

[This question paper contains 6 printed pages.]

Sr.No. of Question Paper : 1841

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Your Roll No.....

Unique Paper Code : 217661

Name of the Course : B.Sc. (Programme) Physical Science / Life Science

Name of the Paper : CHPT – 606 : CHEMISTRY – VI

Semester : VI

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt three questions from Section A and three questions from Section B.
3. Section A and B are to be attempted in separate portions of the same answer sheet.
4. Please indicate the section you are attempting at the appropriate place and do not intermix the sections. The questions should be numbered in accordance with the number in the question paper.
5. Calculators and Log tables may be used.

SECTION A

(Attempt any three questions.)

1. (a) Why does CO act as both a Lewis base and acid ? Which atom Carbon or Oxygen is involved in both the cases ? Explain with reference to MO diagram.
(b) Calculate the EAN of the following :
 - (i) $\text{Fe}_2(\text{CO})_9$
 - (ii) $\text{V}(\text{CO})_6^-$
 - (iii) $\text{HMn}(\text{CO})_5$

P.T.O.

- (c) Draw the structure of Ziese's Salt and mention in which class of organometallic compounds will you place it.

OR

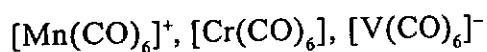
On the basis of VBT predict the shape of $\text{Cr}(\text{CO})_6$ which is found to be diamagnetic.

- (d) What is the effective oxidation state of Iron in $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]^{2+}$?
(4.5, 4.5, 2.5, 1)

2. (a) What happens when (give chemical equations)

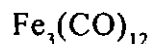
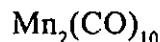
- (i) H_2O_2 is added to acidified solution of $\text{K}_2\text{Cr}_2\text{O}_7$ having some ether.
 - (ii) $\text{K}_4[\text{Fe}(\text{CN})_6]$ is treated with FeCl_3 .
 - (iii) KI reacts with moderately alkaline KMnO_4 .
 - (iv) Excess of sodium nitrite dissolved in AcOH is added to a solution of cobalt nitrate.
 - (v) Sodium sulphite solution is treated with sodium nitroprusside.
- (b) How KMnO_4 is obtained from pyrolusite ore on a large scale ?
- (c) When an aqueous solution of KOH is added to orange red solution of compound A, a yellow solution results due to formation of compound B. On acidifying with H_2SO_4 , the yellow colour changes to orange red again. Identify the compounds A and B and give the chemical reactions involved.
- (d) Discuss the substitution or reduction reactions of carbonyls giving two examples. (5, 2.5, 3, 2)

3. (a) Predict the order of increasing CO stretching frequencies in the following isoelectronic species and give explanation.

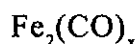


(b) Using 18 electron rule as a guide :

(i) Determine the number of metal-metal bonds in :



(ii) Predict the number of CO ligands in :



(c) Despite being a 17 electron species $[\text{V}(\text{CO})_6]$ does not dimerise. Explain. (4,3,3,2.5)

4. (a) What is glycolysis ? Which metal ion plays a role in glycolysis ?

(b) In which category – essential, non-essential, trace or toxic, will you place the following :

Fe, Zn, Mg, Ba, Cd, Na

(c) What is meant by active transport ? Why is the Na-K pump an example of active transport ?

(d) What is Calmodulin ? What is its main function ? (3,3,3.5,3)

SECTION B

(Attempt any three questions.)

