

Please check that question paper contains 9 questions and 3 printed pages within first ten minutes

[Total No of Questions: 09]

MORNING

[Total No of pages: 03]

Uni. Roll No.....

Program/Course: B. Tech. Sem 1,2

04 OCT 2023

Name of the Subject: Chemistry

Subject Code: BSC-105

Paper ID: 15933

Time Allowed:03 Hours

Max. Marks:60

NOTE:

- 1) Part A and Part B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are Compulsory, but with internal choice.
- 3) Any missing data may be assumed appropriately.

Part-A

[Marks: 02 each]

Q1.

- a) Wave no. for C=O group in CH_3COCH_3 is 1715 cm^{-1} , whereas for HCOH is 1750 cm^{-1} in IR spectrum. Why?
- b) The solubility of $\text{Mg}(\text{OH})_2$ is 1.518×10^{-4} moles/litre at 285K. Calculate its solubility product at this temperature.
- c) How chlorination results into disinfection of water?
- d) Define: (i) critical temperature and (ii) permanent gases.
- e) Briefly discuss induced dipole- induced dipole interactions.
- f) How the nature of (a) alkyl halide and (b) halogen atom, influence the SN_2 reactions.

Part-B

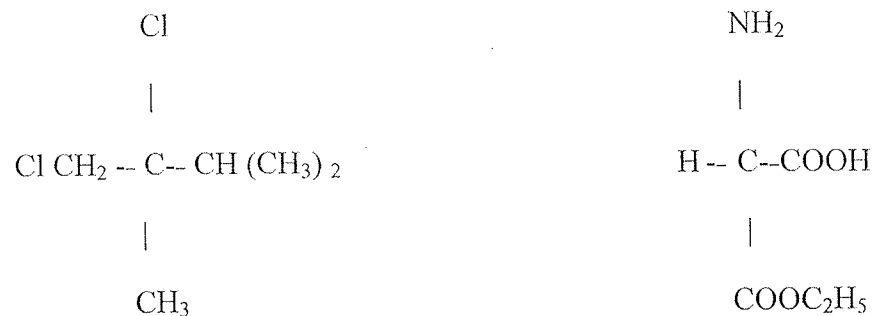
[Marks: 04 each]

Q2) $\text{C}_2\text{H}_6\text{O}$ is molecular formula of a sample. It shows three signals in its NMR spectrum. Write down its structure and draw a high resolution NMR of it.

Q3) If a point 'A' lies on melting point curve of water system. What is the equilibrium that exist at this point ? What is the effect of increase in temperature on this equilibrium? Discuss with help of a diagram.

Q4) What is (a) doping (b) n- type semiconductor? Discuss the effect of temperature on n - type semiconductor.

Q5) Assign R and S configuration to the following :



Q6) What is sodium zeolite? Discuss how it is useful for softening of hard water?

Q7. Calculate CFSE for d⁴ strong field octahedral complex. What type of magnetic property this shows and why?

Part-C

[Marks: 12each]

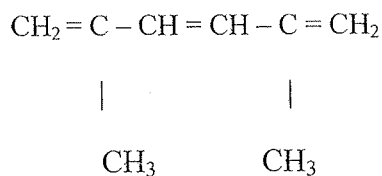
Q8a) Give reasons to the following statements:

i) The UV-VIS spectrum of CH₃-Cl is different from CH₃-I, although both are from same family of alkyl halides. .

ii) H bonding shifts UV-VIS absorption to shorter wavelength. Explain. (4)

8 b) (i) Define auxochrome. What is its influence on chromophore?

(ii) Calculate the wavelength absorbed by the following , using Woodward Fieser rule:



(4)

c) Calculate the amount of lime(91% pure) and soda (97.2%pure) required to soft one million litres of water having following impurities in ppm: Ca(HCO₃)₂=30.5, Mg(HCO₃)₂=35.5, MgSO₄=20, CaSO₄=24, CaCl₂= 25, and NaCl=10. (4)

OR

Q8a) A substance when dissolved in water at $10^{-3}M$ concentration absorbs 10% of an incident radiation in a path of 1cm length. What should be the concentration of the solution in order to absorb 90% of the same radiation? (4)

b) Write a detailed note on boiler corrosion and its control. (4)

c) What is scale formation and how can it be prevented by internal treatment process? Discuss. (4)

Q9 a) Draw a well labelled diagram of Pb-Ag system and discuss the Eutectic point. (4)

b) Calculate the standard electrode potential of $Ni^{2+} | Ni$ electrode if the cell potential of the cell $Ni | Ni^{2+} (0.01M) || Cu^{2+} (0.1M) | Cu$

is 0.59V. Write down the cell reaction also. The standard electrode potential value given of $Cu^{2+} | Cu = 0.34V$. (4)

c) Compare diastereomers and enantiomers. (4)

OR

Q9 a) Discuss Markownikov's rule with help of an example. What is the exception to this rule? (4)

b) Draw various conformations of cyclohexane and give their energy relationship with help of a diagram. (4)

c) Write down the cell reaction of following cell:

$Zn | Zn^{2+} (0.1M) || Cu^{2+} (0.175M) | Cu(s)$ at $25^{\circ}C$.

$E^0_{Zn^{2+}/Zn} = -0.76V$ and $E^0_{Cu^{2+}/Cu} = 0.34V$

Also calculate the ΔG of this cell. (4)

