



NATIONAL OPEN UNIVERSITY OF NIGERIA
UNIVERSITY VILLAGE, PLOT 91 CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESS WAY, JABI - ABUJA.
FACULTY OF SCIENCES
DEPARTMENT OF PURE AND APPLIED SCIENCE
2023_1 POP EXAMINATION

COURSE CODE: CHM 422
COURSE TITLE: NATURAL PRODUCTS CHEMISTRY II
TIME: 2 HOURS
INSTRUCTION: Answer question one and any other two questions.

QUESTION ONE

- 1.a. Caffeine, colchicines, quinine hydrogen chloride and quinine are examples of alkaloids. Comment on their solubility in water (6 marks)
- (ii) Compare the biological activity and pharmaceutical applications of primary or secondary metabolites (3 marks)
- (iii) What are the ecological roles of natural products (3 marks)
- b.(i) State the five major classes of natural product (5 marks)
- (ii) What are the basic composition of alkaloids and how are they synthesized naturally in living organism (2 marks)
- (iii) Can plants and insects produce terpene? Explain (in not more than two sentences) and state its protective function (4 marks)
- c. State four methods that can be used to extract essential oil from plant tissues (4 marks)
- (ii) State three principles used for the nomenclature of alkaloids (3 marks)

QUESTION TWO

- 2.a(i) What are natural products (2 marks)
- (ii) Highlight the three basic classes of natural products (state one example for each class) (8 marks)
- (iii) State (in one sentence for each), how terpenoids and steroids are synthesized (2 marks)
- b.(i) Draw the chemical structure of isoprene unit, hence define terpene (6 marks)
- (ii) State the two basic synthetic pathway for terpenes (2 marks)

QUESTION THREE

- 3a.(i) State three major functions of carotenoids in plants (4.5 marks)

- (ii) State the name for hydrocarbon and oxygenated carotenoids and hence state the mechanism for the light harvesting role of carotenoids in plants (3.5 marks)
 - (iii) State the major roles or function of carotenoids in mammals (2 marks)
 - (iv) How many isoprenoid units has carotenoids, hence what is the arrangement of these units in carotenoids (4 marks)
- b. State the three basic features of alkaloids (6 marks)

QUESTION FOUR

- 4a.(i) List seven classes of alkaloids based on the number of heterocyclic rings (3.5 marks)
- (ii) State one common source of pyrrolidine alkaloids and its basic content. Also draw the chemical structure of the basic content (3.5 marks)
- (iii) Why are vitamins regarded as both primary and secondary metabolites? (4 marks)
- b.(i) What are indole alkaloids (2 marks)
- (ii) What is the basic application of indole alkaloids and their derivatives (2 marks)
- (iii) What is the source of strychnine and its major application (2 marks)
- (iv) State the major biochemical role of vitamins and give examples of such associated processes (3 marks)

QUESTION FIVE

- 5.a(i) Briefly discuss the natural product chemistry of taxol with respect to source, major applications and mode of action that distinguishes it from other tubulin-binding types (8 marks)
- b(i) How does abscisic acid regulate the stomatal opening (4 marks)
- (ii) Draw the chemical structure of abscisic acid (4 marks)
- (iii) Explain the major function of abscisic acid in plants and their major applications in the ecosystem (4 marks)