



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

KAKAMEGA (MAIN), AND KISUMU CAMPUSES

**UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR**

FIRST YEAR SECOND TRIMESTER SPECIAL EXAMINATIONS

**FOR THE DEGREES
OF
BACHELOR OF SCIENCE IN MEDICAL LABORATORY SCIENCES,**

BACHELOR OF SCIENCE IN MEDICAL BIOTECHNOLOGY

COURSE CODE: BML 125

COURSE TITLE: Organic Chemistry

DATE: 2019 **TIME:**

INSTRUCTIONS TO CANDIDATES

1. This paper consists of three sections A, B and C
2. Write your registration number only on the answer booklet
3. Write your registration number on every new leaf of the paper

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over

SECTION A: MULTIPLE CHOICE QUESTIONS (MCQs)

Instructions to the candidate

1. This section has twenty (20) multiple choice questions (MCQs)
2. Each question has a stem and four (4) options
3. Indicate the correct option(s) for each question by writing the corresponding letter
4. Use the provided university examination booklet only

SECTION A: MULTIPLE CHOICE QUESTIONS (MCQs)

- Q1. Which of the following is **false** about aromatic compounds?
- They are also called arenes
 - They have a conjugated system of p orbitals
 - They are more stable than non-aromatic compounds
 - They are less stable than anti-aromatic compounds
- Q2. Which of the following statements is **not true** about Heteroaromatic compounds?
- They can be benzenoid or non-benzenoid
 - Involvement of the heteroatom in the cyclic system requires that it provides an s orbital to be part of the conjugated pi- system
 - The heteroatom must be Sulphur, Nitrogen or Oxygen
 - The heteroatom can only make one contribution to the pi-system
- Q3. At normal conditions, benzene has ___ resonance structures.
- 4
 - 3
 - 2
 - 1
- Q4. The systematic (IUPAC) name for TNT is
- Trinitrotoluene
 - 2,4,6-Trinitrotoluene
 - 2-Methyl-1,3,5-Trinitrobenzene
 - 2,4,6-Trinitromethylbenzene
- Q5. Which of the following is **not** a form of structural isomerism?
- Functional group isomerism
 - Geometric isomerism
 - Chain isomerism
 - Position isomerism
- Q6. Which of the following compounds can exhibit cis-trans isomerism?
- Ethene
 - Propanoic acid
 - Prop-1-ene
 - Propan-1-ol
- Q7. Which of the following would be the product of the reaction between but-1-ene and hydrogen chloride in presence of organic peroxides?
- 1-chlorobutane
 - 2-chlorobutane
 - 1-chlorobut-1-ene
 - 1-chlorobut-1-ene

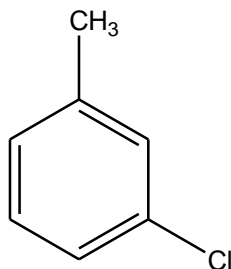
Q8. Which of the following compounds has a carbonyl group in any of its molecules?

- a) Ethanoic acid
- b) Ethanal
- c) Ethanone
- d) All the above

Q9. Identify the case that can be explained by free radical substitution reaction mechanism

- a) Reaction between ethene and sulphuric acid to form ethyl hydrogen sulphate
- b) Sulphonation of benzene by warming it under reflux at 40° with fuming sulphuric acid for 20 to 30 minutes
- c) Reaction between propane and bromine in presence of ultra violet light
- d) Reaction between ethane and chlorine in absence of ultra violet light

Q10. A number of organic compounds are known to have more than one name. Which of the following **cannot** be an acceptable name of the following compound?



- a) Meta-chloromethylbenzene
- b) Meta-methylchlorobenzene
- c) 3-methylchlorobenzene
- d) 1,3-chloromethylbenzene

Q11. The carbon atom to which Hydrogen will attach itself to when a compound of the type HX reacts with ethene can be explained by

- a) Markovnikov's rule
- b) The peroxide effect
- c) Huckel's rule
- d) None of the above

Q12. Select the **most accurate** statement

- a) Propanone and propanal are structural isomers
- b) Propanone and propanal are functional group isomers
- c) Propanone and propanal are isomeric hydrocarbons
- d) Propanone and propanal are stereoisomers

Q13. Which of the following **not true** about benzene?