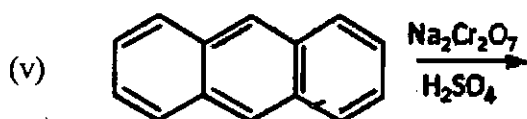
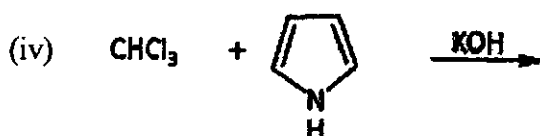
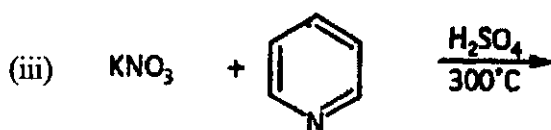
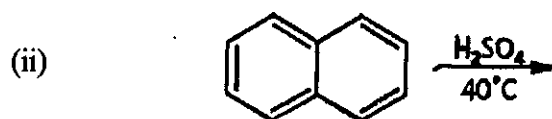
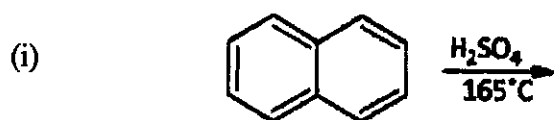
5. (a) (i) Furan is the only five membered heteroaromatic compound which undergoes Diels-Alder reaction. Justify.

(ii) A tripeptide on selective hydrolysis yields two dipeptides A & B. Dipeptide A contains Leucine and Glycine & dipeptide B contains Alanine and Glycine. The N-terminal of dipeptide A is Leucine and that of B is Glycine. Identify the tripeptide.

(iii) How will you prepare alanine using Strecker synthesis ?

- (b) (i) Why does UV spectra of organic compounds consist of bands and not sharp peaks ?
- (ii) Calculate the number of fundamental vibrational modes in the following molecules : H_2O & CO_2
- (c) Pyridine undergoes nucleophilic substitution reaction in addition to electrophilic substitution reaction. Justify the dual behaviour of Pyridine. (6,4,2.5)

6. (a) Complete the following reactions :



- (b) (i) How is anthracene synthesised by Haworth synthesis ?
- (ii) Give the order of reactivity of 5-membered heteroaromatic compounds with suitable explanation.
- (c) The dipole moment of heteroaromatic compound is reverse as that of its corresponding tetrahydro derivative. Explain.

OR

Draw resonating structures of naphthalene & explain why naphthalene has different C-C bond lengths ? (5,5,2.5)

7. (a) Write a short note on any two of the following :

- (i) Merrifield solid phase synthesis
- (ii) Electrophoresis
- (iii) Secondary structure of protein (α - helix).

(b) (i) Define isoelectric point. Calculate pI value of Lysine for given pKa values ($pK_{a_1} = 2.2$, $pK_{a_2} = 9.0$, $pK_{a_3} = 10.5$)

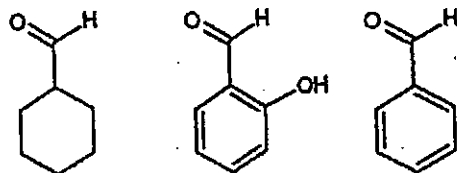
(ii) Write the structure of the product formed by the Edman degradation of polypeptide Gly-Leu-Ala-Phe-Tyr-Val. Which fragment of peptide chain will leave after the degradation reaction ?

(c) How the dipeptide ala-val is synthesized from alanine and valine ?

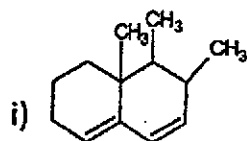
Alanine: $\text{CH}_3\text{CH}(\text{NH}_2)\text{COOH}$, Valine: $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}(\text{NH}_2)\text{COOH}$ (4,5,3.5)

8. (a) A conjugated diene absorbs at a higher wavelength with higher value of extinction coefficient as compared to a diene in which double bonds are isolated. Justify with examples.

(b) Giving reasons, predict the frequency shift of the carbonyl absorption in the given aldehydes, $\bar{\nu}$ values are 1665 cm^{-1} , 1700 cm^{-1} and 1730 cm^{-1} .



- (c) λ_{max} of aniline shifts from 230 nm in neutral medium to 203 nm in acidic medium. Explain.
- (d) Calculate λ_{max} for the given compounds :



Base value-215 nm



Base value-217 nm

(3,4,2.5,3)