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NAS102/NAS202

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

PAPER ID : 199124

Roll No.

B.Tech. (Semester-I)

SPL. THEORY EXAMINATION, 2014-15

ENGINEERING CHEMISTRY

Time : 3 Hours] *[Total Marks : 100*

Note: Attempt questions from all sections as per the instructions.

Section – A

1. Attempt all ten parts. Each part carries equal marks. 2×10=20

(a) Define chain growth polymers with examples.

(b) Which have higher bond order N_2 or O_2?

(c) What is temporary hardness? How it can be removed?

(d) Give the possible stereoisomers of lactic acid.

(e) What are the differences between Sigma bond and Pi bond?

(f) What is meant by elastmers?

(g) How is bond order related with bond length?

(h) What is monomer?

(i) What is unit cell? What are its types?

(j) What is metallic bond?

Section – B

2. Attempt any three parts of this question: 10×3=30

(a) (i) What is Band theory? Discuss with detail.

(ii) What are the carbocations and carboanions? Why is the allylcation isomer more stable than ethylcarbocation?

(b) (i) What is hardness of water? What is interrelationship between ppm, mg/l, degree Clarks?

(b) Write short notes on the following:

(i) Calorific value of fuel

(ii) Plaster of Paris

(c) In a particular sample of a polymer, 100 molecules have molecular mass 10^3 each, 200 molecules have molecular mass 10^4 each and 200 molecules have molecular mass 10^5 each. Calculate the number average and mass average molecular mass.

—x—

(ii) Describe the role of calgon in descaling of the boiler.

(c) (i) Write difference between Molecular orbital theory and Valence bond theory.

(ii) What is electromeric effect? Give examples.

(d) (i) Calculate temporary, permanent and total hardness of a sample of water containing $Mg(HCO_3)_2$ = 7.3 mg/L; $Ca(HCO_3)_2$ = 16.2 mg/L; $MgCl_2$ = 9.2 mg/L; $CaSO_4$ = 13.6 mg/L.

(ii) What are nucleophilic substitution reaction? Explain the mechanisms of SN^1 reactions.

(e) (i) Describe zeolite process for making soft water from hard water.

(ii) Give the preparation, properties and applications of following polymers; SBR, PVC, Nylon 6,6.

Section – C

Attempt all five questions. Each question carries equal marks. 5×10=50

3. Attempt any <u>one</u> part of the following:

(a) What are biodegradable polymers? Give their applications.

(b) What are the organometallic compounds? Give the preparation and applications of Grignard reagent.

(c) Write the principle of UV spectroscopy. Write the various types of electronic transitions in UV spectroscopy in the order of increasing energy.

4. Attempt any <u>one</u> part of the following:

(a) Define the term polymer. Discuss the process of vulcanization of rubber.

(b) What is electrochemical corrosion? Write the mechanism involved in electrochemical corrosion.

(c) Discuss the stereochemistry of tartaric acid. What will happen if one of the OH group of tartaric acid is replaced by NH_2 group?

5. Attempt any <u>one</u> part of the following:

(a) What are conducting polymer? What are the applications of conducting polymer?

(b) What is liquid crystal? Distinguish between nematic and smectic liquid crystal and give its applications.

(c) What is bio-gas? Discuss the mechanism of biogasification.

6. Attempt any <u>one</u> part of the following:

(a) What is chemical shift? How many signals will be obtained in NMR spectrum of the following compounds with their splitting?

(i) $CH_3\,COO\,CH_2CH_3$

(ii) $CH_3CH_2CH_2CH_2CHO$

(iii) $(CH_3)_2CH - CH_2CHO$

(iv) C_3H_7Cl

(b) Explain the following terms:

(i) Line defects

(ii) Biomass

7. Attempt any <u>one</u> part of the following:

(a) State and explain phase rule. Discuss the salient features of phase diagram of water system.