ANIL AGGRAWAL'S
Internet Journal of Forensic Medicine and Toxicology
The world's first online journal devoted entirely to forensic medicine and toxicology · Published 1 January and 1 July

VOL. 4, NO. 2 · JULY – DECEMBER 2003
Downloaded from www.anilaggrawal.com · ISSN 0972-8074 (Online) · https://www.anilaggrawal.com/ij/vol_004_no_002/papers/paper003.html

Results Of Detection On The Persistence Of Insecticides (Dimethoate And Phosphamidon) From Soil And Paper Substrates By Thin Layer Chromatography

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CITE THIS ARTICLE

Kaur K, Garg RK. Results Of Detection On The Persistence Of Insecticides (Dimethoate And Phosphamidon) From Soil And Paper Substrates By Thin Layer Chromatography. *Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology* [serial online], 2003; Vol. 4, No. 2 (July – December 2003): []. Available from: https://www.anilaggrawal.com/ij/vol_004_no_002/papers/paper003.html

ABSTRACT

In the present investigation dimethoate and phosphamidon pesticides presents on soil and paper material have been examined using Thin Layer Chromatography. Among the fifteen different solvent systems examined, it has been observed that dimethoate can be separated by using Benzene: Acetone (9 : 1) and phosphamidon by using cyc1ohexane . Acetone' chloroform (70 : 25 : 5) followed by iodine fuming as visualizing aid. The analysis of these two compounds could be successfully performed even up to 8 weeks times from soil and paper containing these pesticides in small amounts and it remains therein. The study will provide a useful information to the forensic toxicologists..

Keywords: insecticides, dimethoate, phosphamidon, thin layer chromatography

Introduction

Poisoning due to insecticides and pesticides have an important role in crimes all over the world. Forensic toxicologists are dealing with maximum number of cases' due to insecticides and pesticide poisoning involved in various types of crimes. Pesticides also cause much hazard to the surrounding environments and other organisms. Since the analysis of insecticide residue poses an entirely different type of problem for the toxicologists because these residues are present in extremely small quantity in heterogeneous materials including the biological materials. The importance of insecticide residue problem led to intensive search for analytical methods for accurate and rapid analysis (Zweig, 1964), The determination of the pesticide in various biological materials often faced with the problem of determining the minute quantity of insecticides mixed

with large amount of extraneous material or intermixing. Qualitative and quantitative methods are required to be applied keeping in view the sensitivity and specificity of the methods on one hand and nature of type of pesticides on the other hand. The technique of thin layer chromatography has made a strong impact on analytical toxicology. Extensive literature on both the qualitative and quantitative analysis of insecticides/pesticides is available (Beynon and Elgar, 1966 ; Fisher and Vanwazar, 1961 ; Cautselinis and Dinvopoulos, 1971 ; Stanley, 1964 ; Abbott et al. 1964 ; Tewari, 1976 ; Ganguly and Bhattacharya, 1975 ; Das, 1977 ; Kaur, 1998 ; Grant et aI. 1969 ; Guru et aI. 1981 ; Dewey, 1958 ; Stewart and Stolman, 1960, 1961 ; Gunther and Blinn, 1963 ; Zweig, 1964 ; KawaIe and Joglekar, 1968, 1976 ; Fargo, 1967 ; Prasad et aI. 1982 ; Clarke, 1971 ; Bami, 1972, 1981 ; Tewari, 1976 ; Kirchner, 1978 ; 1973b. Tewari et al., 1981 ; Gouldon et al. 1965) Tewari and Ram, 1969 ; Wong and Chou, 1969 ; Narayanswami et al., 1974; Sandroni and Schlitt, 1971 ; Stahl, 1969; Ludwick et. aI., 1977, Bunyan, 1964 ; Chakravarti and Roy, 1976 ; Joglekar and MahaI, 1968 ; Kulkarni and Ramakrishna, 1972).

In the present investigation an attempt has been made to investigate the persistence of two different organophosphorus compounds present on two different substrates (soil and paper) after a varied length of time (upto 8 weeks) using thin layer chromatography technique applying different solvent systems.

