



THE OPEN UNIVERSITY OF SRI LANKA
B.Sc DEGREE PROGRAMME/ STAND ALONE COURSES 2006/2007
LEVEL 5- CONTINUOUS ASSESSMENT TEST 1
(NO BOOK TEST)

CHU 3130 INTRODUCTION TO NATURAL PRODUCTS
CHEMISTRY
(2 1/2 HOURS)

Date: Monday 14th August 2006

Time: 4.00 pm – 5.30 pm

ANSWER ALL QUESTIONS IN THE SPACE PROVIDED

Index Number

Question	Marks
1	
2	
3	
4	
5	
Total	

1. a. Give suitable spray reagents for the following classes of compounds.

- i. Alkaloids
- ii. Amino acids
- iii. Saponins
- iv. Steroids

(4 marks)

b. What are the techniques that you can use to separate a natural product from a crude extract.

- i.
- ii.
- iii.
- iv.

(8 marks)

c. What are the main spectroscopy methods that you should use to do a structural elucidation of a compound?

- i.
- ii.
- iii.
- iv.

(8 marks)

2. a. Give three ways that an enzyme catalyzes reactions.

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-

(6 marks)

b. Explain one of the above in (a).

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(4 marks)

c. What is a prosthetic group?

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(4 marks)

d. Explain the difference between a prosthetic group and a co-substrate.

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(6 marks)

- [illegible]

(5 marks)

-

(5 marks)

- d. How radioactivity is measured on paper chromatogram? (5 marks)
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(5 marks)

- [illegible]

(5 marks)

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-
-

(6 marks)

- [illegible]

(6 marks)

- c. If you feed glucose labeled at C-6 position, where would you expect the label to end up in pyruvic acid after glycolysis.

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(8 marks)

5. a. List five (5) different roles played by pheromones in animal –animal relationship in nature.

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(10 marks)

b. If natural product is colourless how would you detect it on TLC after separation?

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(10 marks)

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B.Sc. Degree Program/ Stand Alone Courses 2006/2007
Answer Guide to Assignment Test I
CHU 3130 – INTRODUCTION TO NATURAL PRODUCTS CHEMISTRY

1. a) i) Dragendorff reagent
ii) Amino acids – Ninhydrin
iii) Saponins – Vanillin – Sulphuric acid
iv) Steroids – Acetic anhydride – Sulphuric acid
(Liebermann – Burchard reagent)

b) Column chromatography
TLC
Paper chromatography
Gas chromatography
HPLC
Ion exchange

c) UV, IR, ^1H NMR, ^{13}C NMR, Mass, 2D NMR
2. a) 1) By distorting the substrate to make it look more like the transition state of the reaction.
2) By destabilizing the substrate and stabilizing the transition state, the activation energy of the reaction is reduced.
3) By bringing two reactants together in the right orientation for the reaction to occur.
4) By using its side chains (acidic, basic, nucleophilic, etc) to participate in the reaction mechanism.

b) Explain one of the above in (a)

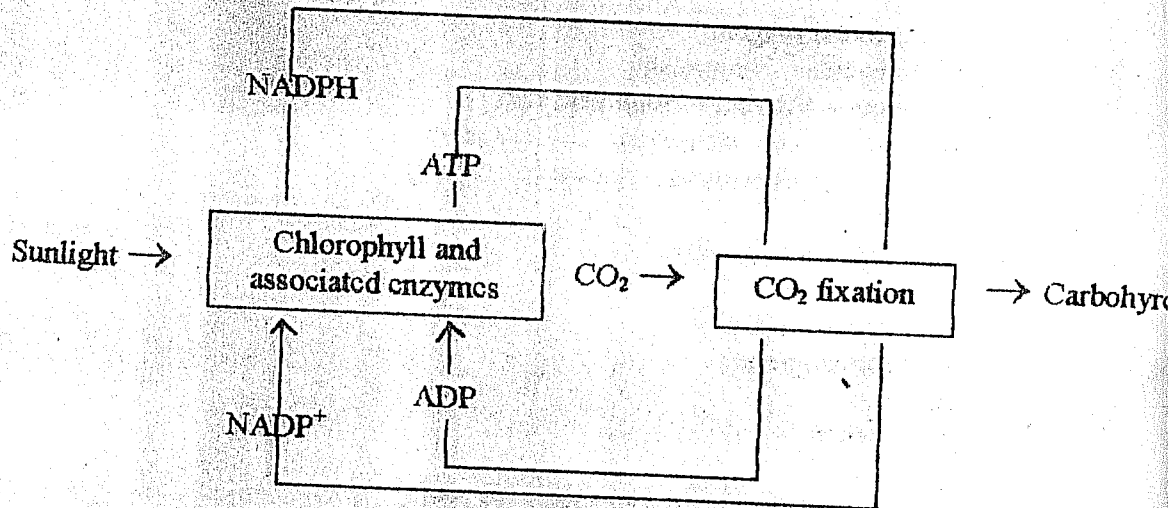
c) A co-enzyme that is more or less permanently (sometimes covalently attached to the enzyme

