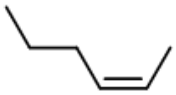
INTI INTERNATIONAL UNIVERSITY

FOUNDATION IN SCIENCE (CFSI)
CHM1204: CHEMISTRY 2
FINAL EXAMINATION: AUGUST 2015 SESSION

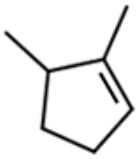
Instructions: This paper consists of **FIVE (5)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

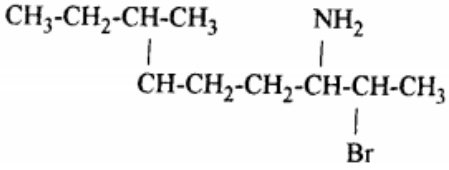
(a) Give the IUPAC name for each of the following organic compounds:

(i) 

(2 marks)

(ii) 

(2 marks)

(iii) 

(2 marks)

(iv) 

(2 marks)

(b) You are given two bottles of colorless solutions without label on the bottles. One bottle is pentane solution and the other is pentene solution.

(i) Suggest one chemical test to use to differentiate between these 2 solutions.

(2 marks)

(ii) From the chemical test stated above, clearly state the observation(s) that you observed.

(2 marks)

(c) Butane solution was added with bromine water and placed under the sun for one hour.

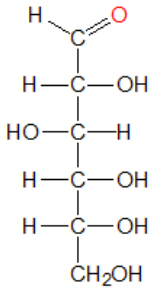
(i) Name the reaction involved.

(1 mark)

(ii) Predict the observation(s) observed after one hour.

(2 marks)

(d) Starch is a polysacharide sugar formed by α-(1,4) glycosidic linkage formed from two or more units of α-D-glucose. The D-glucose structure is as shown below



D-glucose

(i) Draw the structure of α-D-glucose in Haworth projection.

(2 marks)

(ii) Draw the structure of α-D-glucose in Fischer projection.

(2 marks)

(iii) Draw the structure of starch molecule.

(2 marks)

(iv) Water is added into starch molecule and solution is heated. The glycosidic linkages are broken down producing glucose molecules. Solution is tested with benedict test and iodine test. Complete the table below stating the observations. You may copy the table given below into your answer sheet.

Chemical Test	**Observations**
Benedict Test	
Iodine Test	

(4 marks)

Question 2

(a) The compound, C_3H_6O has three carbons compound and a carbonyl group.

(i) Draw TWO structural formulae of C_3H_6O

(2 marks)

(ii) Give the IUPAC names of the TWO isomers in (a) (i).

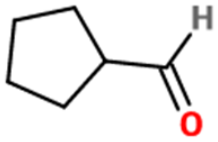
(2 marks)

(iii) From the isomers in (ii), state which of the isomers that has no reaction with potassium permanganate solution.

(2 marks)

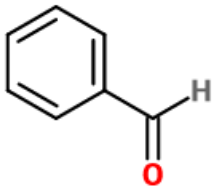
(b) Give the IUPAC name for each of the carbonyl compounds below:

(i)



(2 marks)

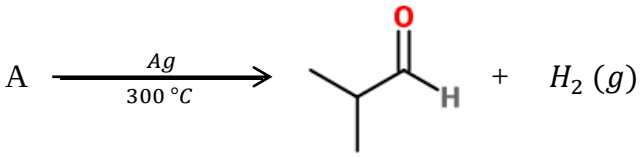
(ii)



(2 marks)

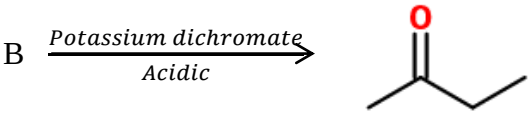
(c) Compound A and B below are the reactants needed in preparing aldehyde and ketone compounds as shown in equations (i) and (ii) below. Draw the structural formula of compound A and B.

(i)



(2 marks)

(ii)



(2 marks)

(d) Linoleic is an essential fatty acid with full structural notation of 18:2 $\Delta^{9,12}$ ώ-6.

