

Water Pollution by Insecticides in an Agricultural River: Quantitative Structure–Activity Relationship of Organophosphate Compounds

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Abstract: The present method is accurate and rapid. In an ordinary laboratory, the reaction conditions can now easily be maintained. With varying sample size, the recovery of the sample is mainly constant within the error range less than 1.0%. The effect of variables was studied in order to establish the reaction conditions. Keeping the concentration of Chloramine- T reagent, the amount of Parathion (tech.) and acetic acid as constant during the studies of effect of reaction time, the reaction time was now varied from 10-30 minutes.

Background: The determination of the concentration of some insecticides is specially shown as Organophosphate compounds. All these compounds are generally utilized as the insecticides. Particularly these compounds are suitable for vegetable, household, garden and the fruit pests' control. The development of these Organophosphate compounds as an insecticide is mainly because of the original and hard work of Rikaya and his co-workers from 1939. Nowadays these Organophosphate compounds generally form an important class of pesticides. The use of these Organophosphate compounds as pesticides is generally compared to Organochlorine compounds. Insecticides, nematocides, acaricides, defoliant herbicides, and fumigants are some of those substances.

Materials and Methods: Aliquots containing 1-5 mg of the sample were now taken. Further 10 ml of 0.2 N Chloramine- T reagent was added and later 10 ml of glacial acetic acid was added to it. The contents were well shaken. It is allowed to react at room temperature. 10.0 ml of potassium iodide (10.0%) solution was now added to it after the required reaction time. The contents were thoroughly shaken and it is kept for few minutes. With standardized (0.2 N) sodium thiosulphate solution, the liberated iodine was now titrated, where starch used as indicator.

Results: For the determination of Organophosphate compounds, Chloramine- T reagent in acidic medium is not been used either in the technical form or in their formulations. In the present work, a smooth and the convenient procedure has been nicely developed for the quantitative evaluation of some of the Organophosphate insecticides. These are Dimethoate, Malathion, Phorate, and Ethion in the technical form and in their formulations.

Conclusion: The present method is accurate and rapid. In an ordinary laboratory, the reaction conditions can now easily be maintained. With varying sample size, the recovery of the sample is mainly constant within the error range less than 1.0%. The effect of variables was studied in order to establish the reaction conditions. Keeping the concentration of Chloramine- T reagent, the amount of Parathion (tech.) and acetic acid as constant during the studies of effect of reaction time, the reaction time was now varied from 10-30 minutes.

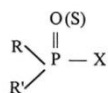
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I. Introduction

The determination of the concentration of some insecticides is specially shown as Organophosphate compounds. All these compounds are generally utilized as the insecticides. Particularly these compounds are suitable for vegetable, household, garden and the fruit pests' control. The development of these Organophosphate compounds as an insecticide is mainly because of the original and hard work of Rikaya and his co-workers from 1939. Nowadays these Organophosphate compounds generally form an important class of pesticides. The use of these Organophosphate compounds as pesticides is generally compared to Organochlorine compounds. Insecticides, nematocides, acaricides, defoliant herbicides, and fumigants are some of those substances. All the Organophosphate compounds can be now represented by the classical hypothetical structure in spite of its enormous structural diversity of these insecticides;



Here, R' and R are short chain alkoxy, alkyl, amide or alkylthio groups. Here labile leaving group is denoted by X it also represents the groups that can be further metabolized in vivo to a labile entity. Its biological activity is because of the capacity of the very central P-atom to the phosphorylate group the active site of the enzyme cholinesterase.

II. Material and Methods

Aliquots containing 1-5 mg of the sample were now taken. Further 10 ml of 0.2 N Chloramine- T reagent was added and later 10 ml of glacial acetic acid was added to it. The contents were well shaken. It is allowed to react at room temperature. 10.0 ml of potassium iodide (10.0%) solution was now added to it after the required reaction time. The contents were thoroughly shaken and it is kept for few minutes. With standardized (0.2 N) sodium thiosulphate solution, the liberated iodine was now titrated, where starch used as indicator.