d) Prosthetic groups are more or less permanently bound to the enzyme and play a catalytic role in the reaction mechanism, providing functionality that the enzymes own side chains cannot provide. Co-substrates also play a role in the reaction, but are used up in the course of it, so that they must be replaced each time the reaction occurs (they behave just like another substrate)

3. a) Sugars, low molecular weight carboxylic acids, amino acids, carbohydrates, nucleic acids, proteins, fatty acids

b) Carbohydrates

c)



d) Scanning the paper chromatogram with a Geiger-Muller counter or by autoradiography. In radiography the radioactive spots appear as black areas on the developed film.

4. a) i) Precursor added to the nutrient may have difficulty in diffusing through the cell wall of the microorganism.

ii) Precursor may not be absorbed, may not be transported or may not be degraded before it reaches the tissue where the metabolism occurs.

iii) A similar fate as above for precursors applied by injection, spreading on leaves or via a wick through the stem.

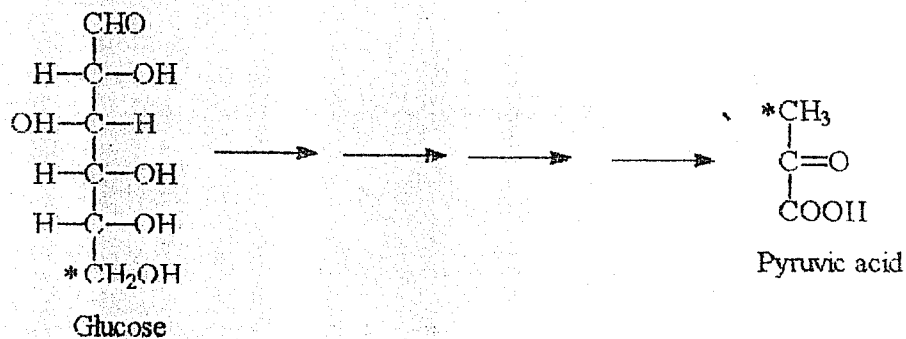
iv) Higher concentration of a normal plant constituent may have undesirable toxic effects.

v) Dilution can cause problems because added precursor has to compete with the normal pool of metabolites in the cell during the experiment.

vi) The cellular reactions are reversible. A constant degradation and rebuilding occurs, therefore causing a slow dispersion of the original leaf.

- b) i) Large amount of energy produced by oxidation is converted for metabolic use, principally by the generation of ATP.
- ii) A number of low molecular weight organic acids (α -keto acids.....) are produced by the reaction involved.
- iii) α -keto acids formed are precursors – by animation produce number of important Amino Acids.
- iv) Acetyl co-enzyme A is formed in the first stage is the starting point of 3 key reaction sequences.

c)



5. a) 1) Sex pheromones - Sex attractant or stimulant.
- 2) Alarm pheromones – to prepare for attack or defence or prompt insects to evacuate an area rapidly.
- 3) Trail pheromones – some insects leave scent trails on the ground for other members of the colony to follow. eg :- food trail
- 4) Territorial pheromones – leaving scent marks as a warning signal.
- 5) Oviposition
- i) Attract other females to lay eggs.
 - ii) Prevent other females laying eggs on its site/ over crowding.
- b) By using a suitable spraying reagent or observe under UV lamp (254nm or 365nm)