EMBU UNIVERSITY COLLEGE

(A Constituent College of the University of Nairobi)

2015/2016 ACADEMIC YEAR

FIRST SEMESTER EXAMINATION

SECOND YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION, BACHELOR OF SCIENCE, BACHELOR OF SCIENCE IN AGRICULTURE, HORTICULTURE, RANGE MANAGEMENT

SCH 202: ORGANIC CHEMISTRY II

DATE: NOVEMBER 30, 2015 **TIME: 8:30-10:30**

INSTRUCTIONS:

Answer Question ONE and any other TWO

QUESTION ONE

a) Using specific examples distinguish the following

i) Conjugated and Cumulated diene (2 marks)

ii) Alcohol and Ether (2 marks)

iii) SN_1 and E_2 reactions (2 marks)

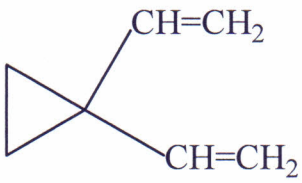
iv) Benzene and Cyclo hexane (2 marks)

v) Dimer and polymer

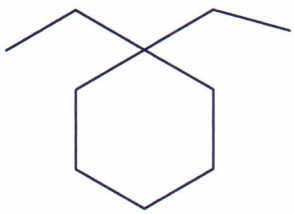
b) Write systematic names for the following compounds

i) $(CH_3)_2C=C(CH_3)CH_2CH(C_2H_5)_2$ (2 marks)

ii)

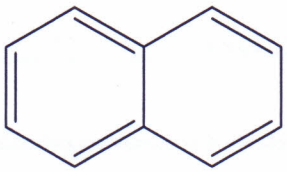


(2 marks)



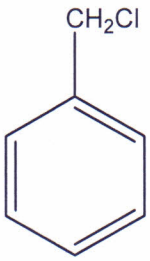
iii (2 marks)

iv)



(2 marks)

v)



(2 marks)

c) Draw the structures of each of the following compounds (6 marks)

i) Ethoxyethane

ii) Methyl Phenyl ether

iii) Toulene

d) With reasons classify the following alcohols as primary, secondary and tertiary alcohols. (6 marks)

i) 2-Methylpropan-2-ol

ii) Phenylmethanol

iii) Propan-2-ol

QUESTION TWO

a) Using curly arrows write possible mechanism for the reactions (9marks)

i)

$$2C_2H_5\text{-}OH \xrightarrow[140^{O}C]{H_2SO_4} C_2H_5\text{-}O\text{-}C_2H_5 + H_2O$$

ii)

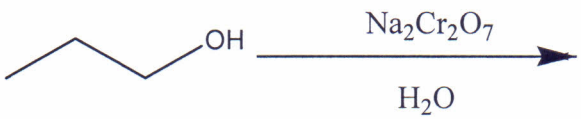
$$CH_3C(CH_3)_2CH{=}CH_2 + HCl \longrightarrow \underset{35\%}{(CH_3)_2CClCH(CH_3)_2} + \underset{65\%}{(CH_3)_3CCHClCH_3}$$

iii)

$$CH_2{=}CH_2 \xrightarrow[\text{excess water}]{Br_2} BrCH_2CH_2OH$$

b) Give the products of the following reactions.

i)

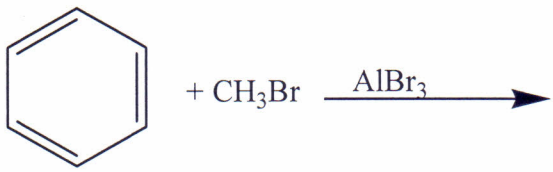


(1 mark)

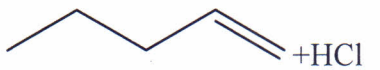
ii)

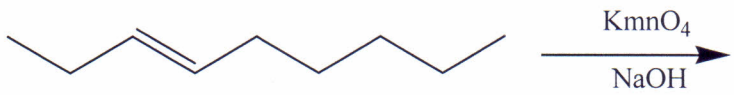
(1 mark)

iii)



(2 marks)

iv)  (1 mark)



v) (1mark)

c) Write down the mechanism for the reaction between benzene concentrated nitric acid and concentrated sulphuric acid and name the products formed. (5 marks)

QUESTION THREE

a) How would ethanol and 2-Methylpropan-2-ol be distinguished chemically. (2 marks)

b) i) Arrange the following in order of decreasing bond length. (1 marks)

