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

Paper ID : 199102 Roll No. | | | | | | | | | | |

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° 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 =6.62×10^{-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^{2+}= 160 ppm; CO_2= 88 ppm
Mg^{2+}= 72 ppm; HCO_3= 488 ppm
Calculate the lime and soda required to soften 1,00,000 liters of water.

8. Write short notes on:

(a) E,Z nomenclature.

(b) Conformation of n-butane.

9. Explain various methods of preparation of Grignard reagent and also write it's 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:

(i) Butyl rubber

(ii) HDPE

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

(i) CH_3COOH and $CH_3COOC_2H_5$

(ii) C_2H_5OH and $C_2H_5OC_2H_5$

(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°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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