NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF APPLIED CHEMISTRY

BACHELOR OF SCIENCE HONOURS DEGREE

SUPPLEMENTARY EXAMINATIONS – JUNE 2014

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) What is the function of acetylcholine. Draw the structure of acetylcholine.
(4 Marks)

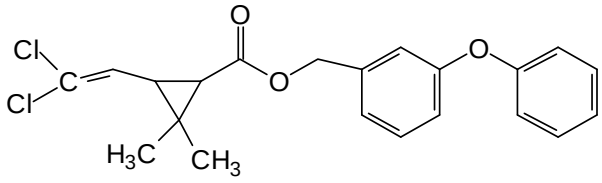
(c) What are pesticides? Classify pesticides and give one example of each.
(6 Marks)

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

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) Draw the structures of acid moiety and the alcohol moiety of naturally occurring pyrethrines.
(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) Flocoumafen are rodenticides known as Mortein. Draw the structure and describe its function

(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 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) Paraquat is a bipyridinium herbicide which is available to farming community. If it is not used correctly can kill crops and also harm livestock and humans. (i) Draw the structure of paraquat. (ii) Suggest (a) what type of herbicide is it? and (b) also indicate how it acts on plants?

(4 Marks)

**********END OF QUESTION PAPER**********