- a) It has pi bonds in its structure
- b) It has sigma bonds in its structure
- c) It has 2 resonance structures
- d) None of the above

Q14. The compound consisting of a methyl group attached on a benzene ring is commonly called

- a) Toluene
- b) Phenol
- c) Pyridine
- d) Xylene

Q15. The truth about a methyl group already substituted on a benzene ring is that

- a) Is it an ortho director
- b) It is a para director
- c) It is an ortho and para director
- d) It cannot allow any further substitution on the ring

Q16. The catalyst used in Friedel Craft's acylation of benzene using ethanoyl bromide is

- a) Sulphuric acid
- b) Aluminium bromide
- c) Aluminium chloride
- d) A mixture of nitric acid sulphuric acid

Q17. Which of the following is **true** about cyclohexane?

- a) It is anti-aromatic
- b) It is non-aromatic
- c) It is cyclic aromatic compound
- d) All of the above

Q18. The **main** reason why benzene is attacked by electrophiles is

- a) It has pi orbitals which lie above and below the plane of the molecule, exposing electrons in them
- b) It is positively charged
- c) It is negatively charged
- d) It has a conjugated system of pi electrons which gives the ring extra stability

Q19. There is no way

- a) The CO double bond in a ketone can be on a carbon atom which is in the middle of two other carbon atoms
- b) The CO double bond in an aldehyde can be on a carbon atom which is in the middle of two other carbon atoms
- c) Electrophilic substitution can take place in an already substituted benzene ring

- d) An aromatic compound
can react with a non-aromatic compound

Q20. Which of the following organic compounds is used to preserve dead bodies?

- a) Methylbenzene
b) Ethanal
c) Acetone
d) Methanal

SECTION B (40 Marks)

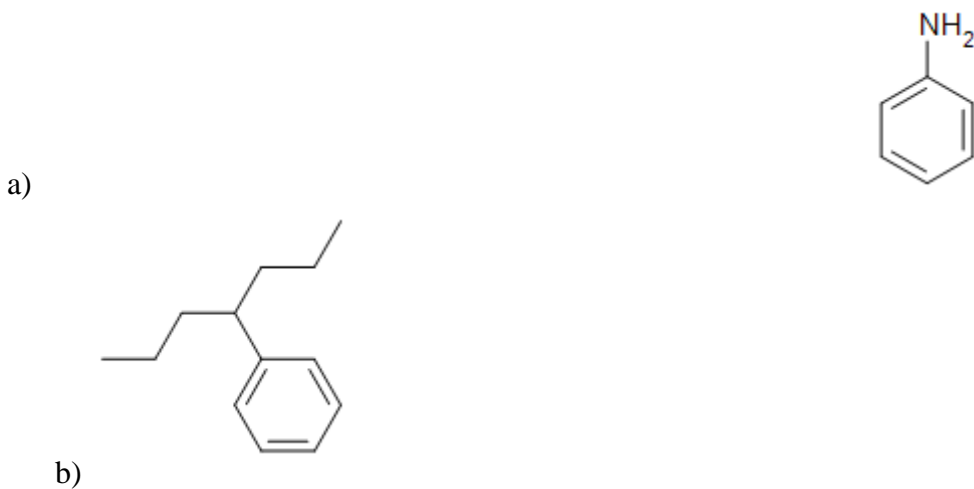
Q1. Name the **three** main stages involved in free radical substitution reactions and for each stage, briefly describe what happens at each (6 marks)

Q2. Draw **2** stereoisomers (cis/trans) of pent-2-ene and give the specific name of each (4 marks)

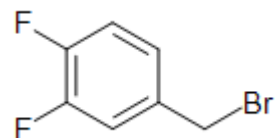
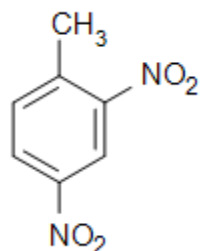
Q3. Draw the structures of each the following compounds (12 marks)

- a) 3-Phenylheptane
b) Propanone
c) Naphthalene
d) Anthracene
e) Cyclopentane
f) Sulphuric (VI) Acid

Q4. Give the systematic IUPAC name for each of the following compounds (10 marks)

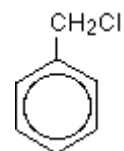


c)



d)

e)



Q5. Explain how each of the following can be prepared in the laboratory (8 marks)

a)

Benzene

b)

Propanone

c)

Methylbenzene

Q6. Give the biomedical importance of each of the following compounds (2 marks)

a)

formaldehyde (methanal)

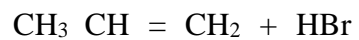
b)

phenol

SECTION C (40 Marks)

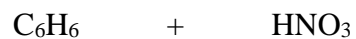
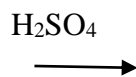
Q1. Use curly arrows where applicable to show the mechanisms for the following chemical reactions, clearly showing all the steps involved until the final product(s)

a)



(7 marks)

b)



(8 marks)

