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University Examinations 2022/2023

FIRST YEAR, SECOND SEMESTER EXAMINATION FOR THE DEGREE OF MASTERS OF
SCIENCE IN CHEMISTRY

SCH 7138: NATURAL PRODUCTS II: SECONDARY METABOLITES

DATE: AUGUST 2023

TIME: 3 HOURS

INSTRUCTIONS: *answer question one and any other two questions*

QUESTION ONE (20 MARKS)

- a) Define the following terms
 - i. Chemosystematics
 - ii. Pharmacognosy
 - iii. Metabolism
 - b) Draw the structure of the following compounds
 - i. nicotine
 - ii. menthol
 - iii. caffeine
 - iv. uric acid
 - c) In modern sciences, natural products are still the best resource of bioactive compounds.
 - i. What are the advantages to use them? And also, (2 marks)
 - ii. Describe the problems to utilize them (disadvantages) (2 marks)
 - d) Describe how the following tests are conducted
 - i. Test for tannin
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- ii. Test for flavonoids
 - iii. Test for alkaloids
 - iv. Test for terpenoids
- e) Using Hygrine whose molecular formula is (C₈H₁₅NO), draw the structure and show how you arrive at it. (5 marks)

QUESTION TWO (20 MARKS)

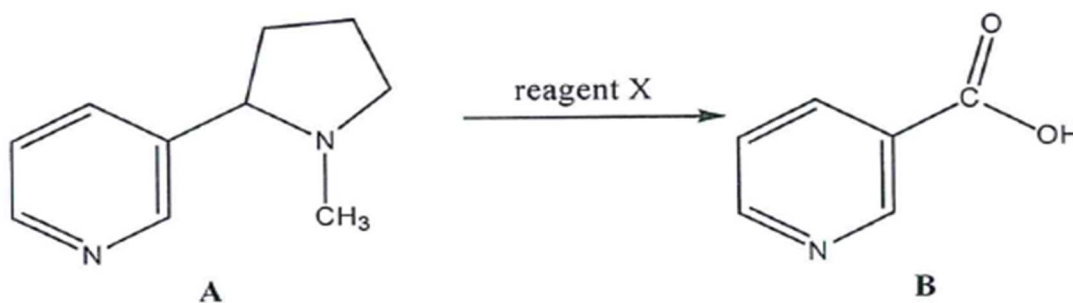
- a) By giving an example in each class, describe the classification of secondary metabolites (8 marks)
- b) By use of a flow diagram show the biosynthesis of alkaloids from glucose. (6 marks)
- c) What techniques are used for structure elucidation of natural products and what is their significant role (6 marks)

QUESTION THREE (20 MARKS)

- a) Alkaloids generally occur in all parts of the plant but sometimes accumulated only in a particular organ. What is their role in plants? (5 marks)
- b) Chromatography is an ideal method for separation of a vast number of secondary metabolites. Describe five chromatographic techniques suitable for separation of these natural products (10 marks)
- c) By giving an example in each case, briefly describe the classification of terpenoids (5 marks)

QUESTION FOUR (20 MARKS)

- a) Gives the various methods for evaluation of crude drug (natural drug). (5 marks)
- b) Outline the advantages of extraction of terpenoids from plant materials with supercritical liquids over the traditional solvent extraction methods (3 marks)
- c) (i) Indicate the reagent required in the following conversions can be carried out



- (ii) Name compound labeled A and B (2 marks)
- d) Discuss the isolation of quinine from cinchona tree (*Cinchona officinalis*) (5 marks)
- e) Name the classes of compounds derived from the following biosynthetic path ways (3 marks)
 - i) Mevalonic Acid Pathway (MVA)
 - ii) Schekimic acid Pathway
 - iii) Maloni Acid pathway