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SARDAR PATEL UNIVERSITY

Bachelor of Science, Vth Semester Examination - 2025

Eng.
Date: 04.10.2025

US05CCHE51 - ORGANIC CHEMISTRY

Day: Saturday

Time : 10.00 a.m. to 1.00 p.m.

Total Marks : 70

Note: (i) All questions are to be attempted. (ii) Figures to the right indicate full marks of the questions.

Q.1 Choose the correct option for the following :

[10]

- (i) Hybridization of 'N' atom in pyridine is ?
(a) sp^3 (b) sp^2 (c) sp (d) dsp^3
- (ii) What will be product when pyrrole is reacted with chloroform and potassium hydroxide ?
(a) 3-pyrrolicarboxaldehyde (b) 2-pyrrolicarboxaldehyde
(c) 5-pyrrolicarboxaldehyde (d) 4-pyrrolicarboxaldehyde
- (iii) What will be product, when pyridine undergo chichibabin reaction?
(a) 1-aminopyridine (b) 2-aminopyridine
(c) 3-aminopyridine (d) 4-aminopyridine
- (iv) Which intermediate is formed during Baeyer – Villiger Oxidation mechanism?
(a) dioxirane (b) betaine (c) ylide (d) radical
- (v) Perkin condensation of Benzaldehyde with acetic anhydride in the presence of sodium acetate produce ?
(a) acetic acid (b) cinnamic acid (c) oxalic acid (d) benzoic acid
- (vi) The molecular formula of hydrazoic acid is ?
(a) HN_2 (b) HN_3 (c) NH_3 (d) HN_4
- (vii) All carbon atoms in anthracene have which kind of hybridization ?
(a) sp (b) sp^2 (c) sp^3 (d) all of these
- (viii) Naphthalene when refluxed with Na/C_2H_5OH it gives ?
(a) Decalin (b) 1,4-Dihydronaphthalene
(c) Tetralin (d) Phthalic anhydride
- (ix) How many double bonds are present in β -carotene ?
(a) 10 (b) 11 (c) 12 (d) 13
- (x) Citral upon treatment with ozone (O_3)/Zn-acetic acid produce ?
(a) Acetone (b) glyoxal (c) laevulaldehyde (d) All of these

Q.2 Answer the following short Questions (Attempt any ten) :

[20]

- (i) Using suitable illustration write electrophilic substitution reactions of pyrrole.
- (ii) Describe aromatic character of Furan.
- (iii) Complete and rewrite the following reaction :
Acetylacetone + Ammonium carbonate/ $100^\circ C$ ----->
- (iv) Write about Wittig reaction.
- (v) Write equation for the ~~conversion~~ of Benzil to Benzylic acid.
- (vi) Write equation for the conversion of benzoic acid into 1,4-dihydrobenzoic acid in the presence of suitable catalyst.
- (vii) Explain : In naphthalene C1- C2 bond is shorter than C2- C3 bond.
- (viii) Give a brief account on Bucherer reaction.
- (ix) Draw all possible resonance structures of phenanthrene.

- (x) List the methods used for the isolation of essential oils from plant materials and separation of terpenoids from essential oils.
- (xi) Define isoprene rule. How isoprene rule was deduced and confirmed?
- (xii) Give the importance of (a) phenyl hydrazine and (b) H_2/Pd reagents for the structure elucidation of terpenoids.

Q.3 Answer the following :

[10]

- (A) Arrange the increasing basicity order for the pyrrole, piperidine and pyridine, and give detail explanation of your answer.
- (B) Write detail stepwise synthesis of 2,4-dimethyl-3-acetylpyrrole using Knorr pyrrole synthesis.

OR

- (A) Explain nucleophilic substitution reaction in pyridine is preferred at the 2nd and 4th position and not at 3rd position.
- (B) Write skraup synthesis of Quinoline.

Q.4

[10]

- (A) Discuss Benzoin condensation reaction mechanism and show that *p*-*N,N*-dimethylaminobenzaldehyde do not undergo benzoin condensation.
- (B) Discuss Curtius-Schmidt rearrangement mechanism for the conversion of carboxylic acid in to primary amine.

OR

- (A) Discuss Crigee-Kasper reaction mechanism for Baeyer-Villiger oxidation reaction.
- (B) Explain Favorskii rearrangement and show that Favorskii rearrangement involves symmetrical cyclopropanone intermediate.

Q.5

[10]

- (A) Give the name of four potent carcinogenic polynuclear aromatic hydrocarbons and discuss how do they induce cancer in human?
- (B) Explain nitration of naphthalene take place almost exclusively at 1- position.

OR

- (A) Explain: 1-Nitronaphthalene on further nitration gives 1,8-dinitronaphthalene as a major product.
- (B) Write Haworth synthesis of naphthalene.

Q.6

[10]

- (A) Write the synthesis of Citral using Arens-Van Dorp's method.
- (B) How will you determine the position of double bond and *tert.* alcoholic group in the structure of α -terpeniol?

OR

- (A) Give evidence for the presence of two β - ionone units in the structure of β - carotene.
- (B) Write the Perkin-Junior synthesis of α -terpeniol.

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