

[Total No. of Questions - 9] [Total No. of Printed Pages - 4]
(2123)

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B. Tech 1st Semester Examination

Engineering Chemistry (N.S.)

NS-103

Time : 3 Hours

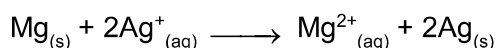
Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt any one question each from sections A, B, C & D.
Section E is compulsory

SECTION - A

1. (i) Give the cell representation for a cell in which the following reaction takes place. (6)



Calculate the cell potential. Given that $E^0_{\text{Ag}^+/\text{Ag}}$ and $E^0_{\text{Mg}^{2+}/\text{Mg}}$ are 0.80V and -2.37V, respectively and the concentrations of Ag^+ and Mg^{2+} ions are 0.02M and 0.001M, respectively.

- (ii) What are concentration cells? Explain the electrolyte concentration cell and give its applications. (7)
- (iii) What are reference electrodes? Describe the construction and working of a calomel electrode. (7)
2. (i) What is Gibbs phase rule? Explain with suitable examples the terms involved in it. (7)
- (ii) Explain: (a) meta stable equilibrium (b) Eutectic point (6)
- (iii) Discuss the sulphur system with the help of phase diagram. (7)

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[P.T.O.]

SECTION - B

3. (i) Explain caustic embrittlement. What are the causes of caustic embrittlement? How can it be prevented? (7)
- (ii) Write short note on:
- a. Corrosion inhibitor
 - b. Sacrificial anodic protection
 - c. Galvanizing and tinning (6)
- (iii) Explain the term passivity. Distinguish between electrochemical series and galvanic series. (7)
4. (i) Describe the principle and procedure involved in the zeolite process for the treatment of water. What are the limitations, advantages and disadvantages of the process? (10)
- (ii) Why is it conventional to express hardness of water in terms of CaCO_3 ? How many grams of FeSO_4 dissolved per liter gives 210.5 ppm of hardness? (4)
- (iii) Explain the terms BOD and COD. Indicate their significance in sewage treatment. (6)

SECTION - C

5. (i) What is the basic principle involved in NMR Spectroscopy? How will you differentiate between acetone and ethyl methyl ether using this technique? (5)
- (ii) Differentiate with one suitable example between:
- a. Shielding and deshielding
 - b. Bathochromic and hypsochromic shift
 - c. Chromophores and auxochromes (9)

- (iii) What modes of vibrations are active in IR absorption spectra and why? Taking nitro group as an example show different types of vibrations observed in IR spectra. (6)
6. (i) What are fuels? What are advantages of gaseous fuel over solid and liquid fuels? (5)
- (ii) What are the constituents of coal as determined by proximate analysis? How is this analysis method different from ultimate method? (7)
- (iii) What is meant by cracking of petroleum oil? Differentiate between thermal and catalytic cracking. What are the advantages of catalytic cracking over thermal cracking? (8)

SECTION - D

7. (i) Classify polymers on the basis of configuration. Give salient features of each type. (6)
- (ii) Explain the mechanism of coordination polymerization. Why is it called stereospecific polymerization? (5)
- (iii) Explain the preparation, properties and applications of-
- Epoxy resins
 - Polyvinyl chloride
 - PMMA (9)
8. (i) What are composites? Give at least five advantages of composites over traditional materials. (6)
- (ii) Discuss in brief the role of matrix, fiber and interface in fiber reinforced composites. (8)
- (iii) Describe in brief the failure modes of fiber reinforced composites. (6)

[P.T.O.]

SECTION - E

9. (i) Copper rivets can be used on steel sheets but steel rivets cannot be used on copper sheets.
- (ii) Why does blue color of copper sulphate solution fade when it is electrolysed using platinum electrode?
- (iii) What is condensed phase rule? When is it applied?
- (iv) Alkalinity of water cannot be due to the simultaneous presence of OH^- , CO_3^{2-} and HCO_3^- . Give reason.
- (v) Arrange $\text{CH}_2=\text{CH}_2$, $\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_2$ and $\text{CH}_2=\text{CH}-\text{CH}=\text{CH}-\text{CH}=\text{CH}_2$ in increasing order of their UV absorption maxima.
- (vi) Explain why teflon is called pseudo-thermosetting polymer.
- (vii) Define cetane number.
- (viii) Explain why Bakelite cannot be remoulded.
- (ix) 'IR spectra are often characterized as molecular finger prints'. Justify the statement.
- (x) What is meant by the term reforming? **(2×10=20)**