BONDO UNIVERSITY COLLEGE

UNIVERSITY EXAMINATION 2012/2013

1ST YEAR 2ND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE WITH IT (SCHOOL BASED)

COURSE CODE: SCH 103
TITLE: BASIC ORGANIC CHEMISTRY
DATE: 23/12/2012 TIME: 9.00-11.00AM
DURATION: 2HOURS

INSTRUCTIONS

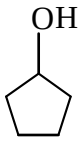
1) **This paper contains TWO sections**
2) **Answer ALL questions in section A COMPULSORY and ANY other TWO [2] questions in section B.**
3) **Write ALL answers in the booklet provided.**

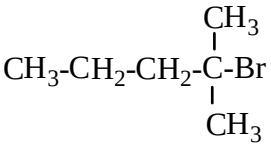
Section A This section contains ONE COMPULSORY question

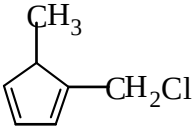
QUESTION 1

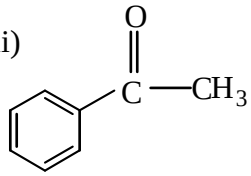
(a) Organic Chemistry is the most important branch of Chemistry. Discuss this statement. (4 marks)

(b) Give the IUPAC names of the following compounds; (10 marks)

(i) $C_{10}H_{22}$ (ii) $CH_3\text{-}CH_2\text{-}CH{=}CH\text{-}CH_3$ (iii) $CH3\text{-}CH\text{-}C{=}C^{-}Li^{+}$ (iv) 

(v) 

(vi) 

(vii) 

(viii) $CH_3\text{-}CH(Cl)\text{-}CH(Br)\text{-}CH_3$ (ix) $CH_3\text{-}CH_2\text{-}CH_2\text{-}CH_3$ (x) $HOOC\text{-}CH_2\text{-}CH_2\text{-}CH_3$

(c) Draw the structures of the compounds given below; (10 marks)

(i) 2,4,6-trinitrotoluene
(ii) Decane
(iii) Pentan-2-one
(iv) Propanoic acid
(v) cyclohexene
(vi) 2-methyl-3,4-dichlorononane

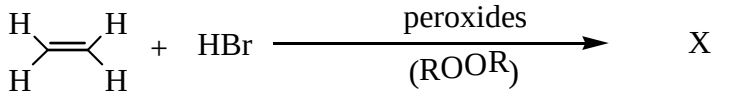
(d) Give the reaction mechanism for the bromination of ethene. (6 marks)

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

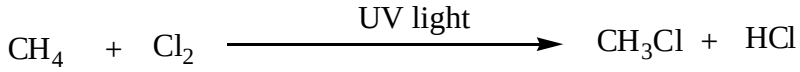
QUESTION 2

(a) Carbon is said to be a unique element. Discuss this fact giving four counts. (8 marks)

(b) Draw the structure of compound X, and give the reaction mechanism for its formation using the reactants in the following reaction; (5 marks)



(c) For the reaction of methane with chlorine;



Name (i) the type of mechanism. (1 mark)

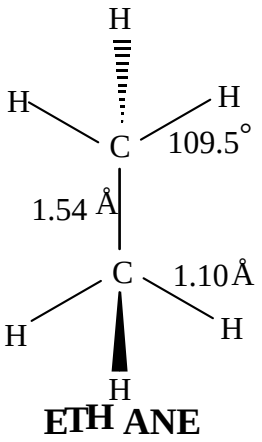
(ii) the type of bond fission involved (1 mark)

(d) Show the reaction mechanism. (5 marks)

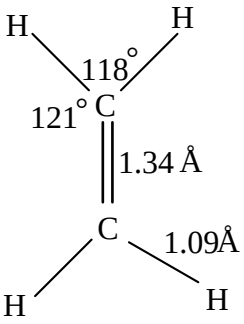
QUESTION 3

(a) Using mechanism, distinguish between *homolytic* and *heterolytic* bond cleavage. (4 marks)

