]

Sol. Reactivity order towards nucleophilic substitution reaction

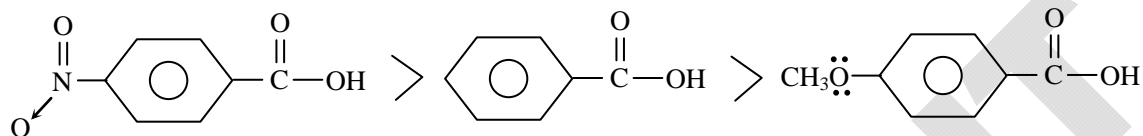


(B) Alkanoic acids exist in dimeric form by hydrogen bonding due to H-bond carboxylic acids having high BP

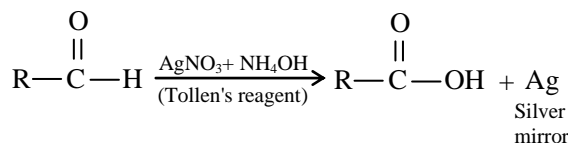


OR

(A) Acidic strength order



(B) Due to reducing nature aldehyde gives Tollen's test while ketone not



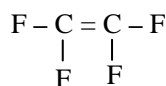
It's also known as silver mirror test.

Q.22 (A) Write the name of monomer unit of polymer used in non-stick surface coated utensils.

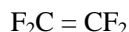
(B) Give an example of each of Homopolymer and copolymer.

[2]

Sol. (A) Tetra fluoro ethylene



or



(B) Poly ethylene or PVC or PVA] Homo polymer

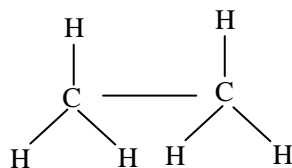
Poly ester or Terylene or Nylon-66] Co-polymer

Q.23 (A) Which conformer has higher energy in the Sawhorse projection formula of ethane and why ?

(B) Racemic mixture are optically inactive. Give reason.

[1+1=2]

Sol. (A) Eclipsed conformer having maximum energy due to torsional strain [strain due to repulsion between bonding electrons]



Eclipsed [SAW-HORSE projection]

(B) Racemic mix is equimolar (1 : 1) mix of optically active enantiomeric forms Racemic mix is optically inactive due to external compensation [Both active forms d and ℓ counter balance the rotation of ppℓ]



- Q.24** (A) Aspirin should not be taken in empty stomach, why ?
 (B) Write any two differences between dyes and pigments. [1+1=2]

Sol. (A) If aspirin is taken in empty stomach, it can cause stomach irritation, followed by a stomach ache. This happens because there is low acid level in the stomach which get maintained by the intake of food to dissolve the aspirin.

(B) Dyes	Pigments
i) Most of dyes are organic	Most of pigments are inorganic
ii) Dyes have direct affinity to textile material	They have no direct affinity to textile material

SECTION-C

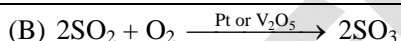
- Q.25** Read the given paragraph and write answers of the following questions.

When any solid substance is kept in contact with liquid or gas, then liquid or gas are more adsorbed on the surface of solid rather than bulk. The process is known as adsorption. It is different from absorption. Many gaseous reaction occurs in the presence of solid catalyst. Catalyst is a chemical substance which change the rate of reaction without undergoing itself change. This phenomenon is known as catalysis.

- (A) Write any two differences between Absorption and Adsorption.
 (B) Write any chemical equation of heterogeneous catalysis.
 (C) Write the name of Zeolite catalyst used to convert Alcohol to Petrol. [1+1+1=3]

Sol. (A)

Absorption	Adsorption
(1) Gas or liquid get equally distributed at the surface as well as in the inner bulk	Gas or liquid Get absorb at the surface only
(2) It is a bulk phenomenon	It is a surface phenomenon



(C) ZSM – 5

- Q.26** Read the given paragraph and write answers of the following questions.

Protein is very essential for the growth, development and maintenance of living systems. Proteins are natural polymer of σ -amino acids. A definite sequence of amino acids form a specific protein. Two or more than two amino acids bind to give peptide bond. Proteins are polypeptide, which loses its biological activity by physical or chemical changes.

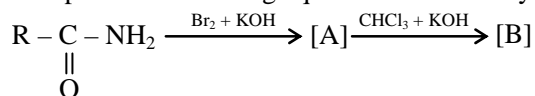
- (A) Explain essential and non-essential amino acid with example.
 (B) Explain denaturation of protein. [2+1=3]

Sol. (A) Essential Amino acids : 8 amino acids which are not synthesised in human body said to be essential like valine, iso-leucine etc [obtained from food]

Non-essential amino acids : Amino acids which are synthesised in human body eg. alanine, glutemine.

- (B) Denaturation is a process in which proteins lose the quaternary structure, tertiary structure and secondary structure which is present in their native state, by application of strong acids or bases or an organic solvent like alcohol.

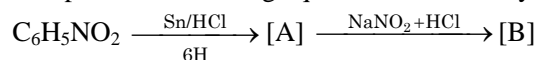
Q.27 (A) Complete the following equations and identify A and B.



(B) Draw the resonating structure of Urea

OR

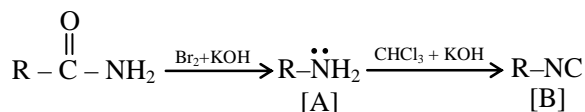
(A) Complete the following equations and identify A and B.