Materials And Methods

The present investigation has been conducted on two commercial grade organophosphorus compounds namely Dimethoate and Phosphamidon using TLC. One ml of each of these two samples were' kept in 20 gms dried sol kept in two different containers and in another case on two different filter papers. All these samples were kept in cupboards and examined periodically upto two months time. They were extracted and identified with a varied length of time using different solvent systems. Smooth glass plates of 5x20 cms size coated with silica gel G.(E Merck Ltd. Bombay, India) in the ratio of 1 : 2 in water were used (thickness 0.25mm). The silica gel layer was allowed to settle and dried in the air for 10-15 minutes and later kept in an oven at 1100C for an hour for proper activation. Fifteen different solvents were tried on the sample for their separation and identification based on their polarity. The soil and paper samples having pesticides were extracted and analyzed with a varied period of time (from one week to eight weeks) using 800mg of soil and making small cutting of filter paper portion having insecticides/pesticides with acetone (1ml and 0.5ml) in a test tube respectively. All the samples were centrifuged before use and supernatant used for TLC. The samples were spotted with the help of five capillaries separately for each sample. These spots were allowed to dry before being placed to run in respective solvent systems. The solvent run was restricted to the distance of 10 cms from the site of application of sample spot by marking a horizontal line on the plate with the help of a scale. All the TLC experimentation work was accomplished by ascending development. The development of colourless and separated constituents was carried but using. (i) iodine fuming (one minute exposure) and (ii) silver nitrate solution (1.0 gm AgNo3 dissolved in 95ml of redistilled ethanol and 5ml of conc. Ammonia). After development of the colourless constituents, colour, size, shape and hRf value was noted in each case.

Results And Discussion

The results of the present investigation are given in Table -1. It is observed that amongst the used solvents, the Benzene: Acetone (9 : 1), cyclohexane : Acetone : Chloroform (70 : 25 : 5) and Hexane: Acetone (8': 2) followed by iodine fuming gave more clearer and easily interpretable results upto the period of analysis. The Dimethoate and Phosphamidon constituents did not disintegrated upto the period of analysis i.e. upto 8 weeks at the laboratory conditions. Iodine fuming gave much better results as compared to the silver nitrate spray on both the substrates for the development of spots. Benzene: Acetone (9 : 1) followed by iodine fuming as a visualizing aids has been found to be most suitable combination for Dimethoate detection while cyc1ohexane : Acetone: Chloroform (70 : 25 : 5) for the phosphamidon in commercial grade insecticides and pesticides in this study. The results show that these compounds can still be examined for the separation and detection upto 8 weeks period from soil and paper substrates. It persists in and on soil and filter paper upto 8 weeks times. The hRf value of dimethoate and phosphamidon are different in different solvent systems and spraying reagents. However, the hRf value may differ slightly depending on the variation of batch of the- compound, silica gel G, thickness of TLC plates, temperature etc. It needs to be examined further for various other factors such as on different types of soils, papers, prolonged time, etc. The study will provide a useful information in toxicological analysis.

Table 1. RESULTS OF DIMETHOATE AND PHOSPHAMIDON COMPOUNDS DETECTION USING IODINE FUMING AS VISUALIZING AID AFTER EXTRACTION FROM TWO DIFFERENT SUBSTRATES (SOIL AND PAPER) (ROOM' TEMPERATURE 21.6oC - 28.90C)

Solvent System	Soil	Paper	Soil	Paper
	Dimethoate		**Phosuhamidon**	
	No. of Spots & hRf Values		**No. of spots and hRf values**	
1	2 (16, 35)	2 (15, 36)	3 (10, 28, 30)	1 (10)
2	3 (5, 17, 55)	3 (5, 17, 55)	3 (13, 23, 42)	4 (13, 18, 23, 43)
3	3 (2, 24, 39)	4 (3, 4, 24, 39)	3 (14, 24, 61)	1 (14)

The figures in parenthesis indicates hRf values after eight weeks.

The colours of the developed spots was brown or light brown in all samples examined.

1. Hexane: Acetone (8 : 2).

Cyc1ohexane : Acetone: Chloroform (70 : 25 : 5).

Benzene: Acetone (9 : 1).

Acknowledgement

We are thankful to all the laboratory staff of the Forensic Science Department for helping in carrying out the present study at various stages of this work.

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