III. Resultand Discussion

For the determination of Organophosphate compounds, Chloramine- T reagent in acidic medium is not been used either in the technical form or in their formulations. In the present work, a smooth and the convenient procedure has been nicely developed for the quantitative evaluation of some of the Organophosphate insecticides. These are Dimethoate, Malathion, Phorate, and Ethion in the technical form and in their formulations. Approach of the reaction is as follows. Malathion (tech.) was now taken as the test sample for the testing of the quantitative validity of reaction. In a 100 ml Erlenmeyer flask, Aliquots containing few mg of the sample were also placed. This is followed by the addition of a known amount of 10 ml solution of Chloramine-T (0.2 N) reagent and glacial acetic acid. The Contents were must be shaken thoroughly. The flask was now stoppered. 10 ml of potassium iodide (10%) solution was put in to it after the reaction was over. The Contents were shaken. This solution is kept for a minute. Using starch as indicator, the liberated iodine was now titrated with the standardised sodium thiosulphate (0. IN) solution.

For the determination of other samples of the Organophosphate compounds like Ethion, Dimethoate, and Phorate on the basis of the reaction conditions developed here were also must be determined within the error of $\pm 1.00\%$.

The reaction time was varied from 1-30 minutes on keeping the concentration of Chloramine - T reagent, amount of Malathion (tech.), and glacial acetic acid as constant

In a 100 ml stoppered conical flask, Aliquots (10.0 ml) containing 4.789 mg of Malathion (tech.) was now taken. 10 ml of 0.2 N Chloramine -T solution was added along with 10 ml of glacial acetic acid. Further the reaction mixture was shaken. It is allowed to react at room temperature (25° C) for 1,3,5, 10, 15,20,25 and 30 minutes. Once the reaction was over. The 10 ml of potassium iodide (10%) solution was now added. This content was thoroughly shaken.

The effect of variables such as the concentration of reagent, the reaction time, the concentration and the volume of acetic acid. For the determination of concentration of some of the insecticides like Organophosphate compounds, the temperature were studied to develop a suitable method taking Malathion (. tech.) as the test sample. The concentration of Chloramine- T reagent is the important variable to be studied. The effect of varying concentration of Chloramine -T reagent keeping reaction time, amount of Malathion (tech.) and glacial acetic acid as constant. The recovery of the sample is determined now. Further the unconsumed reagent is now calculated iodometrically.

A higher and lower concentration gives the inaccurate results (Table-2). The recovery is not change very much by increasing the concentration up to 0.60 N. Thus, 0.2 N concentration of Chloramine - T reagent was generally recommended for the further estimations in order to avoid the wastage of the reagent and to get the accurate results.

With other Organophosphate insecticides, Experiments along with the same concentration were carried out.

As keeping amount of Malathion (tech.), reaction time, and the concentration of Chloramine- T reagent as constant, the concentration of acetic acid was mostly varied .This results were noted (Table-4). By mixing the distilled water in the glacial acetic acid, the dilute solutions of acetic acid obtained. As indicated in the table, glacial acetic acid gives the quantitative and the stoichiometric results.

The reaction temperature was varied from 0°C to 100°C keeping every condition constant. The recovery of Malathion (tech.) was calculated (Table-6). As keeping amount of Malathion (tech.), reaction time, and the concentration of Chloramine- T reagent as constant, the concentration of acetic acid was mostly varied. These results were noted. By mixing the distilled water in the glacial acetic acid, the dilute solutions of acetic acid obtained. As indicated in the table, glacial acetic acid gives the quantitative and the stoichiometric results.

IV. Conclusion

The present method is accurate and rapid. In an ordinary laboratory, the reaction conditions can now easily be maintained. With varying sample size, the recovery of the sample is mainly constant within the error range less than 1.0%. The effect of variables was studied in order to establish the reaction conditions. Keeping the concentration of Chloramine- T reagent, the amount of Parathion (tech.) and acetic acid as constant during the studies of effect of reaction time, the reaction time was now varied from 10-30 minutes.

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