



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCE

DEPARTMENT OF APPLIED CHEMISTRY

ORGANIC CHEMISTRY

FOR SBB, SBB PARALLEL, ESH, EFW, TXT STUDENTS

SCH 1116

First Semester Examination Paper

December 2014

This examination paper consists of 4 pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements: Graph Paper (on request)

Examiner's Name: DR C T PAREKH

INSTRUCTIONS

1. Answer all questions from Section A and any three from Section B. Section A carries 40 marks and each question in Section B carries 20 marks.
2. Show mechanism, chemical steps or synthesis by means of curved arrows.

MARK ALLOCATION

QUESTION	MARKS
1.	40
2.	20
3.	20
4.	20
TOTAL	100

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SECTION A :

1. (a) Write structural formulae for the following compounds.

(i) 3-chloro-2-methyl hexane

(ii) cis-1,2-dichlorocyclopentane (2 Marks)

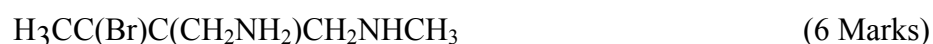
(b) The following names are incorrect. Draw the structure and provide proper IUPAC names.

(i) 5-ethyl octane

(ii) 1,1-dimethylpentane

(4 Marks)

(c) Assign E and Z configuration to the following alkene. Indicate priority on the structure.

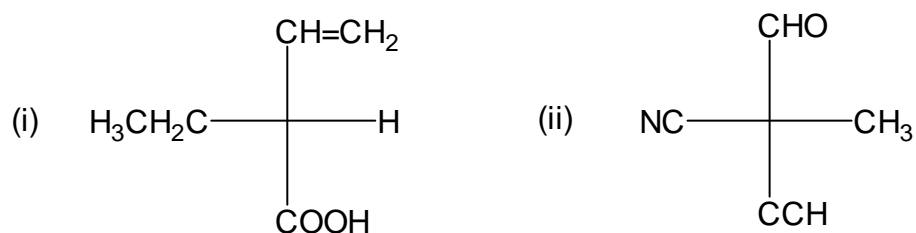


(d) Predict the products of the following pericyclic reactions.



(2 Marks)

(e) Show the steps to assign R or S configurations to each chiral centre in the following molecules.

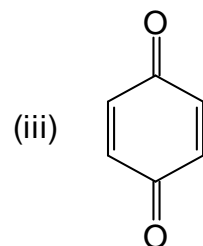
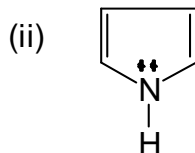
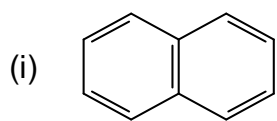


(6 Marks)

(e) Draw functional isomers and give IUPAC names of a compound with molecular formula $\text{C}_3\text{H}_6\text{O}$.

(4 Marks)

- (f) State whether the following compounds are aromatic or non-aromatic and also indicate the number of pi electrons present in the compound.



(6 Marks)

- (g) Write reaction mechanism for the formation of ethyl phenyl ether. Use reactants and reagents of your choice.

(6 Marks)

- (h) What Grignard reagents and carbonyl compounds might you start with to synthesise the following alcohols. (Draw the structures and not the IUPAC names of the compounds).

(a) Butan-1-ol (b) 2-methyl pentan-2-ol.

(4 Marks)

SECTION B

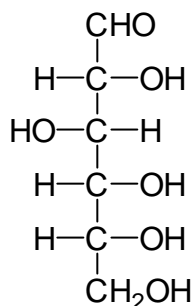
2. (a) Draw various Newman projections for 1,2-dibromoethane. Indicate the name of the projection and also (i) the most stable and (ii) the least stable. (6 Marks)
- (b) Explain with the aid of chemical structures, why phenylamine is less basic than ethylamine. (10 Marks)
- (c) With an appropriate example define α -amino acid. (4 Marks)
3. (a) With the aid of an organic compound of your choice explain the sp^3 hybridisation. Draw orbital diagram, bonded structure and the shape of the molecule. (10 Marks)
- (b) With an appropriate structural example explain (i) enantiomers and (ii) plane of symmetry (5+5 Marks)
4. (a) Write reaction mechanisms for SN^2 reactions. Use compounds of your choice. (4 Marks)

(b) What information does the term below give?

$$[\alpha] = \pm 2.5^{\circ}$$

(4 marks)

(c) The structure of D-glucose is as follows.



D - GLUCOSE

(i) Draw Fischer projection and Haworth projection for D-glucose. (1+2 Marks)

(ii) Draw α - and β -anomers of D-glucopyranose. (4 Marks)

(d) Draw the structures of the products and give IUPAC names for the following reactions. Indicate also if there is a major product. (No mechanism required).

(i) reduction of $\text{CH}_3\text{CH}_2\text{CH}_2\text{C}\equiv\text{CCH}_3$ in presence of Lindler catalyst.

(ii) oxidation of $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_3$ in presence of alkaline KMNO_4 . (5 Marks)

5. (a) The reaction between 2-chlorobutane (alkyl halide) and potassium hydroxide in ethanol yields a mixture of products. Write reaction mechanism for the reaction. Also indicate the type of reaction that has taken place. (10 marks)

(b) Write reaction mechanism for the formation of nitrobenzene. What is the name of the reaction? (6 Marks)

(c) What are the functions of the following spectrometers?

- (i) Infra-red spectrometer
- (ii) Ultraviolet/visible spectrometer
- (iii) proton NMR spectrometer
- (iv) mass spectrometer

(4 Marks)

End of Question Paper!!!

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