C═C , C—C , C≡C

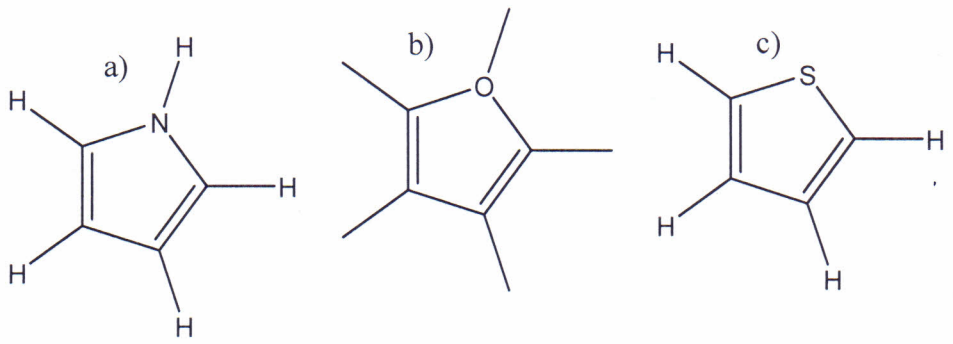
ii) Identity the conditions, A, B and C in the reaction below. (3 marks)

$C(CH_3)_2=C(CH_3)H \xrightarrow[B]{A} C(CH_3)_2=O + CH(CH_3)=O$

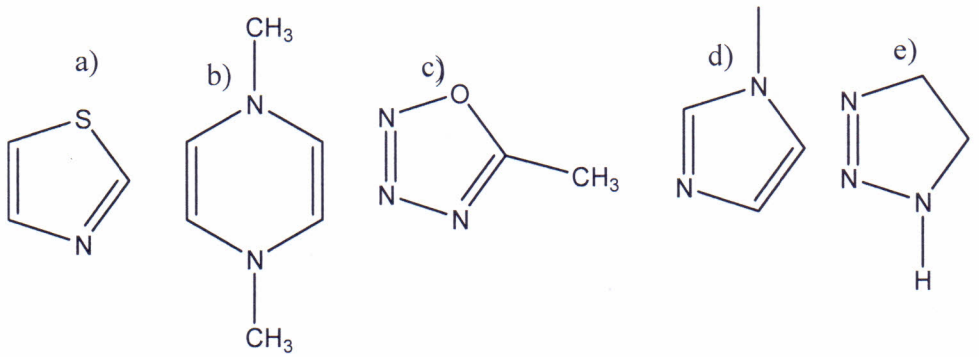
C

c) i) State the Huckel rule (2 marks)

ii) Name the following compounds (3 marks)



iii) Which of the following compounds are aromatic. Explain. (5 marks)



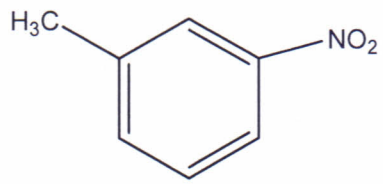
d) Write down the mechanism for the reaction between benzene and chlorine gas at room temperature in presence of aluminum chloride. (4 marks)

QUESTION FOUR

a) Briefly explain how Grignard reagent may be prepared. (3 marks)

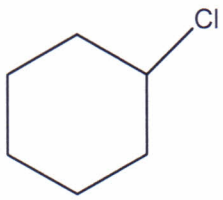
b) Identify A and B from the reaction below. (2 marks)

c) Suggest the products for the reactions below.



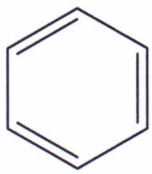
H_2,Ni
heat +pressure

A (1 mark)

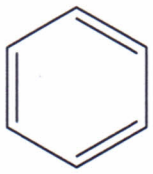


NaOH, H_2O
340°C

B (1 mark)



$+ CH_3(CH_2)_3Cl$ ⟶ D (1 mark)



HNO_3, H_2SO_4

⟶ E (1 mark)

$(CH_3CH_2CH_2)_3B + 3C_2H_5CO_2H$ ⟶ F + G (2 marks)

d) Identify and name the keto and enol forms from the reaction below. (4 marks)

$HC{\equiv}CH + H_2O \xrightarrow[HgSO4]{H_3^{\oplus}O}$

e) Describe a simple chemical test that can be used to distinguish cyclohexene and Benzene. (4 marks)

QUESTIONFIVE

a) i) What are Polynuclear aromatic hydrocarbons compounds? (2 marks)

ii) Briefly discus the environmental effects of polynuclear hydrocarbons (4marks)

iii) Draw and name two structures of Polynuclear aromatic hydrocarbons. (4 marks)

iv) Define a fullrene and give two uses. (3 marks)

b) i) Define organic synthesis (2 marks)

ii) State the factors you would consider in planning a synthesis. (3 marks)

iii) Give two reactions that can be used when increasing number of carbon atoms in the carbon chain. (2 marks)

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