

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

[Total No of Questions: 09]

[Total No of pages: 03]

Uni. Roll No.....

Program: B.Tech. (Batch 2018 onward)

Semester: 2

Name of the Subject: Chemistry

Subject Code: BSC-105

Paper ID:15933

Scientific calculator is Allowed

MORNING  
22 SEP 2022

**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) List any two reasons for less crystal field splitting in tetrahedral complexes than in octahedral complexes
- b) Discuss Reverse Osmosis.
- c) Why TMS is used as a standard/ reference in NMR?
- d) Define erythro and threo isomers. Quote one example also
- e) The emf at 25°C for the cell reaction  $Zn(s) + Cu^{2+}(1.0M) \rightarrow Cu(s) + Zn^{2+}(0.1M)$  is 1.3V. Calculate  $E^0$  for the cell.
- f) Using Woodward-Fieser rule, calculate the value of wavelength maxima for:  
 $(CH_3)_2 - C = CH - CO - CH_3$

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**Part-B**

[Marks: 04 each]

- Q2. Write a short note on following type of intermolecular forces : (a) Induced dipole - Induced dipole and (b) ion-dipole .
- Q3. Discuss the process of disinfection of water by chlorination. What is the importance of break point chlorination in this process?
- Q4. Write two pairs of enantiomers and two pairs of diastereomers for  
 $\text{CH}_3\text{-CH}_2\text{-CHCl-CHCl-CH}_3$
- Q5. What are different types of electronic transitions? Explain.
- Q6. Discuss and draw crystal field energy level diagram for a  $d^6$ , weak field, octahedral complex.
- Q7. Draw a well labelled diagram of Pb-Ag system and discuss the eutectic.

**Part-C**

[Marks: 12each]

- Q8. a) A sample of water has following impurities (in ppm) per litre of water. Calculate the amount of lime and soda , required to make this water soft:  $\text{Ca}^{2+}=80$ ,  $\text{Mg}^{2+}=36$ ,  $\text{K}^+=39$ ,  $\text{HCO}_3^- =244$  and  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}=69.5$  (4)
- b) Discuss the principle of NMR (4)
- c) Write a note on vibrations shown by molecules on absorption of IR energy, with help of diagram. (4)

**OR**

- Q8a) what is zeolite? How this can be used for softening of water? List any two major disadvantages of this treatment (4)
- b) Define auxochrome. How it influences the chromophore? (4)
- c) How the nature of ligands influence the crystal field splitting caused by it ? Explain. (4)

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

**b)** Discuss chair confirmation of cyclohexane (4)

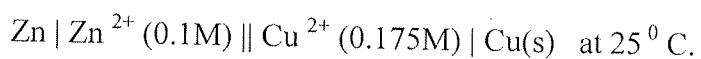
**c)(i)** Define conjugate acid and conjugate base. Discuss the relative strength of conjugate acids and bases. (4)

**OR**

**9a)** Draw labelled diagram of water system and discuss different points, curves and areas.(4)

**b)** Explain SN1 reaction mechanism by taking one example (4)

**c)** Write down the cell reaction of following cell:



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

Also calculate the  $\Delta G$  of this cell.

(4)

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