سامية محمد مصطفى

شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

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شبكة المعلومات الجامعية

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التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

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بالرسالة صفحات لم ترد بالأصل

CHEMICAL AND BIOCHEMICAL STUDIES ON ^{14}C - LABELLED CHLORPYRIFOS AND ITS FATE IN COTTON LEAF WORM

A THESIS

SUBMITTED FOR THE M.Sc. DEGREE IN CHEMISTRY "ORGANIC CHMISTRY"

By

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SUPERVISED BY

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APPROVAL SHEET

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Prof. Dr. Ibrahim Zeid	
Prof. Dr. Issa Mohamed Imam Fakhr	Fakhr
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CONTENTS

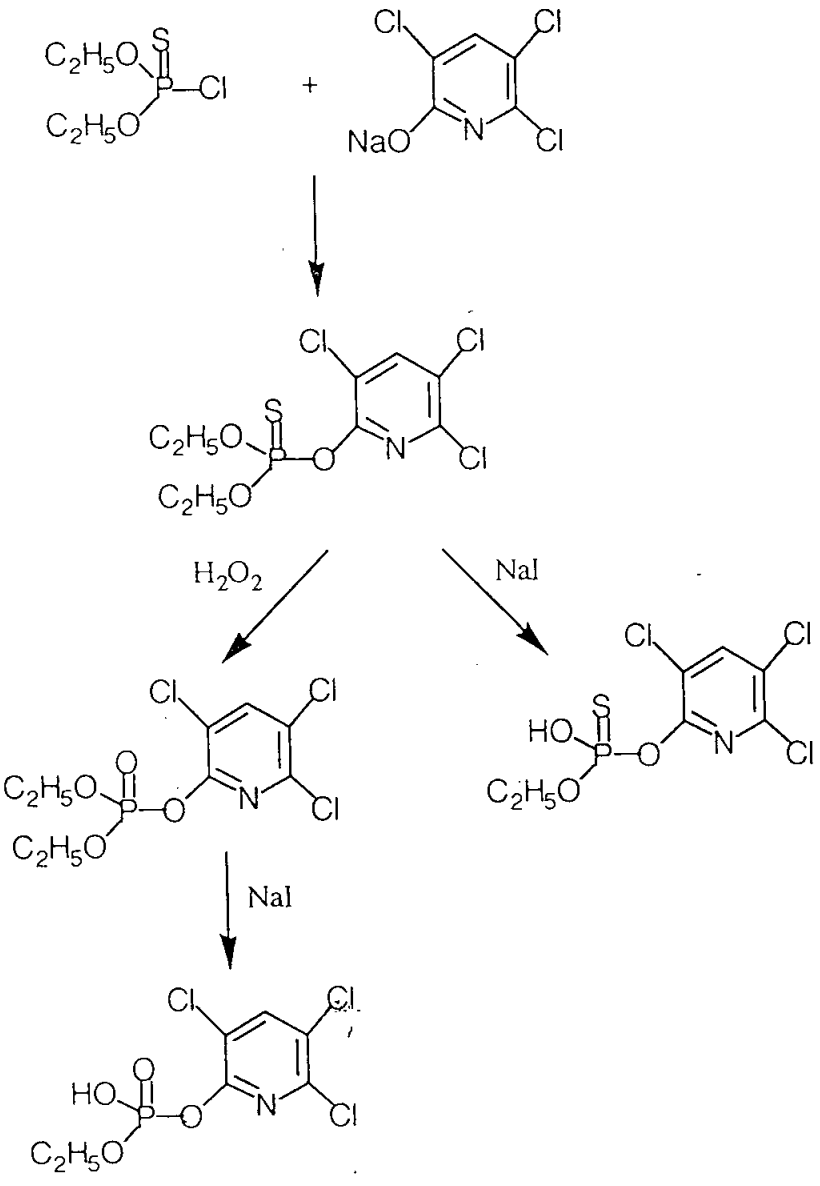
Summary of the original work

Synthesis of the organophosphorus insecticide chlorpyrifos and some of its degradation products

A micromethod for the synthesis of the organophosphorus insecticide chlorpyrifos has been established by the reaction of the sodium salt of 3,5,6-trichloro-2-hydroxypyridine with O,O-diethylthiophosphoryl chloride in dimethylformamide.

Following this procedure, Ethoxy-1-^{14}C-chlorpyrifos could be synthesized in one-vessel reaction using radiolabelled Ethanol-1-^{14}C. The crude radiolabelled product was purified by chromatography on silica gel column using benzene for elution to produce over 98% radioactively pure insecticide.

Some of the degradation products of chlorpyrifos were also synthesized. These compounds served as authentic substances for identification of biotransformation products of the insecticide (Scheme A).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Scheme A

TOXICITY OF THE INSECTICIDE CHLORPYRIFOS TO *SPODOPTERA LITTORALIS* LARVAE

The percentage of the living 4th instar larvae of the cotton leaf worm *Spodoptera littoralis* following treatment with different doses of the organophosphorus insecticide chlorpyrifos was determined. From the results obtained and under the conditions of the experiment LD_{50} of this compound was found to be 2.69 μg/gm cotton leaf worm.

The in vitro kinetics of the interaction of chlorpyrifos with the brain homogenate of the adult moth of *Spodoptera littoralis* were determined by using different concentrations of the inhibitor. On plotting the percentage remaining activity versus log inhibitor concentration [I], expressed as moles / liter, a typical sigmoid curve resulted with $I_{50} = 3.7 \times 10^{-7}$ M.

METABOLISM OF ETHOXY-1-^{14}C-CHLORPYRIFOS IN *SPODOPTERA LITTORALIS* LARVAE

The distribution of ethoxy-1-^{14}C-chlorpyrifos among the different organs of the cotton leaf worm is studied, following topical application of the insecticide. The radioactivity reached its maximum after 30 minutes in hemolymph and after one hour in the fat. No radioactivity was detected in the gut of the worm during the period of the experiment.

For the in vivo metabolism 150 5th instar larvae were treated topically with the radioactive chlorpyrifos. After 24 hours about 47.8% and 21.3% of the applied radioactivity could be recorded as water soluble metabolites and in organic extracts, respectively. The radioactivity remaining in the larvae and saw dust amounted to 9.6% and 16.5% respectively and the radioactivity eliminated as $^{14}CO_2$ in the expired air within 24 hours was about 1.2%.

Thin layer chromatography showed in addition to three radioactive unidentified substances, the presence of unchanged insecticide and its oxygen analogue in the chloroform extract and O-ethyl-O-3,5,6-trichloro-2-pyridyl phosphorothioate and phosphate as water soluble products. Authentic substances were run alongside for identification purposes.

LITERATURE REVIEW