**MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**P.O. Box 972-60200 – Meru-Kenya**

**Tel: 020-2069349, 061-2309217. 064-30320 Cell phone: +254 712524293, +254 789151411**

**Fax: 064-30321**

**Website:** [**www.must.ac.ke**](http://www.must.ac.ke) **Email:** **info@must.ac.ke**

**University Examinations 2016/2017**

THIRD YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE CHEMISTRY

**SCH 3302: CHEMISTRY OF NON-BENZENOID AROMATIC COMPOUNDS**

**DATE: December, 2016 TIME: HOURS**

**INSTRUCTIONS:** *Answer questions* ***one*** *and any other* ***two*** *questions .*

**QUESTION ONE - (30 MARKS)**

1. Differentiate between aromatic and antiaromatic compounds. . (2 Marks)
2. Draw the structures of the following compounds; (5 Marks)
3. 9, 10 – anthraquinone
4. 2-methyl-1,4- benzoquinone
5. 9,10-dihydrophenanthrene
6. Phthalic acid
7. Pyridine-3-Sulfonic acid
8. Using relevant illustrations, briefly describe why pyrrole undergoes electrophilic substitutions at carbon-2 rather than at carbon-3. (7 Marks)
9. Briefly explain why 1,5-dinitronaphthalene is formed when 1-nitronaphthalene is reacted with HNO3 in conc.H2SO4 and not 1, 3-dinitronaphthalene. (4 Marks)
10. Give the names of the compounds below and describe their aromaticity. (6 Marks)



 

1. (i) Briefly describe the process involved in browning of fruits like peeled bananas.

( 4 Marks)

 (ii) Give two uses of quinones. (2 Marks)

**QUESTION TWO (20 MARKS)**

1. Explain the following observations;
2. Pyridine and benzene undergo electrophilic aromatic substitution; however pyridine is less reactive than benzene. (2 Marks)
3. Furan is more reactive than thiophene towards electrophilic substitution(3 Marks)
4. Sulphonation of naphthalene yields 1-substituted product at low temperatures and 2-substituted product at high temperatures; the 2-substituted product is more stable than the 1- substituted product. (3 Marks)
5. Naphthalene is more reactive than benzene towards electrophilic substitution.

(2 Marks)

1. (i) Define optical activity. (1 Mark)

(ii) Determine whether the compound below is achiral or chiral. Give an explanation for your answer. (3 Marks)

 

1. Using suitable reagents, show how you would synthesize pyridine from 1,5-dicarbonyl compounds. (6 Marks)

**QUESTION THREE (20 MARKS)**

1. Draw the structure and give the name of the major products formed when naphthalene is reacted with the following reagents and conditions. (10 Marks)
2. HNO3/ H2SO4
3. CrO3 / AcOH
4. 
5. Na/EtoH
6. H2SO4/80$°c$
7. Differentiate between activating substituents and deactivating substituents. (3 Marks)
8. Draw four resonance contributor of pyrrole. (2 Marks)
9. The lone pair of electrons in nitrogen cannot be delocalized over the ring in pyridine but is delocalized over the ring in pyrrole. Briefly explain. (4 Marks)
10. Briefly explain how one would control enzymatic browning. (1 Mark)

**QUESTION FOUR (20 MARKS)**

1. Draw five resonance structures of phenanthrene. (5 Marks)
2. Draw the structure and name of the products formed in the following reactions;







 

1. Show the synthesis of anthracene from 1,4-naphthoquinone and 1, 3- butadiene.

(5 Marks)