

BONDO UNIVERSITY COLLEGE
UNIVERSITY EXAMINATION 2012/2013
2ND YEAR 2ND SEMESTER EXAMINATION FOR THE DEGREE OF
BACHELOR OF EDUCATION SCIENCE WITH IT (REGULAR)

COURSE CODE: SCH 206

TITLE: ORGANIC CHEMISTRY II

DATE: 30/11/2012

TIME: 15.00-17.00PM

DURATION: 2HOURS

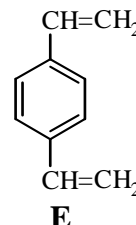
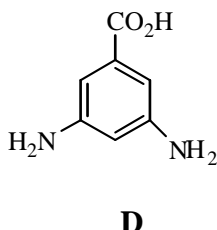
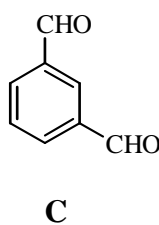
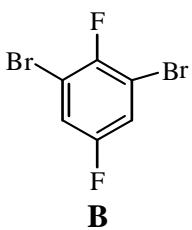
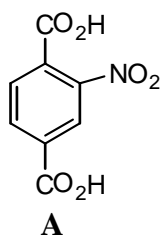
INSTRUCTIONS

- 1) Answer ALL questions in section A
- 2) Answer any TWO questions in section
- 3) Use illustrations where appropriate

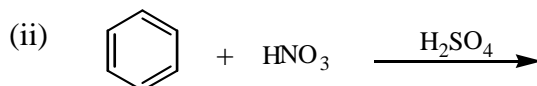
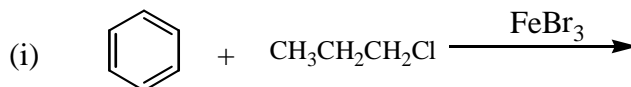
Section A This section contains ONE COMPULSORY question

QUESTION 1

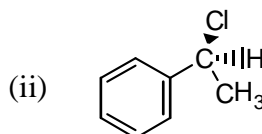
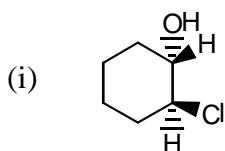
- (a) Write brief notes on benzene. (3 marks)
- (b) Give a brief history on the structure of benzene. (3 marks)
- (c) Give the IUPAC names of the following compounds; (5 marks)



- (d) (i) Define the term bond dissociation energy. (2 marks)
- (ii) Using examples, describe the conditions under which bond dissociation energies can be used to calculate enthalpy (ΔH) of a reaction. (2marks)
- (e) Complete the following reactions giving the necessary reagents and reaction conditions. (4 marks)



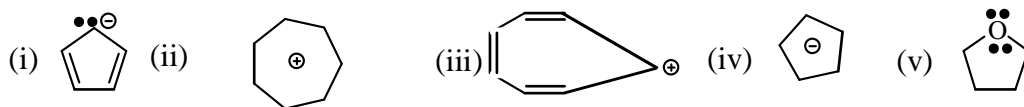
- (f) Give the mechanism for the reactions in (d) (i) and (ii) above. (8 marks)
- (i) Assign R,S configurations to the stereogenic centres in the following molecules: (3 marks)



Section B: This section contains FOUR questions. Answer ONLY TWO questions.

QUESTION 2

- (a) Which of the following compounds/ions are aromatic? Explain your answer. (5 marks)

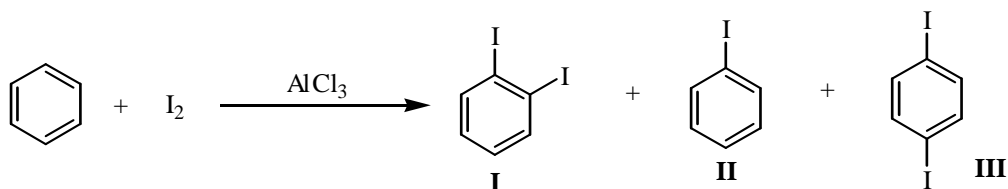


- (b) Rank the following in order of decreasing nucleophilicity. Give reason(s) for your answer.



