1303

CHEM136

Enrol. No. A230522336

[ST]

END SEMESTER EXAMINATION : APRIL-MAY, 2024

ENGINEERING CHEMISTRY

Time : 3 Hrs.   *Maximum Marks : 60*

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

SECTION – A   (24 Marks)

Attempt any **four** *questions out of* **five.**
Each question carries **06** *marks.*

1. (a) Discuss the significance of using buffer in EDTA titration for determination of hardness. Give structure of the indicator used in above titration.

(3)

(b) 100 ml of water sample required 26 ml of N/25 HCl for neutralization to phenolphthalein end point. After this, methyl orange indicator was added to this and further acid required was again 52 ml. Calculate the type and extent of alkalinity of water as $CaCO_3$ in ppm.   (3)

P.T.O.

2. Give reasons for :

(a) Impure metal corrodes faster than pure metal under identical conditions.

(b) Rusting of iron is quicker in saline water than in ordinary water.

(c) Small anodic area results in intense corrosion.

(d) A copper equipment should not possess a small steel bolt.

3. (a) Calculate the force constant for CO, if this compound absorbs at 2.143×10^5 m^{-1} and its reduced mass is 1.139×10^{-26} Kg.   (3)

(b) Give two examples of compounds , each undergoing n→σ* and π→π* transitions. Also give the order of decreasing energy for the absorption for different electronic transitions in UV spectroscopy.   (3)

4. (a) A coal sample has the following composition by weight: C=90%, O=3.0%, S=0.5%, N=0.5% and ash=2.5%. Net calorific value of the coal was found to be 8490.5 kcal/Kg. Calculate the percentage of hydrogen and HCV of coal. [MW : C=12, O=16, N=14: Latent heat of steam = 587cal/g].   (4)

(b) Define GCV and LCV. Explain why GCV is also known as HCV.   (2)

5.   (a) Give the synthesis of Nylon 6,6.   (3)

(b) Give any three properties and uses of Bakelite.   (3)

SECTION – B   **(20 Marks)**

Attempt any **two** *questions out of* **three**.
Each question carries **10** *marks.*

6.   Classify Lubricants. Give short notes on :

   (i) Extreme pressure additives

   (ii) Viscosity and Viscosity index

   (iii) Cloud and Pour point

   (iv) Flash and Fire point

7.   (a) Explain internal treatment for prevention of scales.   (6)

(b) Calculate the amount of Lime (92% pure) and soda (98%) required for treatment of 30000 litres of water whose analysis is as follows : $Ca(HCO_3)_2$ = 40.5 ppm, $Mg(HCO_3)_2$ = 36.5 ppm, $MgSO_4$ = 30.0 ppm, $CaSO_4$ = 34.0 ppm, $CaCl_2$ = 27.75 ppm, NaCl = 10.0 ppm.   (4)

P.T.O.

8. (a) 1.56 g of coal sample was kjeldahlized and NH_3 gas evolved was absorbed in 50 ml of 0.1 N H_2SO_4. After absorption, the excess acid required 6.25 ml of 0.1N NaOH for exact neutralization. 2.6 g of the coal sample, in a quantitative analysis, gave 0.1755 g of $BaSO_4$. Calculate the percentage of N and S in the coal sample.   (4)

  (b) Explain Proximate analysis of Coal.   (6)

SECTION – C   (16 Marks)
(Compulsory)

9. (a) Define Chemical Shift. Give any two important applications of NMR spectroscopy. Predict the number and type of peaks for the following molecules using NMR.

    (i) $(CH_3)_3C\text{-}OH$

    (ii) $CH_3\text{-}CH_2\text{-}CH_2\text{-}CH_3$

    (iii) $C_6H_5\text{-}CH_3$

    (iv) $CCl_3\text{-}CHCl\text{-}CH_2Cl$

    (v) $CH_2\text{=}CH\text{-}CH_3$ (8)

  (b) Comment upon   (8)

    (i) Passivity

    (ii) Corrosion inhibitors