

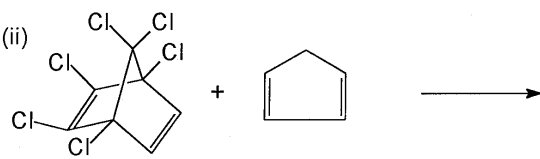


NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF APPLIED CHEMISTRY
END OF FIRST SEMESTER EXAMINATIONS – DECEMBER 2004
INDUSTRIAL ORGANIC CHEMISTRY II – SCH 4115
TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATES

This paper consists of two sections viz Section A and Section B. Answer **all questions** in Section A and **three questions** from Section B. Section A carries 40 marks and Section B 60 marks. Mark distribution within questions is as indicated.

SECTION A

1. (a) With one specific example for each class outline advantages of systemic over contact insecticides. (4 marks)
- (b) Give two names of plants from which natural pyrethrins are obtained. (4 marks) *
- (c) Economic factors aside, explain why Kenya is one of the world's leading producers of pyrethrum. (4 marks) *
- (d) Draw the structures of each of the following compounds:
- (i) aldrin
- (ii) normicotine (4 marks)
- (e) Give the major product for each of the following reactions:
- (i) $2 \text{ Cl}-\text{C}_6\text{H}_4-\text{ONa} \xrightarrow{\text{CH}_2\text{Cl}_2/\Delta}$
- (ii)  (4 marks)
- (f) With appropriate representations, show how dicofol and DDA are obtained from DDT. (4 marks)

- (g) Explain why tabun and sarin, despite the fact that they are powerful insecticides, have never been extensively used as insecticides. (4 marks)
- (h) Endosulfan is the only organochlorine insecticide that is permitted for use in the USA. Draw the structure of endosulfan. (4 marks)
- (i) The phosphothioates can be regarded as proinsecticides. Explain this statement with reference to the activity of malathion and parathion. (4 marks)
- (j) The effectiveness of herbicides depends on selective toxicity. Explain this statement with reference to the use of two named herbicides. (4 marks)

SECTION B

- 2. Pyrethroids are amongst the most potent insecticides discovered by humans.
 - (a) Draw the structures of two naturally occurring pyrethrins and two synthetic pyrethroids. (4 marks) ✖
 - (b) The insecticidal activity of pyrethroids is enhanced by the use of synergists. Briefly comment on this statement with particular reference to the use of two named synergists. (6 marks) ✖
 - (c) Briefly discuss the development and use of synthetic pyrethroids. (10 marks) ✖
- 3. Compare and contrast the insecticidal activity and metabolism of organochlorine and organophosphorus pesticides/insecticides. (20 marks)
- 4. The use of DDT is now banned in most developed countries. Critically discuss this statement with particular reference to the use of DDT in Zimbabwe. (20 marks)
- 5. 2,4-D and 2,4,5-T are amongst the many chemicals that were extensively used during the Vietnam War.
 - (a) Explain why 2,4-D and 2,4,5-T were used during the Vietnam War. (2 marks)

- (b) Draw the structures of:
- (i) 2,4-D and
 - (ii) 2,4,5-T (2 marks)
- (c) Name and 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. (4 marks)
- (d) How could you change the reaction conditions so that the production of the agent named in (c) is suppressed or eliminated. (4 marks)
- (e) Assume that you have been put in a position of authority to manage the waters of the City of Harare. One of your immediate concerns is to arrest the growth of the water hyacinth at Lake Chivero.
- With only 2,4-D and 2,4,5-T at your disposal, outline in detail the scope and limitations of a comprehensive plan that you would adopt in combating the water hyacinth. (8 marks)

End of question Paper!!!