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Total printed pages four + two pages of spectroscopy data sheet = 06 pages.

SARDAR PATEL UNIVERSITY
B. Sc. EXAMINATION NOVEMBER- 2013 (Vth SEMESTER)
SUBJECT : ORGANIC CHEMISTRY
COURSE CODE : US05CCHE01

DATE : 12-11-2013 **TIME : 10.30 a.m. TO 01.30 p.m.**
DAY : TUESDAY **TOTAL MARKS : 70**

Q. 1 Choose the correct option for the following **10**

(i) Which of the following compound have the properties of secondary aliphatic amine ?
(a) Pyridine (b) Furan (c) Pyrrolidine (d) Thiophene.

(ii) The correct relative basicity order of (i) imines (ii) nitriles and (iii) amines is:
(a) iii > i > ii (b) iii > ii > i (c) i > ii > iii (d) ii > i > iii.

(iii) How many CMR signals would you expect from p-ethyl toluene ?
(a) 5 (b) 7 (c) 6 (d) 9.

(iv) How many NMR signals would you expect from CH_2 =$CHCH_2OH$?
(a) 5 (b) 4 (c) 3 (d) 6.

(v) Which of the following is the example of isolated diene ?
(a) 1,3-butadiene (b) 1,3-pentadiene (c) 1,2-butadiene (d) 1,4-pentadiene.

(vi) Which of the following is the monomeric unit of Duprene ?
(a) Isoprene (b) Methyl methacrylate (c) Adipic acid (d) Chloroprene.

(vii) Which of the following is the example of homopolymer ?
(a) Glyptal (b Nylon-6,6 (c) Plexiglas (d) SBR.

(viii) Which of the following insecticide is the derivative of carbamic acid ?
(a) Malathion (b) Baygon (c) Heptachlor (d) Ferbum.

(ix) Which of the following detergent is the example of amide sulphonate class ?
(a) Miranol C2M (b) Igepon T (c) Tinopol RBX (d) Sodium lauryl benzene sulphonate.

(x) Which of the following perfume is used as a deodourant for unpleasant odour of various goods ?
(a) Linalool (b) Musk xylene (c) Vanillin (d) None of these.

[P.T.O.]

Q. 5 ANSWER THE FOLLOWING

(a) What is coordination polymerization ? Explain the importance of Ziegler-Natta catalyst in coordination polymerization and discuss its advantages over free-radical polymerization in the preparation of polyethylene. **4**

(b) Give the mechanism for polymerization of styrene in presence of sodium metal and naphthalene. **3**

(c) Justify the following with suitable example : Conjugated dienes undergo 1,4-addition preferentially over 1,2-addition during electrophilic addition reaction. **3**

OR

Q. 5 ANSWER THE FOLLOWING

(a) Give detail discussion for the addition of HBr to 1,3-butadiene at -80^{0}C and at 40^{0}C temperature with potential energy diagram. **4**

(b) Give the distinguishing features of addition polymerization and condensation polymerization. **3**

(c) Draw the structure of following dienes and classify them into appropriate class. **3**
(i) 2,4-hexadiene **(ii)** 1,2-propadiene **(iii)** 1,5-hexadiene.

Q. 6 ANSWER THE FOLLOWING

(a) What is meant by detergent ? Discuss detail classification of detergent on the basis of ionization into water. **4**

(b) Give the synthesis and applications of following from cheapest raw materials. **6**
(i) Insecticide of organophosphorus class.
(ii) Compound which give warm floral and spicy sweetness to perfume.

OR

Q. 6 ANSWER THE FOLLOWING

(a) Give the synthesis and applications of following from cheapest raw materials. **6**
(i) Compound used for providing flavourings in beverages.
(ii) Compound containing heterocyclic triazole moiety which used as whitening agent.

(b) What are insecticides? Give only detail classification of insecticides and discuss in detail of any one class. **4**

THE END

Q. 2 ANSWER THE FOLLOWING (ANY TEN) **20**

(i) Give the synthesis of 3-aminopyridine from β-picoline.

(ii) Write about Chichibabin reaction.

(iii) Describe the structure of furan.

(iv) Why TMS is use as a standard for reference point in NMR spectroscopy ?

(v) Define the term chemical shift. Sketch the NMR spectrum of p-xylene with respect to δ value.

(vi) Give the various aspects of NMR spectroscopy.

(vii) Write the chemical structure of monomer and polymer for following.

(a) Natural rubber **(b)** Lucite

(viii) What is meant by co-polymer ? Give only names of various class of co-polymer.

(ix) Cis-1,4-polyisoprene is an elastomeric while trans-1,4-polyisoprene is non-elastic.

(x) Give at least five advantages of organophosphorous compound.

(xi) Give the synthesis and applications of detergent of imidazoline derivative.

(xii) Give the synthesis and two applications of compound used to impart sweet hay like odour.

Q. 3 ANSWER THE FOLLOWING **10**

Give the synthesis of 5,6-benzoquinoline by using Skraup synthesis route. Why electrophilic substitution reaction in **pyrrole** takes place chiefly at the 2-position and not at 3-position. Also discuss why **nucleophilic** substitution reaction in **pyridine** is preferred at the 2- and 4-position.

OR

Q. 3 ANSWER THE FOLLOWING **10**

Arrange the **increasing** basicity order for the pyrrole, piperidine and pyridine and give detail explanation of your answer. Also give the synthesis of (i) 3-carbethoxy-2,4,5-trimethyl pyrrole from appropriate α-amino ketone and acetoacetic ester by Knorr Pyrrole synthesis route and (ii) 1-phenylisoquinoline from toluene and any needed aliphatic and inorganic reagents.

[P.T.O.]

Q. 4 ANSWER THE FOLLOWING

(a) Write a note on phenomenon of the splitting of NMR signals indicating clearly how the multiplicity of splitting reflects the number of protons adjacent to the absorbing protons. **3**

(b) Deduce the structure of compound having following spectral data. Label all kinds of carbons/protons and give appropriate explanation for the structure.

(i) **Molecular formula : C_9H_{10}** **4**

IR (CM^{-1}) : 3100, 2950, 1650, 1600, 1500, 1450, 1375, 890, 760-770.

NMR (δ, ppm) : **(a)** 7.4, 5H, Complex **(b)** 5.35, 1H, Singlet **(c)** 5.1, 1H, Singlet **(d)** 2.10, 3H, Singlet.

(ii) **Molecular formula : C_7H_9N** **3**

CMR (δ, ppm) : **(a)** 14.3, Quartet **(b)** 28.2, Triplet **(c)** 123.4, Doublet **(d)** 149.8, Doublet **(e)** 152.8, Singlet.

OR

Q. 4 ANSWER THE FOLLOWING

(a) Deduce the structure of compound having following spectral data. Label all kinds of protons and give appropriate explanation for the structure.

(i) **Molecular formula : C_4H_6O** **4**

CMR (δ, ppm) : **(a)** 3.4, Quartet **(b)** 50.8, Triplet **(c)** 77.9, Singlet **(d)** 81.6, Singlet.

NMR (δ, ppm) : **(a)** 2.0, 3H, Singlet **(b)** 1.8, 1H, Singlet **(c)** 4.1, 2H, Singlet.

(ii) **Molecular formula : $C_{10}H_{12}$** **3**

NMR (δ, ppm) : **(a)** 0.65, 2H, Multiplet **(b)** 0.81, 2H, Multiplet **(c)** 1.37, 3H, Singlet **(d)** 7.17, 5H, Singlet.

(b) Define coupling constant and give various aspects of CMR spectroscopy. **3**

[P.T.O.]