(i) Give the structure of linoleic acid.

(2 marks)

(ii) Classify the fatty acid as saturated, monounsaturated or polyunsaturated fatty acid.

(1 mark)

(iii) State the physical state of linoleic fatty acid at room temperature.

(1 mark)

(iv) Triacylglycerol or fat molecule is formed with linoleic fatty acids and glycerol molecule, $C_3H_8O_3$.

1. Name the process involved in forming triacylglycerol.

(1 mark)

2. Draw the structure of triacylglycerol formed.

(2 marks)

3. State the observation(s) (eg: physical state, odor etc.) obtained when triacylglycerol undergoes the chemical reactions below:

Chemical Reactions	**Physical Observations**
Triacylglycerol + Hydrogen gases at room temperature	
Triacylglycerol + Sodium hydroxide + water	

(4 marks)

Question 3

(a) Pentene can be prepared from 1-pentanol.

(i) Name the process needed in preparation of pentene.

(1 mark)

(ii) Outline the chemical equation used in (a)(i) above. You need to include the reaction condition into your equation.

(2 marks)

(b) Compounds A and B are alcohol with four carbon atoms. These compounds undergo oxidation with potassium dichromate as oxidizing agent. From the oxidation, it is observe that:

Compound	Result/ Observation
A	Green solution
B	Orange solution

(i) From the observations listed above, identify which of the compounds is tertiary alcohol.

(2 marks)

(ii) Draw the structural formula for the tertiary alcohol in (b)(i).

(2 marks)

(c) Arrange the compounds in (i) and (ii) below in order of increasing

(i) *Solubility in water*
Compounds: 3,5-dihydroxyhexanol, pentane, 4-hexanol, propane

(2 marks)

(ii) *Boiling point*
Compounds: hexanol, butanol, 2-methylpentanol, benzoic acid

(2 marks)

(d) Among all the compounds given, suggest one compound that work **BEST** for each areas below:

Butane, Propanone, Butene, Ethanol, Methyl ethanoate

(i) Disinfectant of wounds

(2 marks)

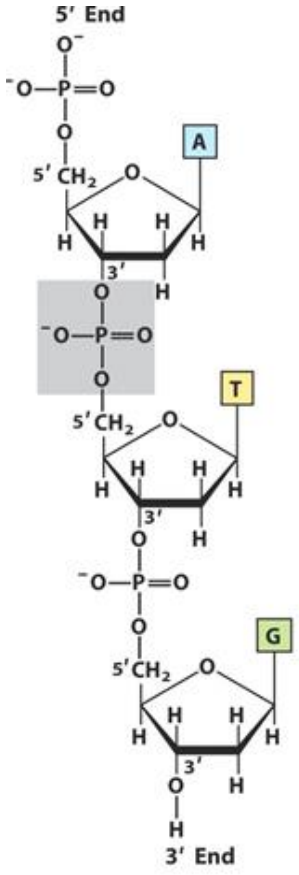
(ii) As a fuel for car engine

(2 marks)

(iii) Dilution of paint

(2 marks)

(e) A polynucleotides strand is formed from nucleotide molecules linked together by ester linkage.



(i) Classify the polynucleotide strand above as DNA or RNA strand.

(1 mark)

(ii) Name the process of polynucleotides formation.

(1 mark)

(iii) Give the name of the ester linkage in the diagram above.

(2 marks)

(iv) Write the complementary strand to the single polynucleotide strand shown above.

(2 marks)

(f) Give one function for each DNA and RNA nucleic acids.

(2 marks)

Question 4

(a) Arrange the amide compounds below in the order of increasing solubility in water

N, N -dimethylpropanamide, N-methylethanamide, propanamide

(2 marks)

(b) Benzamide is an aromatic amide. Draw the structural formula of benzamide.

(2 marks)

(c) Compounds A, B and C are listed below. Given the boiling points are 65^0C, -6^0C and -88^0C. Match the boiling points with the correct compound.

A	CH_3CH_3
B	CH_3NH_2
C	CH_3OH

(3 marks)

(d) Draw the structural formulas of each of the amides listed below. Classify each amide as primary, secondary and tertiary amide.

