

(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 199102

Roll No.

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**B.Tech.**

**(SEM. I) THEORY EXAMINATION, 2015-16**

**ENGINEERING CHEMISTRY**

**[Time:3 hours]**

**[MaximumMarks:100]**

**Section-A**

Q.1 Attempt **all** parts. All parts carry equal marks. Write answer of each part in short. (2×10=20)

- (a) Explain why Teflon is highly chemical resistant.
- (b) Write a short note on Walden inversion.
- (c) Define pour point & cloud point of lubricants.
- (d) What are the monomers of Buna-S and Polystyrene.
- (e) Why is TMS is used as a standard reference in NMR spectroscopy?

- (f) How many phases are present in an unsaturated salt solution?
- (g) The density of NaCl is 2.163 g/cc. calculates the edge of its cubic cell. Assuming that four molecules of NaCl are associated per unit cell.
- (h) What is permanent hardness? Write the constituent responsible for permanent hardness.
- (i) Give the composition of bio-gas.
- (j) Explain why bond energy of  $N_2$  is greater than bond energy of  $O_2$ .

### Section-B

Attempt **any five** questions from this section. (10×5=50)

2. Derive Bragg's equation. When an electron in an excited molybdenum atom falls from the L to the K shell, an x-ray is emitted. These X-rays are diffracted at angle of  $7.75^\circ$  by planes with a separation of 2.64 Å. What are the difference in energy between the K shell and K shell in molybdenum, assuming a first order differaction? (Give that  $h = 6.62 \times 10^{-34}$ ).

3. (i) A sample of coal was found to have the following percentage composition:  
C=75%, H=5.2%O=12.1%;N = 3.2% and ash = 4.5% Calculate the minimum amount of air is required for complete combustion of 1 kg of coal sample.

(ii) Write short note on conducting polymers.

4. Define the term Chromophore and Auxochrome in UV spectroscopy. An organic compound having molecular formula  $C_7H_6O$  shows absorption peaks at 3010, 2700, 1600, 1580, 1520, 1480, and 1270  $cm^{-1}$  in its IR spectrum. Suggest its structure.
5. Discuss the stereochemical implications of  $SN^1$  &  $SN^2$  reaction.
6. Define phase rule. Apply phase rule to water system.
7. What is the basic principle of Lime Soda process? A water sample, using  $FeSO_4 \cdot 7H_2O$  as a coagulant at the rate of 139 ppm gave the following results on analysis.  
Ca<sup>2+</sup> = 160 ppm; CO<sub>2</sub> = 88 ppm  
Mg<sup>2+</sup> = 72 ppm; HCO<sub>3</sub> = 488 ppm  
Calculate the lime and soda required to soften 1,00,000 liters of water.

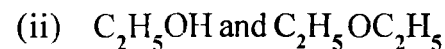
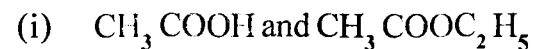
8. Write short notes on:
- E,Z nomenclature.
  - Conformation of n-butane.
9. Explain various methods of preparation of Grignard reagent and also write its at least five applications.

### Section-C

Attempt any two questions from this section. (15×2=30)

10. (a) What is Portland cement? Give the chemical reactions involved during setting and hardening of cement.
- (b) Explain reverse osmosis.
- (c) What are biodegradable polymers? Discuss their application
11. (a) Write the preparation, properties and applications of:
- Butyl rubber
  - HDPE

- (b) How will you distinguish between the following pairs of compounds on the basis of infrared spectroscopy?



- (c) With the help of Molecular orbital diagram explain why NO molecule is paramagnetic.

12. (a) What is Crystal imperfection? Explain the one dimensional imperfection in solid.
- (b) Explain sacrificial anodic and impressed cathodic protection method for prevention of corrosion.
- (c) In an experiment in a bomb calorimeter, a solid fuel of 0.90 g is burnt. It is observed that increase of temperature is  $3.8^\circ\text{C}$  of 4000 g of water. The fuel contains 1% of H. calculate the H.C. V. and L.C.V. value (Water equivalent of calorimeter= 385g, latent heat of steam=587 cal/g).

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