

Please check that this question paper contains 09 questions and 02 printed pages within first ten minutes.

MORNING

[Total No. of Questions: 09]

[Total No. of Pages: 2] 21 JUN 2023

Uni. Roll No.

Program: B.Tech. (Batch 2018 onward)

Semester: 1/2

Name of Subject: Chemistry

Subject Code: BSC-105

Paper ID: 15933

Scientific calculator is Allowed.

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and 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) What is Calgon Conditioning of boiler feed water?
- b) Why TMS is used as standard for measuring chemical shift?
- c) Give one example of dehydrohalogenation.
- d) Differentiate between temporary and permanent hardness.
- e) The solubility product of AgCl is 1.56×10^{-10} at 25° C. What will be its solubility?
- f) Differentiate between n and p type semiconductor.

Part – B

[Marks: 04 each]

- Q2) Discuss dipole induced dipole interaction.
- Q3) What is breakpoint chlorination? What are its advantages? (any two).
- Q4) Select one example and discuss conjugate acid base pair.
- Q5) Calculate CFSE for d_6 configuration in weak field and strong field complexes.
- Q6) Differentiate between diastereomers and enantiomers. (any 4 points).
- Q7) The presence of an auxochrome causes bathochromic shift in a chromophore. Justify this statement by giving its reason in detail.

Part – C

[Marks: 12 each]

- Q 8a) Draw and discuss NMR of $\text{CH}_3\text{CH}_2\text{F}$, by specifying the (i) number of signals (6)
 (ii) Intensity of signal (iii) type of signal (iv) position of signal. (4)
 b) What are Ion exchange resins? How do they make water soft? (4)
 c) What is spectrochemical series? (2)

OR

- Q 8a) Discuss the vibrations shown by polyatomic molecules on absorption of IR energy. (4)
 b) Crystal field splitting in tetrahedral complexes is less than in octahedral complexes. Why? (2)
 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: $\text{Ca}(\text{HCO}_3)_2=30.5$, $\text{Mg}(\text{HCO}_3)_2=35.5$, $\text{MgSO}_4=20$, $\text{CaSO}_4=24$, $\text{CaCl}_2=25$, and $\text{NaCl}=10$ (6)

- Q 9a) Calculate standard electrode potential of $\text{Ni}^{2+} | \text{Ni}$ electrode if the cell potential of $\text{Ni} | \text{Ni}^{2+} (0.01\text{M}) || \text{Cu}^{2+} (0.1\text{M}) | \text{Cu}$ is 0.59V. Write down the cell reaction also. The standard electrode potential value given of $\text{Cu}^{2+} | \text{Cu} = 0.34\text{V}$. (6)
 b) Discuss Markonikov's rule by giving one example (6)

OR

- Q 9a) Draw a well labelled phase diagram of water system. Also show the calculation of F for different lines, areas and point. (6)
 b) Discuss Chair and boat confirmations of cyclohexane with help of a diagram. (6)
