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CHEM136 Enrol. No. A0231670241 32

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END SEMESTER EXAMINATIONS JANUARY 2025

ENGINEERING CHEMISTRY

Time : 3 Hrs. *Maximum Marks : 60*

Note: ***Attempt questions from all sections as directed. Use of Scientific calculators is allowed.***

SECTION – A (24 Marks)

Attempt any ***Four*** *questions out of* ***Five.***

Each question carries **06** *marks.*

1. What type of alkalinity is present if phenolphthalein alkalinity is more than half of methyl orange alkalinity? Why is Buffer added in determination of hardness of water?

2. Explain the determination of %Carbon and %Hydrogen in the fuel sample.

3. Explain the mechanism of Electrochemical / Wet corrosion, with reference to Rusting of iron.

What are the factors that contribute to the rusting of iron?

4. Differentiate the following -

(a) Thermoplastic resins and thermoset resins

(b) Step growth polymerization and chain polymerisation.

5. Explain shielding and deshilding in NMR spectroscopy. What is the reference standard used and give reasons for the same.

SECTION – B (20 Marks)

Attempt any **two** *questions out of* **three**.

Each question carries **10** *marks.*

6. (a) Classify Lubricants. Give short notes on i) Extreme pressure additives ii) Viscosity and Viscosity index iii) Flash and Fire point (6)

(b) Finger Print region is very important in IR spectroscopy. Give reason. (4)

7. (a) Discuss the mechanism of free radical polymerization for polythene. (5)

(b) i) Explain using suitable equations whether lime or soda or both is (are) needed for softening of water containing magnesium sulphate.
ii) Calculate the temporary and permanent hardness of a sample of water containing: $Mg(HCO3)2$=7.3mg/L, $Ca(HCO3)2$= 16.2mg/L, $MgCl2$= 9.5mg/L, $CaSO4$=13.6mg/L. (5)

8. (a) A gaseous fuel has following compostion by volume: $H2$ = 20 %, $CH4$=25 %, $C2H6$= 16%, $C2H4$=9.5%, $C4H8$=2.5 %, CO=8%, $N2$=12 %.Find the voulume and weight required for perfect combustion of 1m3 of this gas. Discuss the various steps involved in Proximate analysis of a fuel. (5)

(b) What is priming? How is it caused? What are its disadvantages? (5)

SECTION – C (16 Marks)

(Compulsory)

9. (a) Calculate the amount of lime (80% pure) and soda (90% pure) required for removing the

following salts in 300 L of water: $Ca(HCO3)2$ = 16.2 ppm, $CaSO4$ = 13.6 ppm, $MgSO4$ = 12.0 ppm and $Mg(HCO3)2$ =14.6 and 5.7ppm $A12(SO4)3$ as coagulant. Also calculate total, permanent and temporary hardness of the water sample. (4)

(b) Define chemical shift. How does shielding and deshielding affect the chemical shift? (2)

(c) A sample of coal was found to have the following percentage composition: C=80%, H= 3.2%, O=10.1%, N=2.2% and ash = 4.5%. Calculate the minimum air required for complete combustion of 2 kg of coal. (4)

(d) Give preparation and uses of polyester and PMMA. (4)

(e) Give differences between Chemical and Electrochemical corrosion? (2)