UNIVERSITY OF SWAZILAND
Faculty of Health Sciences
Department of Environmental Health Science
BACHELOR OF SCIENCE IN ENVIRONMENTAL HEALTH

RESIT EXAMINATION PAPER 2017

TITLE OF PAPER	:	ORGANIC CHEMISTRY FOR HEALTH SCIENCES
COURSE CODE	:	EHS 112
DURATION	:	2 HOURS
MARKS	:	100
INSTRUCTIONS	:	READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
	:	ANSWER **ANY FOUR** QUESTIONS
	:	EACH QUESTION **CARRIES 25** MARKS.
	:	WRITE NEATLY & CLEARLY
	:	NO PAPER SHOULD BE BROUGHT INTO OR OUT OF THE EXAMINATION ROOM.
	:	BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR.

QUESTION ONE

a. Hydrocarbon A has the formula C_9H_{12} and absorbs 3 equivalents of hydrogen to yield B, C_9H_{18}, when hydrogenated over a Pd/C catalyst. Give the structures of both A and B **[4 Marks]**

b. _____ is the ability of carbon to form long chains with itself therefore creating millions of organic compounds. **[2 Marks]**

c. Organic compounds contain heteroatoms such as H, N, O, S, P and _____. **[2 Marks]**

d. Benzene contains only _____ hybridised carbons. **[2 Marks]**

e. Draw saturated structures for the following compounds and fill in non-bonding valence electrons where they can be found.

i) 1,2-dichloroethane

ii) Carbon monoxide

iii) Methanol

iv) 2,4'-dichloro biphenyl

v) 2-bromo-4-methoxyhexanal **[15 Marks]**

[Total: 25 Marks]

QUESTION TWO

a. Dissolved organic carbon (DOC) is derived from the decomposition of naturally occurring material in water.

(i) Name any four classes of organic compounds that make up DOC. **[8 Marks]**

(ii) What are the water treatment problems associated with the presence of DOC? Give a brief discussion on how these problems occur **[9 Marks]**

b. Draw all structural isomers of hexene, C_6H_{12}, that have unbranched carbon chains. **[8 marks]**

[Total: 25 Marks]

QUESTION THREE

a. Account for the following facts;

(i) Primary carbocations do not undergo S_N1 type of reactions. **[5 Marks]**

(ii) Terminal alkenes form minor products of reactions involving the dehydration of alcohols.

[5 Marks]

b. Draw structures of the compounds described below and give the IUPAC name for each structure

(i) An aromatic compound containing one benzene ring and a single carboxyl group which is *ortho* to a bromo group and *para* to a hydroxyl group.

(ii) A straight chain of eight carbons with two methyl groups on the second carbon, an *iso*propyl group on the fourth carbon and a carbonyl group on the eighth carbon.

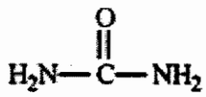
(iii) An unsaturated compound, C_3H_6, undergoes a halogenation reaction to produce dichloride product, A. Draw the molecular structure of Product A.

[15 Marks]

[Total: 25 Marks]

QUESTION FOUR

a) Consider the structure of urea shown below and do the following:



i) Fill in the non-bonding valence electrons that are missing from the line bond structure. **[4 Marks]**

ii) Determine the hybridization of the carbon atom. **[2 Marks]**

iii) Predict the bond angle of NH_2–C=O in urea. **[3 Marks]**

b) There are two molecules with the molecular formula C_3H_9N. Draw them and describe how they differ. **[6 Marks]**

c) What is the difference between S_N1 and S_N2 reactions? **[6 Marks]**

d) Give examples of each type of reaction in (c). **[4 Marks]**

[Total: 25 Marks]

QUESTION FIVE

a. Give the molecular formula of a hydrocarbon containing five carbon atoms that is;

(i) An alkane

(ii) Cycloalkane

(iii) An alkene

(iv) An alkyne.

[Marks 8]

b. Explain why the molecular formulae of the answers given in a. (i) and (ii) are different. **[Marks 4]**

c. Using appropriate examples, explain the difference between

(i) Alkane and an alkyl group

(ii) A saturated and unsaturated hydrocarbon

(iii) A branched and a straight chain hydrocarbon

(iv) Benzene and cyclohexane

[8 Marks]

d. Write a balanced chemical equation for the reaction of 2-butene and bromine.

[5 Marks]

[Total: 25 Marks]

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