UNIVERSITY EXAMINATIONS 2017/2018
DIGITAL SCHOOL OF VIRTUAL AND OPEN LEARNING
SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE
SCH 202: ORGANIC CHEMISTRY II

DATE: Tuesday 19th June 2018 **TIME: 11.00a.m-1.00p.m**

INSTRUCTIONS:

Answer ALL questions

Q1.

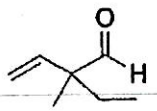
(a) Draw the structure of each of the following compounds.

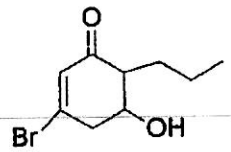
(i) 5-Bromo-4-oxopent-2-enal
(ii) 2,5-dimethyl-3-cyclohexenone
(iii) *N*,3-Dimethylpentan-2-amine
(iv) Sodium 2-iodo-3-methylbutanoate
(v) Ethyl 3-amino-4,4-dichloro-3-butenoate
(vi) *N,N*-diethylpropanamide

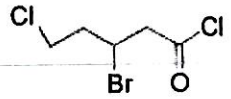
(6 marks)

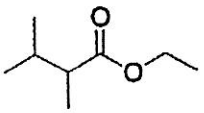
(b) Give a systematic name of each of the following compounds.

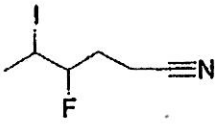
(6 marks)

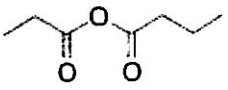
(i) 

(ii) 

(iii) 

(iv) 

(v) 

(vi) 

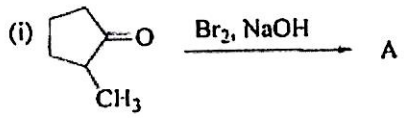
(c) Explain the following using appropriate equations and/or structures.

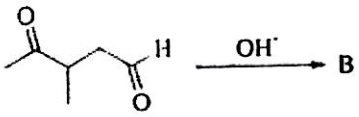
(i) Methanal is more reactive than acetone towards nucleophilic addition reaction.
(ii) 2,4-Pentanedione in hexane exists in about 80% in the enol form.
(iii) Sodium hydroxide is preferred to hydrochloric acid in the hydrolysis of an ester.
(iv) Amines are more basic than amides.

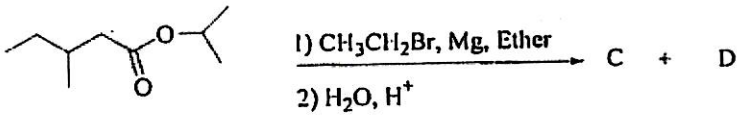
(9 marks)

Q2.

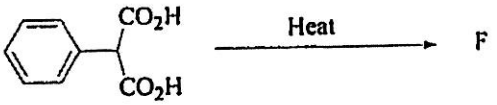
(a) Identify the major organic products A to F in the following transformations.

(i) 

(ii) 

(iii) 

(iv) $HOCH_2CH_2CH_2CO_2H \xrightarrow{H^+,\ Heat} E$

(v) 

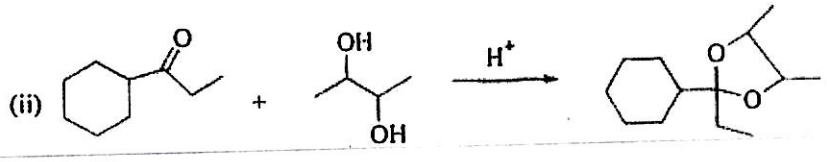
(6 marks)

(b) Compound X, $C_4H_{10}O$, yielded compound Y, C_4H_8O on oxidation. Compound Y reacts with 2,4-dinitrophenylhydrazine and gives a negative iodoform test and a positive Tollen's reagent test. Compound X may be dehydrated to a straight chain compound Z, C_4H_8. Deduce the structure for X, Y and Z and state your reasons.

(5 marks)

(c) Using Curly arrows, write possible reaction mechanisms for the following reactions.

(i) $CH_3COCH_3 + Br_2 \xrightarrow{H^+} BrCH_2COCH_3$

(ii) 

(iii) 

(12 marks)

Q3.

(a) In aldol condensation of butanal and acetone in presence of a base, four different products are obtained.

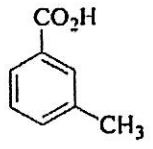
(i) Draw structures of these products and give their systematic names.

(4 marks)

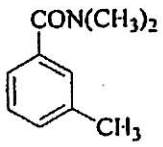
(ii) By use of reaction mechanism, show how one of products in b(i) is formed.

(4 marks)

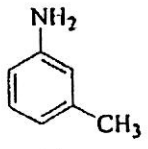
(b) A diethyl ether solution was known to contain compounds L, M and N. If L is a solid and M and N are liquids at room temperature, use a flow chart to outline a procedure for separating and obtaining the three compounds in their pure form. You are provided with diethyl ether, 5% hydrochloric acid and 5% sodium hydroxide.



L



M

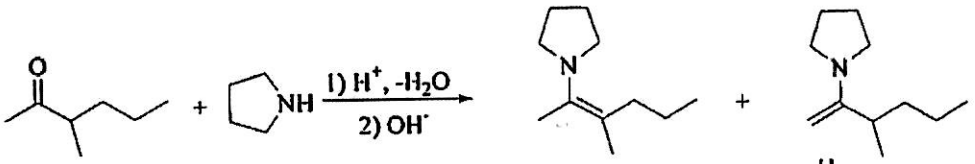


N

(7 marks)

Q4.

(a) The reaction between a ketone with a secondary amine in acidic medium is outlined below.



F G H

(i) In the above reaction, which is the major product? Give a reason for your answer. (2 marks)

(ii) Write a possible reaction mechanism for the above transformation. (5 marks)

(b) Using cyclopentanone and $(C_6H_5)_3P{=}C(CH_2CH_3)_2$ as examples, show how carbonyl compounds are converted to alkenes. (4 marks)

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