- (c) Propose a mechanism to account for the following reaction; show the structure(s) of all intermediates and use curly arrows to indicate the flow of electrons in each step. (6 marks)

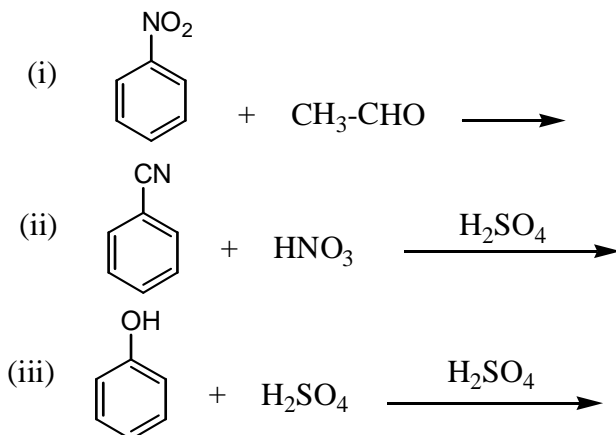
(6 marks)



- (d) Comment on the percentage composition of products; **I**, **II** and **III** (4 marks)

QUESTION 3

- (a) What major products would you expect from these reactions; Explain. (6 marks)



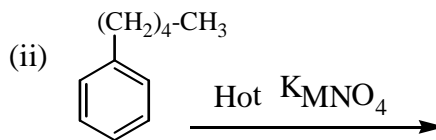
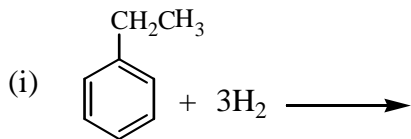
- (b) Illustrate using examples any two ways by which arenes can be prepared. (5 marks)

- (c) Define the following terms; (5 marks)

- (i) Racemic modification
- (ii) Stereogenic centre
- (iii) Meso compound
- (iv) Enantiometrically pure substances

(v) Solvolysis reaction

(d) Complete the following reactions; (4 marks)



QUESTION 4

(a) Define the following terms;

- (i) A non-benzenoid aromatic compound
- (ii) Equatorial bond
- (iii) Hyperconjugation
- (iv) Aromaticity

(4 marks)

(b) Account for the following facts;

(6 marks)

- (i) RS⁻ ions are stronger nucleophiles than RO⁻ ions.
- (ii) A racemic mixture shows no optical activity.
- (iii) Free radicals and carbocations are electrophiles.

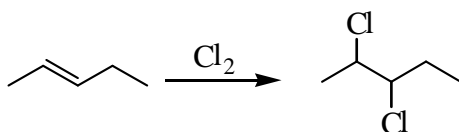
(c) Given the following bond enthalpies in kJ mol⁻¹: C-H : 412, C-C : 348 and H-H : 436.

Calculate the enthalpy of formation of propane if the enthalpy of atomization of carbon (graphite) is 715 kJ mol⁻¹.

(5 marks)

(d) Consider the reaction below;

(5 marks)

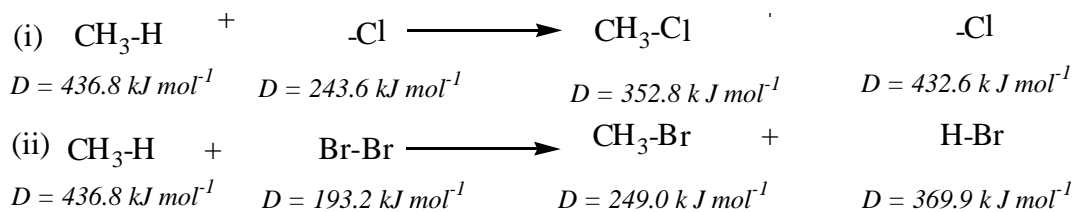


How many stereoisomers of the product are possible? Draw them. Are the products optically active?

QUESTION 5

(a) Calculate the heat of reaction (ΔH) for the following reactions, assuming that in both reactions, bond breakage is homolytic. Comment on the answer.

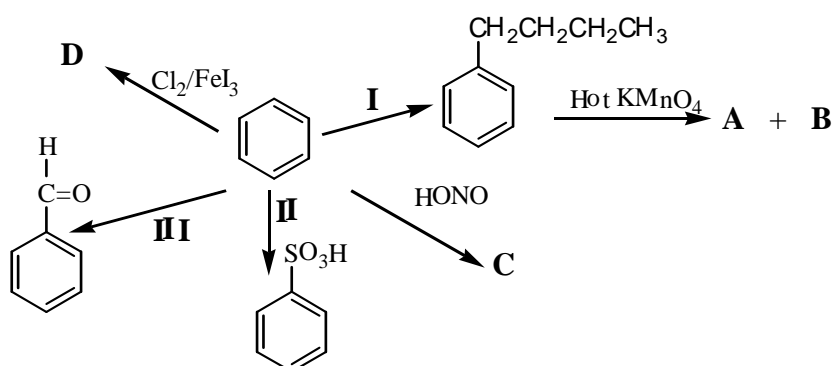
(5 marks)



(b) Illustrate keto-enol tautomerism using the reaction of propanone with water.

(5 marks)

(c) The following is an illustration of some of the major reactions of benzene.



- Give the structures of the compounds A, B, C and D. (4 marks)
- Give the product of nitration of C. Comment on your answer. (2 marks)
- Give the reagents and the conditions for the reaction **I**, **II**, **III**. (4 marks)

*E*****N*****D*