NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF APPLIED CHEMISTRY

BACHELOR OF SCIENCE HONOURS DEGREE

END OF FIRST SEMESTER EXAMINATIONS – FEBRUARY 2010

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 aceylcholine.
(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) Why are the avermectins very useful insecticides?
(2 Marks)

(g) Define plant hormone in your own words.
(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) Draw the structure of parathion and in brief describe the toxicity in humans of parathion.
(6 Marks)

(k) Name the plant from which rotenoid insecticide is extracted. Draw the structure of rotenone.
(4 Marks)

SECTION B:

2. (a) There are four different ways in which carbaryl is synthesised. Draw any two ways to synthesise carbaryl.
(6 Marks)

(b) Explain (i) systemic and (ii) contact insecticides.
(6 Marks)

(c) What is the function of cholinesterase enzyme in the animal kingdom?
(8 Marks)

3. (a) Methoxychlor is an analogue of DDT. Draw the structure of methoxychlor and suggest the harmful action of it.
(6 Marks)

(b) Draw the structure of atropine and suggest its function.
(4 Marks)

(c) Explain with the aid of chemical reactions and schematic diagram how organophosphate insecticide mimicks acetylcholine.
(10 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 process of extraction of natural pyrethroids from the plant described in 1(a).

(8 Marks)

(c) Naturally occurring pyrethroids are used with synergists. Explain the action of synergists. Draw the structure of a known synergist.

(6 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 insecticidal activity of organophosphorus insecticides. Explain the advantage of organophosphorus insecticides over organochlorine insecticides.

(8 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 teratogenesis. Draw the structure of the teratogenic agent that was produced as a side-product during the production of 2,4-D and 2,4,5-T.

(3 Marks)

END OF QUESTION PAPER!!!