

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

Paper ID : 199221

Roll No.

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B. TECH.

Theory Examination (Semester-II) 2015-16

ENGINEERING CHEMISTRY

Time : 3 Hours
Max. Marks : 100

Section-A

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

- Boiling Point of water (H_2O) is higher than that of hydrogen Fluoride (HF). Explain why.
- Define the Symmetry elements of a crystal. Explain the lattice plane and the unit cell in sodium chloride crystals.
- Account for the fine structure in H-NMR Spectrum of C-H protons in ethanol (CH_3CH_2OH).
- Natural Rubber needs vulcanizations. Give Reasons.

(1)

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Write short note on biomass.

Section-B

Q.2 Attempt any five parts from the following (10×5=50)

a. The density of NaCl is 2.163 g/cc. Calculate the edge of its cubic cell, assuming that four molecules of NaCl are associated per unit cell.

b. Calculate the mass of air needed for complete combustion of 5.0 kg of coal containing 80% carbon 15% hydrogen and rest oxygen.

c. Explain the corrosion phenomenon involving oxide film growth law.

g. (i) S_N^1 lead by racemic mixture. Where as S_N^2 gives rise to inverted product.

(ii) Optical isomerism of lactic acid.

h. Define infrared spectroscopy? Describe the various molecular vibrations in the technique.

Section-C

Q.3 Attempt any two questions from this section (15×2=30)

(a) What are the fullerenes? Discuss their properties and uses.

(b) Calculate the bond order of N_2 , CO, NO, and O_2^+ .

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Q.4 (a) How is the calorific value of a solid fuel determined using bomb calorimeter experiments?

(b) Why is it conventional to express hardness of water in terms of CaCO_3 at the international level? Write other units also.

5. (a) What are corrosion inhibitors? Explain with examples how anodic and cathodic inhibitors provide protection against corrosion.

(b) Sample of coal contains C=93%, H=6% and ash=1%. The following data was obtained when the above coal was tested in bomb calorimeter.

(i) Wt. of coal burnt=0.92 g

(ii) Wt of water taken=2200g.

(iii) Water equivalent of bomb calorimeter=550g

(iv) Rise in temperature=2.42°C

(v) Fuse wire correction = 10.0 cal

(vi) Acid correction = 50.0 cal.

Calculate gross and net calorific value of the coal, assuming the latent heat of condensation of steam as 580 cal/g.

(c) Explain Zeolite process of water softening.

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