(i) Ethanamide

(2 marks)

(ii) N-methylethanamide

(2 marks)

(iii) Methanamide

(2 marks)

(iv) N-methylbenzamide

(2 marks)

(e) The effect of substrate concentrations played an important role in determining the rate of reaction.

(i) Draw a graph that describes the effect of increasing the concentration of substrate to the rate of reaction in:-

1. an un-catalyzed reaction

(2 marks)

2. catalyzed reaction

(2 marks)

(ii) What is the effect of doubling the substrate concentrations on the rate of catalyzed reaction?

(2 marks)

(f) The production of ATP in metabolic pathway for every acetyl CoA can be calculated.

(i) How many ATP molecules are produced by the complete oxidation of one molecule of glucose.

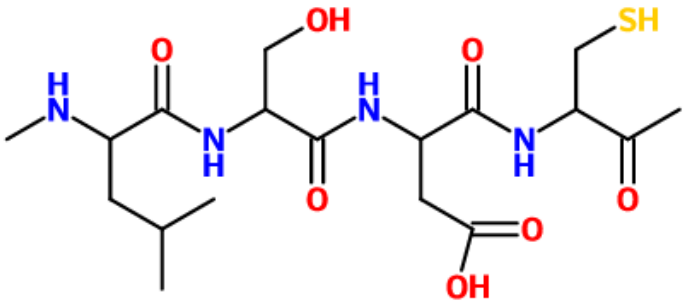
(2 marks)

(ii) How many ATP molecules produced for one acetyl CoA catabolized?.

(2 marks)

Question 5

(a) The structural formula of a section of protein is shown below:

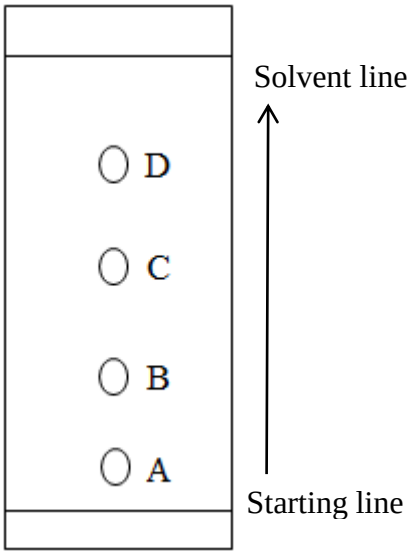


Leu – Ser – Asp – Cys

(i) Explain why protein cannot perform its biological function at very high temperature.

(2 marks)

(ii) This section of protein chain was hydrolyzed and separated using Paper chromatography in a polar solvent. The chromatogram obtained was shown below:



(1) State whether the amino acid labeled as A in the chromatogram above is the most polar or the least polar amino acid.

(1 mark)

(2) With reference to the structural formula of the section of protein chain above, draw the structural formula of the amino acid that would be present at the position indicated by amino acid C in the chromatogram.

(2 marks)

(iii) Draw the D- isomer and L- isomers of serine in Fischer projection.

(2 marks)

(iv) Draw the structural formula of aspartic acid when it is placed in each of the following solution:

(1) pH 5

(2 marks)

(2) pH 10

(2 marks)

(b) The strength of carboxylic acids are shown in the table below:

Acid	A	B	C
pK_a	4.76	3.17	2.86

(i) Given the carboxylic acids are ethanoic, Iodoethanoic and chloroethanoic, identify which carboxylic acids are A, B and C.

(3 marks)

(ii) Among all the acids, which is the strongest acid? Explain your selection.

(3 marks)

(iii) Predict which carboxylic acids form white precipitate the fastest when sodium chloride is added into each of the carboxylic acid compounds.

(2 marks)

(c) Draw the structural formula for each of the following compounds.

(i) 3,3- dimethylcyclopentanone

(2 marks)

(ii) Cyclopentylbenzoate

(2 marks)

(iii) Ethanoic anhydride

(2 marks)

--THE END--

CHM1204(F)/AUG2015/NgSookMey