

Bachelor of Technology (B.Tech Core/CS/FS/UX/UI/AI/ML/Data Science)

Re-appear, Examination

Dec, 2024

ENCH101- Engineering Chemistry

Time: 2.5 Hours

Maximum Marks: 50

Instructions:

- 1) Question No. 1 under Section-A is compulsory.
- 2) Attempt any four from Q. No. 2 to Q. No. 6 under Section-B
- 3) Attempt any two from Q. No. 7 to Q. No.9 under Section-C

Section-A(Compulsory)

1. (a) Fill in the blanks with appropriate words: 3 [CO1] [L1]
 - (i) The method used Ca(OH)_2 (slaked lime) for water softening-----
 - (ii) The reason of temporary hardness is-----
 - (iii) On boiling of water, the hardness of water-----
1. (b) Give the term used for the following: 2 [CO1] [L1]
 - (i) Measure of water's ability to neutralize acids or resist changes that cause acidity, maintaining a stable pH
 - (ii) Any of a class of devices that convert chemical energy directly into electrical energy
1. (c) State one function of each of the following: 2 [CO2] [L1]
 - (i) Fuel cell
 - (ii) Anti-knocking agent
1. (d) Match the items given in Column-A with those in Column-B: 3 [CO2] [L2]

Column-A	Column-B
(i) Anti-knocking agent for petrol/diesel	(a) Octane and Isoocatne
(ii) Anti-knock fuel	(b) Tetraethyl lead
(iii) Power alcohol	(c) Ethyle alcohol

Section-B

2. (a) A sample of water contains 20 mg/L of $\text{Ca(HCO}_3)_2$, 16 mg/L of CaSO_4 , 12 mg/L of CaCl_2 , 11 mg/L of $\text{Mg(HCO}_3)_2$, and 21 mg/L of MgCl_2 . Calculate temporary, permanent and total hardness in terms of CaCO_3 equivalent. Given molecular weight $\text{Ca(HCO}_3)_2 = 162$, $\text{CaSO}_4 = 136$, $\text{Mg(HCO}_3)_2 = 146$, $\text{MgCl}_2 = 95$.
- b) What is meant by carbonate and non-carbonate hardness of water? 5[CO1] [L1]
3. 100 ml of water sample required 30 ml of N/50 acid upto phenolphthalein end point. After adding methyl orange, the titration ended by further addition of 40 ml of same acid. Calculate the type and extent of alkalinity. 5[CO1] [L3]

4. In a bomb calorimeter experiment, the following data was obtained: $x = 0.85\text{gm}$, $W = 2.5\text{kg}$, $w = .5\text{kg}$, observed rise in temperature = $2.25\text{ }^{\circ}\text{C}$, $t_A = 38.6\text{ calories}$, $t_F = 6.8\text{ calories}$, $t_T = 1.9\text{ calories}$ and $t_C = 0.05\text{ }^{\circ}\text{C}$. Calculate net calorific value if the coal contains 10 % hydrogen?

5[CO2] [L3]

5. (a) What are knocking and anti-knocking agents?
(b) Discuss the biodegradable polymers. 5[CO2] [L3]
6. What is the difference between battery and cell. Explain working, construction and principle of Li-ion battery. 5[CO3] [L2]
7. Discuss preparation, properties and application of Buna-S, Isoprene and Dacron polymers. 5[CO6] [L2]

Section-C

8. What are the different methods for removal of hardness of water? Discuss about soda-lime and demineralization process used to remove the hardness of water. 10[CO1] [L3]
9. (a) What are the ultimate and proximate analysis of coal? 10[CO2] [L3]
- b) 2.499 gms of coal sample was taken in a silica crucible and heated in oven at 110°C for one hour. The weight after heating was 2.368 gms. The same sample was analyzed for volatile matter and weight obtained was 1.75 gms. The sample as further treated to get fixed carbon of 0.95 gms. Calculate the percentage of moisture, volatile matter, ash and fixed carbon of this sample.
10. (a) Describe in shorthand notation a galvanic cell for which the cell reaction is\
 $\text{AgCl(s)} + \text{I}^{-}(\text{aq}) \longrightarrow \text{AgI(s)} + \text{Cl}^{-}(\text{aq})$
 (b) What are the different characteristics of battery?
 (c) What is petroleum cracking? 10[CO3] [L3]