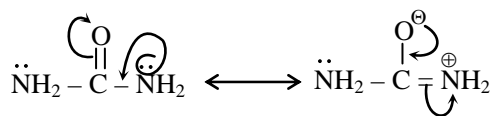
(B) Draw the resonating structures of Aniline. [2+1=3]

Sol.

(A)

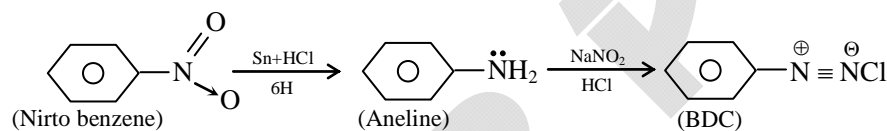


(B)

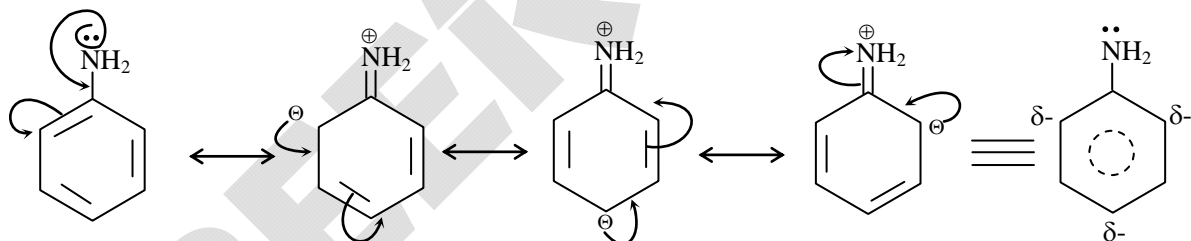


OR

(A)



(B)



SECTION-D

Q.28 (A) Write definition of order of reaction.

(B) According to collision theory, write two main barriers for any chemical reaction.

(C) Show that, In a first order reaction, time required for completion of 99.9 % is 10 times of half life.

$$(\log 10 = 1)$$

OR

(A) Write definition of Molecularity of reaction.

(B) According to collision theory, write name of two factors which increases the rate of reaction as temperature increase.

(C) Show that in a first order reaction, time required for completion of 75 % is twice of half life of the reaction. $(\log 2 = 0.3010)$ [1+1+2=4]



- Sol.** (A) Power or exponents to which conc. of reactants is raised in the rate law is known as order of reaction.
 (B) According to collision theory –
 (i) Molecules should collide with each other
 \therefore rate \propto collision freq.
 (ii) Only activated molecule upon collision form products.
 (iii) Collision is effective if molecules collide in a proper orientation

$$(C) t_{1/2} = \frac{2.303}{1C} \log 2 \quad \dots(1)$$

$$\begin{aligned} t_{99.9\%} &= \frac{2.303}{K} \log \frac{100}{0.1} \\ &= \frac{2.303}{K} \log 10^3 \\ &= \frac{2.303}{K} 3 \log 10 \quad \dots(2) \end{aligned}$$

From equation (1) & (2)

$$t_{99.9\%} = 10 \times t_{1/2}$$

OR

- (A) No. of molecules colliding with each other in a balanced elementary reaction to form product is known as molecularity of reaction.
 (B) As temperature increases
 (i) Collision frequency increases and therefore rate of reaction increases
 $r \propto Z$
 (ii) No. of activated molecules increases $r \propto$ No. of activated molecules

$$\frac{N_a}{N_0} = e^{-E_a/RT}$$

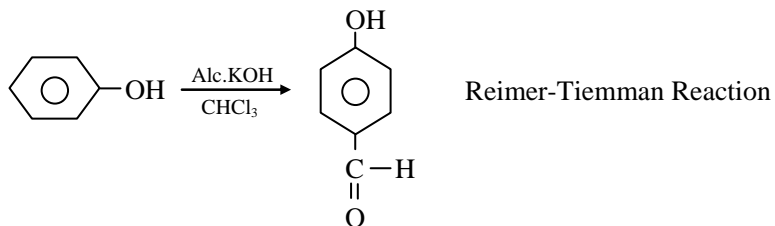
$$\begin{aligned} (C) t_{1/2} &= \frac{2.303}{K} \log \frac{a_0}{a_0 - \frac{a_0}{2}} \\ &= \frac{2.303}{K} \log 2 \quad \dots(1) \end{aligned}$$

$$\begin{aligned} t_{75\%} &= \frac{2.303}{K} \log \frac{a_0}{a_0 - \frac{3}{4}a_0} \\ &= \frac{2.303}{K} \log 4 = \frac{2.303}{K} \cdot 2 \log 2 \quad \dots(2) \end{aligned}$$

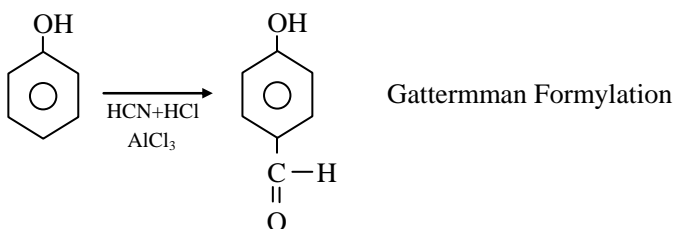
\therefore from equation (1) & (2)

$$\boxed{t_{75\%} = 2 \times t_{1/2}}$$

(C)



or



or

