



KENYATTA UNIVERSITY
UNIVERSITY EXAMINATIONS 2010/2011
FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF
SCIENCE (FOODS, NUTRITION AND DIETETICS)

HFN 201/HFN 107: ORGANIC CHEMISTRY

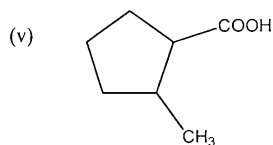
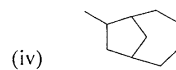
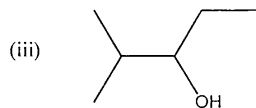
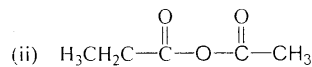
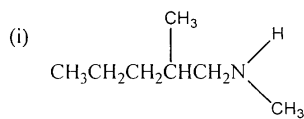
DATE: Friday 26th November 2010

TIME: 11.00a.m – 1.00p.m

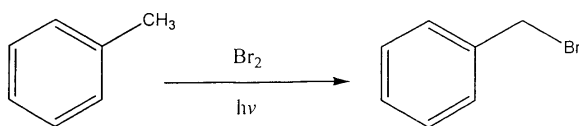
INSTRUCTIONS: Attempt All Questions in Section A and any other TWO Questions in Section B.

SECTION A (ATTEMPT ALL QUESTIONS; 30 marks)

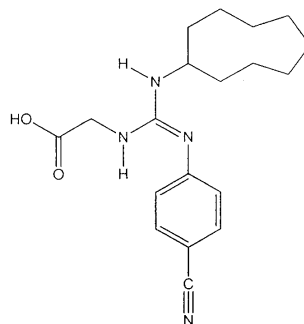
Q1. Provide the names of the following organic molecules based on the IUPAC nomenclature. (5 marks)



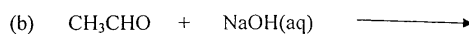
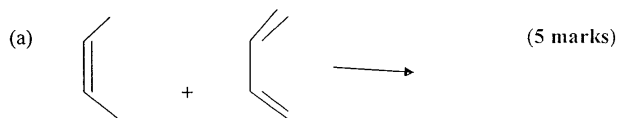
Q2. Provide a complete reaction mechanism for the bromination reaction below. Include all the possible termination steps. (5 marks)



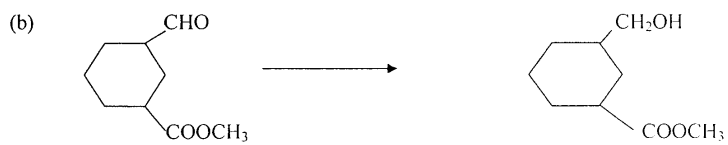
Q3. Circle and name the oxygen and/or nitrogen containing functional groups in sucronic acid-which is 200,000 times sweeter than sucrose. (5 marks)



Q4. Give the products of the following reactions:



Q5. Identify the suitable reagents for the following functional group transformations:



Q6. Explain how the following processes affect the quality of unsaturated oils and

amino acids: (a) oxidative rancidity (b) Maillard reaction **(5 marks)**

SECTION B (ATTEMPT ANY TWO QUESTIONS; 40 marks)

Q1. (a) There are two competing reactions of alkyl halides with nucleophiles; substitution and elimination reactions. Use a general reaction scheme of a nucleophile and alkyl halide to differentiate between the two types of reactions. **(3 marks)**

(b) Arrange the following alkyl halides in the decreasing order of reactivity by an S_N1 reaction mechanism and justify the arrangement. **(5 marks)**

(i) $\text{CH}_3\text{CH}_2\text{Br}$ (ii) CH_3Br (iii) $(\text{CH}_3)_2\text{CHBr}$ (iv) $(\text{CH}_3)_3\text{CBr}$

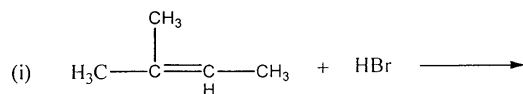
(c) Give the elimination products from the reactions of NaOH in alkanolic system with the following alkyl halides. **[6 marks]**

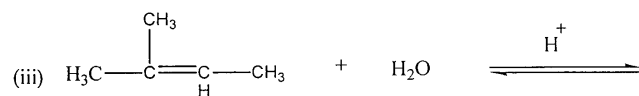
(i) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Cl}$.

(ii) $(\text{CH}_3)_3\text{CCl}$.

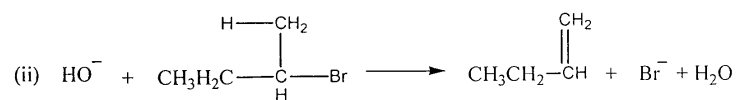
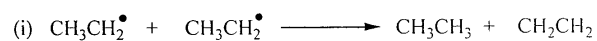
(iii) $\begin{array}{c} \text{Br} \\ | \\ \text{CH}_3\text{CH}_2\text{CHCH}_3 \end{array}$

(d) Provide the structure of the major product formed from each of the following reactions. **(6 marks)**

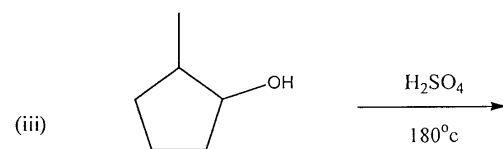
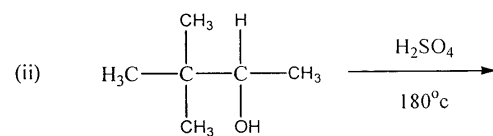
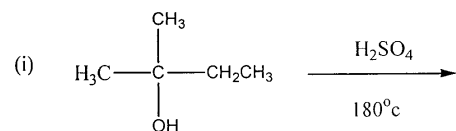




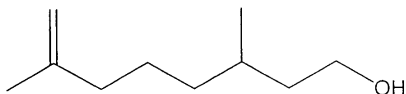
Q2 (a) Show the movement of electrons in the following reactions by making use of Curley arrows. (5 marks)



(b) Give the products for the following dehydration reactions of alcohols and state with reason the major product in each case. (9 marks)



(c) Consider the following structure of citronellol, a monoterpene found in essential oil of geranium:



- i. Circle and label all the sp^3 hybridized carbon atoms.
- ii. Circle and label all the sp^2 hybridized carbon atoms.
- iii. What is the hybridization state of the oxygen atom in this molecule.
- iv. Name **two** functional groups present in this molecule.

(5 marks)

Q3. Explain with suitable examples the application of the following reactions:

(a) Grignard reaction (b) Corey-House reaction

(c) Cationic polymerization (d) Transesterification (20 marks)

Q4. (a) Explain how compounds with the following functional groups can be distinguished:

(i) Carboxylic acid and alkanol (ii) Primary alkanol and Tertiary alkanol

(b) Draw all the possible isomers of an alkane having the following molecular formula C_5H_{12} and give their IUPAC names

(c) Give the mechanism for the reaction between $CH_3CH_2CH_3$ and Cl_2 in the presence of ultraviolet light and/or heat (20 marks)