MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR
SECOND YEAR 1st SEMESTER

SCHOOL OF SCIENCE &INFORMATION SCIENCES
BACHELOR OF SCIENCE IN CHEMISTRY AND BACHELOR OF EDUCATION SCIENCE

COURSE CODE: CHE 2112-1
COURSE TITLE: CHEMISTRY OF AROMATIC COMPOUNDS

DATE: 8TH APRIL, 2022 **TIME: 0830-1030**

INSTRUCTIONS TO CANDIDATES

1. Answer Question **ALL** the questions.
2. All Examination Rules Apply

QUESTION ONE (30 MARKS)

a. Give the product and a plausible mechanism when phenol is completely reacted with concentrated nitric acid in presence of sulphuric acid **(4 MARKS)**

b. Give the structure and name the product formed when aniline is treated with excess aqueous solution of bromine**.** **(2 MARKS)**

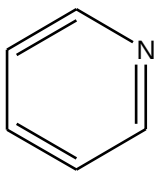
c. Explain why benzene is considered to have unusual stability **(2 MARKS)**

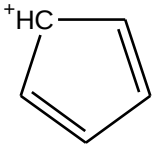
d. Explain why in the hydrogenation of benzene formation of the sigma complexes is the rate determining step. **(2 MARKS)**

e. By use of resonance structure and reaction mechanism, explain why presence of an electron withdrawing group at the ortho and para positions increase the acidic character of phenols **(3 MARKS)**

f. Give the structures for the following **(4 MARKS)**
   I) o-methyl phenol
   II) 2,4-dibromo toluene
   III) 2-(4'-methyl-3'-nitrophenyl)-2,5-dimethylhexane
   IV) Phenanthren-4-ol

g. Analyze and classify the following as either aromatic, antiaromatic or non aromatic **(6 MARKS)**

i) 

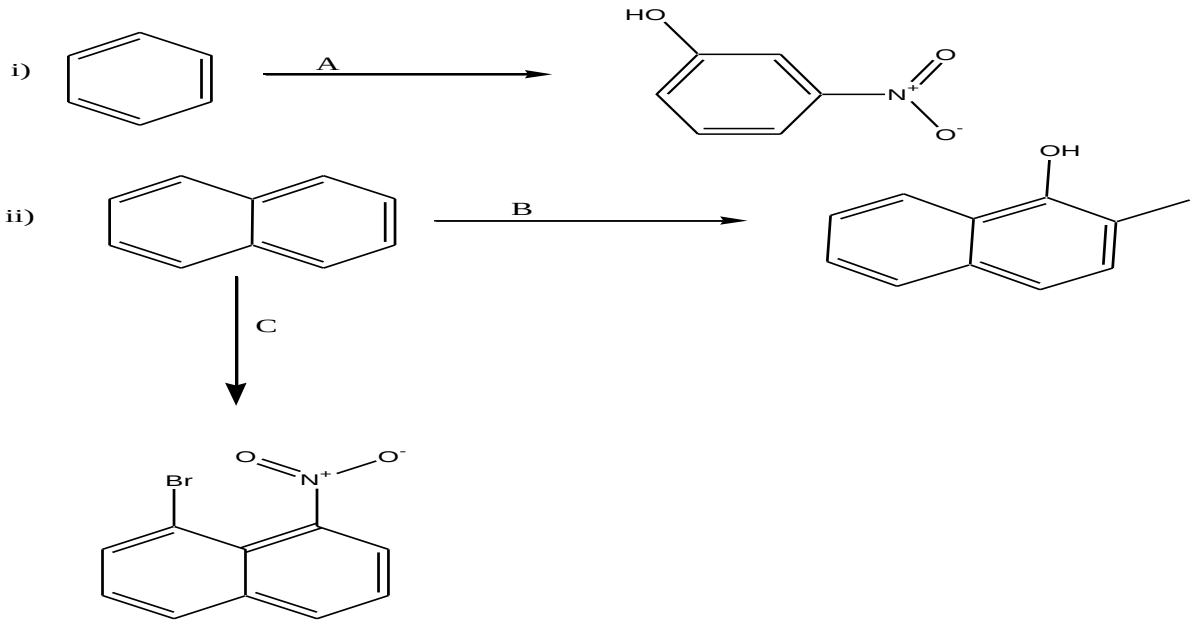
ii) 

iii) 

h. Give a detailed mechanism and reagents required for the Nitrosation of benzene **(4 MARKS)**

i. Explain using a mechanism why in the dissolving metal reduction of benzene 1,3- cyclohexadiene is the minor product yet it the most stable product. **(4 MARKS)**

j. Give the best sequence for the following conversions **(3 Marks)**



QUESTION TWO (10 MARKS)

a) Give the major products for mononitration of the following **(3 MARKS)**

i. p-nitrotoluene
ii. o-bromobenzoic acid
iii. m-bromotoluene

b) By use of resonance structures and reaction mechanism, explain why the acetyl group **($COCH_3$)** to nitrogen reduces the activating properties of aniline **(4 MARKS)**

c) Explain using structures Why a halogen attached to benzene ring is considered to be an activating group to benzene **(2 MARK)**

d) Define annulenes giving an example **(1 MARKS)**

QUESTION THREE (10 MARKS)

a. Using chlorination of benzene as an example write the reaction mechanism showing all possible resonance structures of intermediates if any for the electrophilic aromatic substitution of benzene. Include the reagents used **(6 MARKS)**

b. By use of resonance structures and reaction mechanism explain why EAS of anthracenes is preffered at position 9 over position 2 **(4 MARKS)**

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