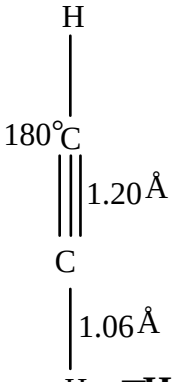
(b) Study the structures below and explain the following observations;



ETHANE



ETHENE



ETHYNE

(i) All the C-H bonds in ethane are 1.10 Å in length. (2 marks)

(ii) The H-C-H bond angle in ethane is 109.5° and not 90°. (3 marks)

(iii) The C-C bond is strongest in ethyne, then ethene and weakest in ethane.(3 marks)

(c) Explain the following observations; (8 marks)

(i) The molecular weight of alkanes increase down the homologous series.

(ii) Alcohols of lower molecular weight are soluble in water.

(iii) Alkenes decolorize bromine water.

(iv) Boiling point of branched alkylhalides are generally lower compared to the corresponding straight-chain derivatives.

QUESTION 4

(a) Give the products of the following reactions; (4 marks)

(i) $C_{11}H_{24} \xrightarrow[\text{Heat}]{}$

(ii) $CH_4 + Cl_2 \xrightarrow[\text{hv}]{}$

(iii) $CH_3CH_2CH_2CH_2Cl \xrightarrow{KOH(alcohol)}$

(iv) $HC \equiv CLi^+ + CH_3CH_2Cl \longrightarrow$

(b) Arrange the following compounds in order of increasing acidity:Explain your answer. (4 marks)

Ethane, Ethanol, ethanoic acid

(c) (i) Draw any **FOUR** structural isomers of the compound with the molecular formula C_4H_9Br. (4 marks)

(ii) Give the IUPAC names of each of the isomers whose structures you have drawn in part (a) (i) above. (4 marks)

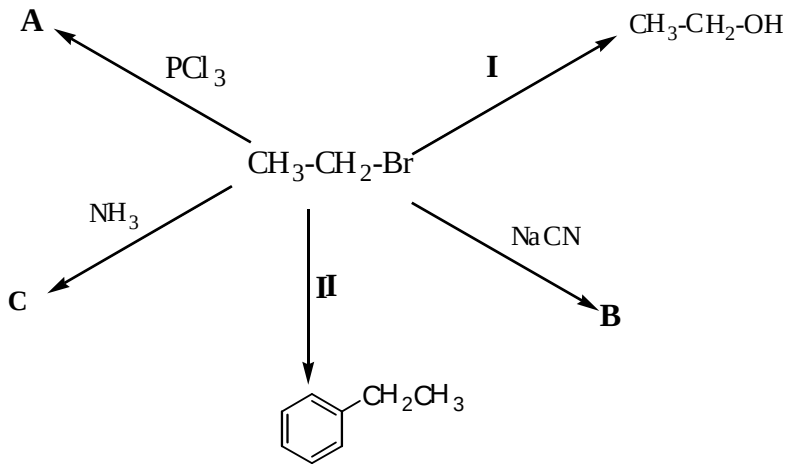
(d) Explain any TWO suitable chemical tests that can be used to distinguish between propanal and propanone. (4 marks)

(e) Give any **THREE** uses of alkylhalides. (3 marks)

QUESTION 5

(a) Explain why alkenes are more reactive than alkanes. (2 marks)

(b) The following is an illustration of some of the major reactions of bromoehtane.



(i) Give the structures of the compounds A, B and C. (3 marks)

(ii) Give the reagents and the conditions for the reaction I and II. (4 marks)

(iii) Bromine is a good leaving group. Explain. (2 marks)

(a) The reactivity of halogenation of alkanes follows the order below; Explain.

$F_2 > Cl_2 > Br_2 > I_2 > As_2$ (4 marks)

(c) Briefly discuss the features of a homologous series. (5 marks)

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GOOD LUCK!!!!!!!!!!!!!!!!!!!!!!!!