FINAL
Alternative Assessment

(COVER PAGE)

Session	:	**April 2020**
Programme	:	Foundation in Science (CFSI)
Course	:	**CHM1204: Chemistry 2**
Date of Examination	:	4 August 2020 (Tuesday)
Time	:	9:00am – 11:30am Reading Time : Nil
Duration	:	2 hours + 30 minutes (uploading time)
Special Instructions	:	

This paper consists of **FOUR (4)** questions. Answer **ALL** questions.
All questions carry equal marks.

Materials permitted :

Non-programmable calculator

Materials provided :

Nil

Examiner(s)	:	**Ms. Lim Sze Theng**
Chief Moderator	:	Ms. Gurdeep Kaur

*This paper consists of **9** printed pages, including the cover page.*

FOUNDATION IN SCIENCE (CFSI)
CHM1204: CHEMISTRY 2
FINAL ALTERNATIVE ASSESSMENT: APRIL 2020 SESSION

Instructions: This paper consists of **FOUR (4)** questions. Answer **ALL FOUR (4)** questions. All questions carry equal marks.

Question 1

(a) Draw condensed structural formulae for the following branched alkanes.

(i) 5-(*sec*-Butyl)decane

(ii) 4,4-Diisopropyloctane

(iii) 5-Isobutyl-2,3-dimethylnonane

(iv) 4-(1,1-Dimethylethyl)octane

(8 marks)

(b) Each of the following alcohols is named incorrectly. However, the names give correct structural formulas. Draw structural formulas for the compounds, and then write the correct IUPAC name for each alcohol.

(i) 2-Ethyl-1-propanol

(2 marks)

(ii) 2,4-Butanediol

(2 marks)

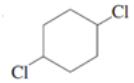
(iii) 2-Methyl-3-butanol

(2 marks)

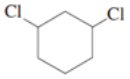
(iv) 1,4-Cyclopentanediol

(2 marks)

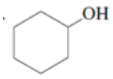
(c) How many chiral centers are present in each of the following molecular structures?

(i) 

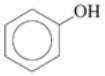
(1 mark)

(ii) 

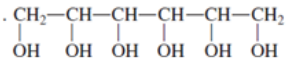
(1 mark)

(iii) 

(1 mark)

(iv) 

(1 mark)

(v) 

(1 mark)

(d) Indicate whether each of the following statements describe a reversible competitive inhibitor, a reversible noncompetitive inhibitor, or an irreversible inhibitor. More than one answer may apply.

(i) Both inhibitor and substrate bind at the active site on a random basis.

(1 mark)

(ii) The inhibitor effect cannot be reversed by the addition of more substrate.

(1 mark)

(iii) Inhibitor structure does not have to resemble substrate structure.

(1 mark)

(iv) The inhibitor can bind to the enzyme at the same time as substrate

(1 mark)

(TOTAL: 25 MARKS)

Question 2

(a) Write the *molecular formula* for hydrocarbons with each of the following structural features.

(i) Acyclic, four carbon atoms, no multiple bonds

(1 mark)

(ii) Acyclic, five carbon atoms, one double bond

(1 mark)

(iii) Cyclic, five carbon atoms, one double bond

(1 mark)

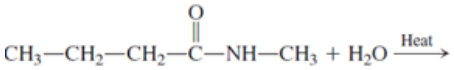
(iv) Cyclic, seven carbon atoms, two double bonds

(1 mark)

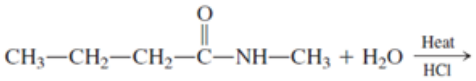
(b) Draw skeletal structural formulas for the four aldehydes and three ketones that have the molecular formula $C_5H_{10}O$.

(7 marks)

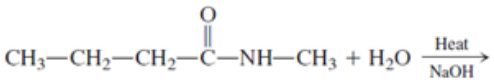
(c) Draw the structures of the organic products in each of the following hydrolysis reactions.

(i) 

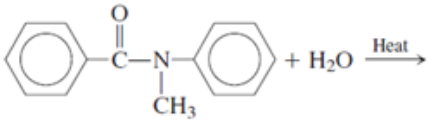
(2 marks)

(ii) 

(2 marks)

(iii) 

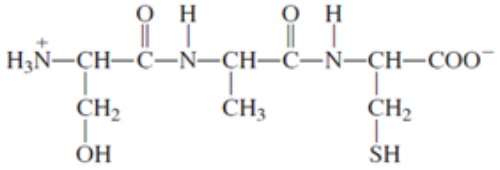
(2 marks)

(iv) 

(2 marks)

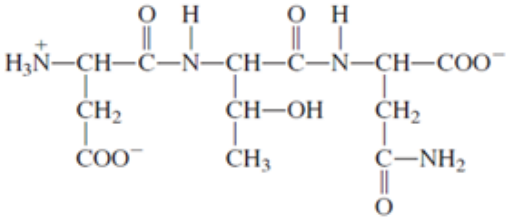
(d) Draw the structural formula of amino acids contained in each of the following tripeptides.

