



(University of Choice)

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

KAKAMEGA (MAIN), AND KISUMU CAMPUSES

**UNIVERSITY EXAMINATIONS
2018/2019 ACADEMIC YEAR**

FIRST YEAR MAIN 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: 29TH MAY 2019

TIME: 3.00 -5.00 PM

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 7 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 not true about benzene?

- a) It has 6 electrons in its pi system
- b) It has no sigma bonds in its entire structure
- c) It has 2 resonance structures
- d) It is the simplest aromatic compound

Q2. When benzene is drawn as a hexagon and a circle inside the ring, this is called

- a) IUPAC structure
- b) Rutherford model
- c) Lewis structure
- d) Kekule structure

Q3. The systematic name for toluene is

- a) Methylbenzene
- b) Ethylbenzene
- c) Phenylmethane
- d) Nitrobenzene

Q4. Which of the following is a form of stereoisomerism?

- a) Functional group isomerism
- b) Spatial isomerism
- c) Chain isomerism
- d) Position isomerism

Q5. Which of the following is **TRUE** about aliphatic compounds?

- a) They are all cyclic
- b) They are all saturated
- c) They all have conjugated p orbitals in their structures
- d) They all have a sweet smell

Q6. Which of the following compounds cannot be used to demonstrate the peroxide effect?

- a) Pent-1-ene
- b) But-1-ene
- c) Propene
- d) But-2-ene

Q7. Which of the following would be the product of the reaction between hex-1-ene hydrogen chloride if Markovnikov's rule were to be followed?

- a) 1-chlorohex-1-ene
- b) 1-chlorohexane
- c) 2-chlorohexane
- d) 2-chlorohex-2-ene

- Q8. 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
- Q9. Which of the following compounds does not have a carbonyl group in its molecules?
- Ethanoyl chloride
 - Ethanal
 - Ethanone
 - Ethanol
- Q10. Which of the following compounds can be named via ortho-, meta- para- nomenclature?
- Chloromethylbenzene
 - Methylphenol
 - 5-bromotoluene
 - Trinitrotoluene
- Q11. Identify the case that can be explained by free radical substitution reaction mechanism
- Reaction between ethene and sulphuric acid to form ethyl hydrogen sulphate
 - Suphonation of benzene by warming it under reflux at 40° with fuming sulphuric acid for 20 to 30 minutes
 - Reaction between propane and bromine in presence of ultra violet light
 - Reaction between ethane and chlorine in absence of ultra violet light
- Q12. The carbon atom to which Hydrogen will attach itself to when a compound of the type HX reacts with ethene can best be explained by
- Markovnikov's rule
 - The peroxide effect
 - Huckel's rule
 - None of the above
- Q13. Which of the following is not a polycyclic compound?
- Pyridine
 - Phenanthracene
 - Napthalene
 - Anthracene

Q14. When one chlorine atom substitutes one hydrogen directly attached to the methyl group on methyl benzene, which of the following is formed?

- a) 4-chloromethylbenzene
- b) chloromethylbenzene
- c) 2-chloromethylbenzene
- d) (chloro)methylbenzene

Q15. When nitrobenzene reacts with an ethyl group from another compound __ if formed

- a) 1-ethylnitrobenzene
- b) 2-ethylnitrobenzene
- c) 4-ethylnitrobenzene
- d) 3-ethylnitrobenzene

Q16. The catalyst used in Friedel Craft's methylation of benzene using ethanoyl chloride is

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

Q17. Which of the following reactions does not occur by electrophilic substitution?

- a) Friedel crafts alkylation of benzene
- b) Friedel crafts acylation of benzene
- c) Nitration of benzene
- d) Halogenation of ethene

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

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

Q20. There is no way

- a) The CO double bond in a ketone can be on a carbon atom in the middle of two other carbon atoms
- b) The CO double bond in an aldehyde can be on a carbon in the middle of two carbons

- c) Electrophilic substitution
can take place in an already substituted benzene ring
- d) An aromatic compound
can react with a non-aromatic compound

SECTION B (40 Marks)

Q1. Draw two stereoisomers of but-2-ene and give the specific name of each (4 marks)

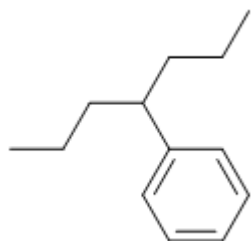
Q2. Draw the structure of each the following compounds (12 marks)

- a) 2-phenyloctane
- b) Propanamide
- c) Anthracene
- d) Cyclopropane
- e) Sulphuric (vi) acid
- f) Para-methylbenzaldehyde

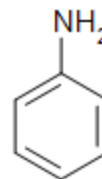
Q3. Name the three main stages involved in free radical substitution reactions and for each stage, briefly describe what happens at each (6 marks)

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

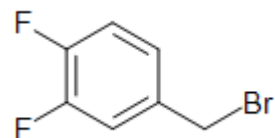
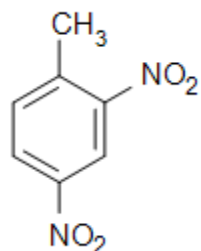
a)



b)

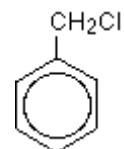


c)



d)

e)



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

a)

Ethylbenzene

b)

Ethanol

c)

Butanone

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

a)

Formaldehyde (methanol)

b)

Ethanol

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)

Propene + Hydrogen

Bromide (7 marks)

b)

Friedel crafts propylation

of benzene (8 marks)

c)

Sulphonation of benzene

(8 marks)

d) methylbenzene (5 marks)

e) marks)

f) (5 marks)

Nitration of

