



**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**DEPARTMENT OF APPLIED CHEMISTRY**

**BACHELOR OF SCIENCE HONOURS DEGREE**

**END OF FIRST SEMESTER EXAMINATIONS – APRIL/MAY 2009**

**INDUSTRIAL ORGANIC CHEMISTRY II – SCH 4115**

**TIME: THREE (3) HOURS**

**INSTRUCTIONS TO CANDIDATES:**

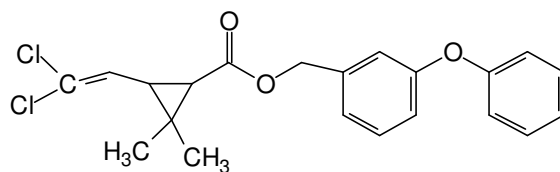
1. ANSWER ALL QUESTIONS FROM SECTION A AND ANY THREE FROM SECTION B. SECTION A CARRIES 40 MARKS AND EACH QUESTION IN SECTION B CARRIES 20 MARKS.

**TOTAL MARKS = 100**

THIS QUESTION PAPER CONSISTS OF **THREE PRINTED PAGES** (ON ONE SIDE ONLY) INCLUDING THE TOP PAGE WITH THE INSTRUCTIONS.

### **SECTION A:**

1. (a) Give two names of plants from which natural pyrethrins are obtained. (4 marks)
- (b) Draw the structure of acetylcholine. (2 Marks)
- (c) Explain why tabun and sarin, despite the fact that they are powerful insecticides, have never been extensively used as insecticides. (4 marks)
- (d) Suggest four principle areas where pyrethrin products are in use. (4 Marks)
- (e) What is the difference between a soap and a detergent? (4 Marks)
- (f) The avermectins are useful insecticides against wide range of insect pests. Why are the avermectins very useful insecticides? (2 Marks)
- (g) Draw the structures of the starting material to produce the following compound.



permethrin

- (2 Marks)
- (h) Auxins are a class of plant growth substances. Give the name and structure of one naturally occurring auxin and one synthetic analogue. (4 Marks)
- (i) Draw the general structure of carbamate. (2 Marks)
- (j) Explain (i) systemic and (ii) contact insecticides. (6 Marks)
- (k) Name the plant from which rotenoid insecticide is extracted. Draw the structure of rotenone. (4 Marks)

### **SECTION B:**

2. (a) Draw structures of 2,4-D and 2,4,5-T. What are the uses of these herbicides in agriculture industry. (6 Marks)
- (b) Draw the structure of atropine and suggest its function. (4 Marks)
- (d) Explain with the aid of chemical reactions and schematic diagram how organophosphate insecticide mimicks acetylcholine. (10 Marks)

3. (a) There are four different ways in which carbaryl is synthesised. Draw any two ways to synthesise carbaryl.  
(6 Marks)
- (b) Endosulfan breaks down slowly to endosulfan sulphate and also readily hydrolysed by acid or alkali to diol. Draw the structures of these three compounds.  
(6 Marks)
- (c) Draw the structure of Deltamethrin. It is produced by the esterification of dibromopermethrin acid with  $\alpha$ -cyano-3-phenoxybenzyl alcohol. Draw the structures of these two compounds. Explain how resmethrin differs from deltamethrin.  
(8 Marks)
4. (a) Dieldrin is a potent, non-specific insecticide which is long-lasting and highly toxic to humans. This insecticide is synthesised from hexachloro – cyclopentadiene and norbornadiene which forms aldrin, followed by peroxide treatment to produces dieldrine. Write reaction mechanism for the production of aldrin and the final product, dieldrin.  
(6 Marks)
- (b) Describe the insecticidal activity of organophosphorus insecticides. Explain the advantage of organophosphorus insecticides over organochlorine insecticides.  
(7 marks)
- (c) Naturally occurring pyrethroids are used with synergists. Explain the action of synergists. Draw the structure of a known synergist.  
(7 Marks)
5. (a) There are three different types of detergents are available: (i) anionic (ii) cationic and (iii) neutral detergents. Draw structures of these detergents.  
(3 Marks)
- (b) Describe the process of extraction of natural pyrethroids from the plant described in 1(a).  
(7 Marks)
- (c) The metabolism of DDT by (i) reductive dechlorination (ii) oxidation and (iii) dehydrochlorination forms three different products. Draw structures of these compounds.  
(6 Marks)
- (d) What do you understand by teratogenic agents? Draw the structure of one of the compounds that you may know.  
(4 Marks)

**END OF QUESTION PAPER!!!**