(i)



(3 marks)

(ii)

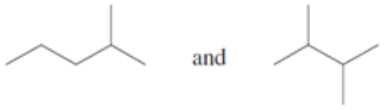


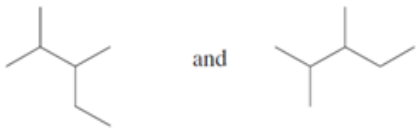
(3 marks)

(TOTAL: 25 MARKS)

Question 3

(a) Do the line-angle structural formulas in each of the following sets represent (1) the same compound, (2) constitutional isomers, or (3) different compounds that are not constitutional isomers?

(i) 

(ii) 

(4 marks)

(b) Draw the structure of the alcohol needed to prepare each of the following aldehydes or ketones by alcohol oxidation.

(i) Diethyl ketone

(1 mark)

(ii) Phenylpropanone

(1 mark)

(iii) 2-Ethylhexanal

(1 mark)

(c) Give IUPAC names for the four isomeric C_5 monocarboxylic acids with saturated carbon chains.

(4 marks)

(d) In each of the following pairs of fatty acids, select the fatty acid that has the lower melting point.

(i) 18:0 acid and 18:1 acid

(2 marks)

(ii) 18:2 acid and 18:3 acid

(2 marks)

(iii) 14:0 acid and 16:0 acid

(2 marks)

(iv) 18:1 acid and 20:0 acid

(2 marks)

(e) A calorimeter was calibrated by burning 2.00 g of methanol (CH_3OH) whose enthalpy of combustion is – 715 kJ mol^{-1}. The temperature of the calorimeter rose from 19.6°C to 52.4°C. The same calorimeter was used to measure the enthalpy of combustion of propan-2-ol. 1.50 g of propan-2-ol $CH_3CH(OH)CH_3$ raised the temperature from 19.8°C to 56.2°C. Calculate the heat capacity of the calorimeter and then the enthalpy of combustion of propan-2-ol.

(6 marks)

(TOTAL: 25 MARKS)

Question 4

(a) For each of the following molecules, indicate whether cis-trans isomerism is possible.

(i) 2-pentene

(1 mark)

(ii) 1-chloro-2-pentene

(1 mark)

(iii) chlorocyclopentane

(1 mark)

(iv) 1,2-dichlorocyclopentane

(1 mark)

(b) Based on Markovnikov's rule, indicate whether hydration of each of the following alkenes produces one or two products.

(i) propene

(1 mark)

(ii) 3-hexene

(1 mark)

(iii) cyclopropene

(1 mark)

(c) Draw the structural formula of the hemiacetal formed from each of the following pairs of reactants.

(i) Acetaldehyde and ethyl alcohol

(2 marks)

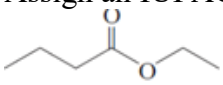
(ii) 2-pentanone and methanol

(2 marks)

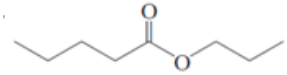
(iii) Butanal and ethanol

(2 marks)

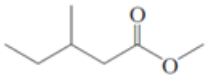
(d) Assign an IUPAC name to each of the following compounds.

(i) 

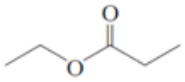
(1 mark)

(ii) 

(1 mark)

(iii) 

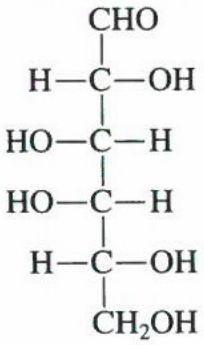
(1 mark)

(iv) 

(1 mark)

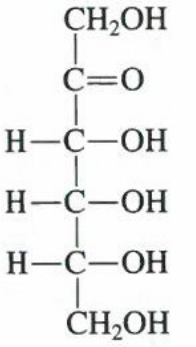
(e) Classify each of the following monosaccharides as an aldose or a ketose.

(i)



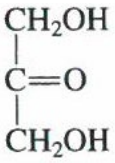
(1 mark)

(ii)



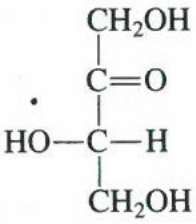
(1 mark)

(iii)



(1 mark)

(iv)



(1 mark)

(f) Give the type of amino acid R group that is involved in each of the following interactions that contribute to tertiary protein structure.

(i) Hydrophobic interaction
(ii) Hydrogen bond
(iii) Disulfide bond
(iv) Electrostatic interaction

(4 marks)
(TOTAL: 25 MARKS)

--THE END--
CHM1204(F)/APR2020/S.T.LIM