

15U611

(Pages: 2)

Name:

Reg. No.....

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, MARCH 2018

(CUCBCSS - UG)

CC15U CHE6 B10 - ORGANIC CHEMISTRY III

Chemistry - Core Course

(2015 Admission)

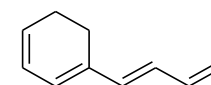
Time: Three Hours

Maximum: 80 Marks

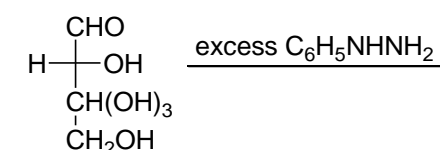
Section A

Answer *all* questions. Each question carries 1 mark.

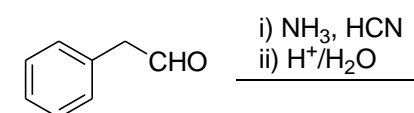
1. Write down the multiplicity of CH₂ proton in propanoic acid.
2. Calculate λ_{\max} of the following compound.



3. What are Fehling's solutions?
4. Write down the structure of the product of the following reaction.



5. Name the parameter which is used to determine the amount of unsaturation in fatty acids.
6. Give the structure of Diel's hydrocarbon.
7. Complete the following reaction.



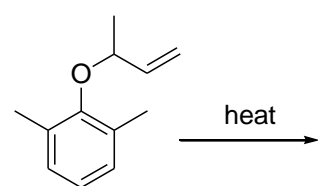
8. Name the class of natural products having basic character and containing at least one nitrogen heterocycle.
9. Draw the HOMO of butadiene in Diels-Alder reaction.
10. Identify the reaction in which the migration of a σ bond adjacent to one or more π systems to a new position in a molecule in an uncatalyzed intramolecular process.

(10 x 1 = 10 Marks)

Section B

Answer any *ten* questions. Each question carries 2 marks.

11. Illustrating an example, explain isoprene rule.
12. What are pyrimidines? Draw the structures of pyrimidine bases present in RNA.
13. What is the structural difference between citral and geraniol?
14. Predict the major product of the following reaction and justify your answer.



15. What are phospholipids? Mention their important biological functions.
16. Draw the structures of vitamin A and vitamin C.
17. Draw the open and cyclic structures of ribose sugar.
18. Why amino acids are called amphoteric compounds?
19. Validate the statement: Starch does not reduce Benedict's solution.
20. Write down the method of analysis of blood sugar.
21. Give the structure of TMS. Why it is used as internal standard in NMR spectroscopy?
22. The UV spectrum of acetone shows two important peaks at λ_{\max} 279 nm (ϵ_{\max} 15) and λ_{\max} 198 nm (ϵ_{\max} 900). Identify the electronic transitions for each and rationalise.

(10 x 2 = 20 Marks)

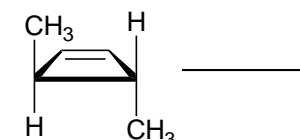
Section C

Answer any *five* questions. Each question carries 6 marks.

23. How will you distinguish between the following pairs of compounds using IR spectra?
 - (a) CH_3COOH and $\text{CH}_3\text{COOC}_2\text{H}_5$
 - (b) $(\text{CH}_3)_3\text{N}$ and $(\text{CH}_3)_2\text{CHNH}_2$
 - (c) *o*- $\text{OHC}_6\text{H}_4\text{COOH}$ and *m*- $\text{OHC}_6\text{H}_4\text{COOH}$
24. Giving examples, differentiate between epimers and anomers.
25. Explain Merrifield solid phase peptide synthesis. What are the advantages of this method?
26. Explain the structure determination of peptides using Edmann degradation method.
27. What is the structural difference between natural rubber and gutta percha? With a suitable example, explain how the process of vulcanisation affects the properties of rubber.
28. Explain the source, structure and physiological function of quinine. Identify the class of natural products to which it belongs.

(2)

29. Draw and arrange the molecular orbitals of C_6 conjugated π system in the increasing order of energy. Identify the HOMO and LUMO under thermal and photochemical conditions.
30. There are two ways of stereochemical modes in the following electrocyclic transformation. Write structures of the products expected from both modes and explain which one is preferred and why?



(5 x 6 = 30 Marks)

Section D

Answer any *two* questions. Each question carries 10 marks.

31. (i) Explain spin-spin splitting and the significance of coupling constants in ^1H NMR spectroscopy.
(ii) Draw and explain the splitting pattern of the signal/signals for the hydrogens in the ^1H NMR spectra of the following compounds.
(a) 1,1,2-tribromoethane; (b) Ethyl alcohol; (c) Toluene
32. Derive Woodward-Hoffmann selection rules for cycloaddition reactions.
33. Describe:
 - (i) The Killiani-Fischer synthesis of glucose from arabinose
 - (ii) Ruff degradation of glucose into arabinose.
34. Illustrating the structures of DNA and RNA, explain the processes of DNA replication and protein synthesis.

(2 x 10 = 20 Marks)

(3)