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SPECTROPHOTOMETRIC DETERMINATION OF CARBOFURAN AND BENDIOCARB WITH 2-AMINOBENZOPHENONE

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A new spectrophotometric method has been described for the determination of carbofuran and bendiocarb based on coupling the hydrolysis products of the insecticides with diazotized 2- aminobenzophenone. The orange-coloured species exhibit absorption maxima at 475nm and 445nm respectively. Beer's Law is valid over the concentration range, 0.5 - 10.0 mg/l. This method is simple, rapid, sensitive and accurate to within ± 1.0% and can be applied for quality control and in contamination assessment experiments.

Key Words: **Spectrophotometric Determination; Carbofuran; Bendiocarb; Formulation Analysis; Recovery Experiments**

INTRODUCTION

SEVERAL spectrophotometric methods[1–6] have been reported for the determination of carbofuran and bendiocarb.

A new spectrophotometric method based on coupling of hydrolysis products of carbofuran and bendiocarb with diazotized 2-amino- benzophenone is described here.

MATERIALS AND METHOD

2-Aminobenzophenone (ABP) Solution: Prepare 0.1% solution in 5% hydrochloric acid.

Sodium Nitrite Solution: Prepare 0.3% solution in distilled water.

Sodium Hydroxide Solution: Prepare 0.5M solution in distilled water.

Preparation of Standard Insecticide Solutions: Dissolve 100mg of insecticide in 100ml of methanol. Dilute 25ml of this solution to 100ml with methanol to obtain working solution containing 250mg/l.

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Calibration Plots

Transfer aliquots of 0.05, 0.1, 0.2, 0.3.....1.0ml of standard insecticide solution in to a series of 25ml volumetric flasks. Add 1.5ml of sodium nitrate solution in case of carbofuran and 2.0ml in case of bendiocarb, 2.0ml ABP solution and 3.0ml of sodium hydroxide solution. Mix the contents thoroughly and dilute it to the marks with distilled water. Measure the absorbance of the orange-coloured species against a reagent blank. Plot absorbance as a function of concentration.

Determination of Insecticidal Formulations

Take an amount of well-mixed formulation equivalent to 100mg of the insecticide. Extract the insecticide with methanol. Dilute the extract to 100ml with methanol. Take known aliquots of this solution, after suitable dilution for colour development. Read absorbance and determine the concentration from the calibration plots.

Determination of Recovery from Grains and Water Samples

Recovery of insecticides from grains and water samples was carried out employing the procedure of Sastry *et al.*[7]

RESULTS AND DISCUSSION

The absorbance maximum was 475nm for carbofuran and 445nm for bendiocarb (Fig 1). Beer's law is obeyed in the concentration range 0.5–14mg/l in the case of carbofuran and

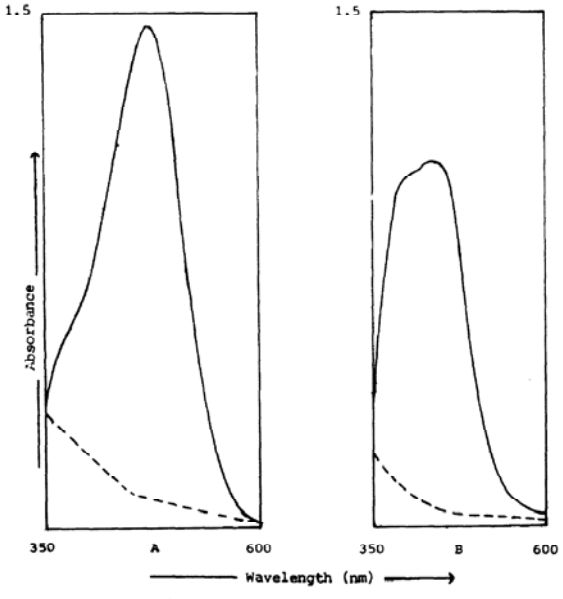

FIG 1

A Absorption spectrum of azo-dye formed by coupling carbofuran phenol with diazotized ABP.
B Absorption spectrum of azo-dye formed by coupling bendiocarb phenol with diazotized ABP.

1–10mg/l in the case of bendiocarb. The colour develops instantaneously at room temperature and remains stable for more than 18 hours.

The results relating to analyses of formulations are given in Table I. The results show that the method is suitable for the determination with a relative error of ± 0.6%.

TABLE I

Determination of carbofuran and bendiocarb in commercial formulations

Sample	Carbofuran		Bendiocarb	
	Granules 3%	Powder 50%	Powder 75%	Powder 90%
1	2.90	48.94	74.63	94.56
2	2.98	49.70	73.95	95.67
3	2.92	48.78	74.21	94.72
4	2.96	49.00	74.52	94.87
5	2.99	49.82	73.64	95.24
6	2.87	48.95	73.89	94.65
7	2.95	49.87	74.37	94.32
Mean	2.94	49.29	74.19	94.86
SD	± 0.4	± 0.81	± 0.38	± 0.46

TABLE II

Recovery of carbofuran and bendiocarb from water and grains

Sample	Carbofuran			Bendiocarb		
	Added	Found*	Recovery	Added	Found	Recovery
Water	1	0.98 ± 0.01	98.0	1	0.97 ± 0.02	97.0
	3	2.92 ± 0.3	97.3	3	2.90 ± 0.05	96.7
	5	4.85 ± 0.05	97.0	5	4.80 ± 0.04	96.0
	7	6.74 ± 0.06	96.3	7	6.72 ± 0.06	96.0
Rice	1	0.97 ± 0.02	97.0	1	0.97 ± 0.02	97.0
	3	2.90 ± 0.03	96.7	3	2.80 ± 0.05	95.3
	5	4.84 ± 0.04	96.8	5	4.80 ± 0.04	96.0
	7	6.72 ± 0.06	96.0	7	6.70 ± 0.05	95.7
Wheat	1	0.97 ± 0.02	97.0	1	0.96 ± 0.03	96.0
	3	2.89 ± 0.03	96.3	3	2.85 ± 0.05	95.0
	5	4.80 ± 0.04	96.0	5	4.76 ± 0.05	95.2
	7	6.70 ± 0.6	95.7	7	6.65 ± 0.07	95.0

* Mean + Standard deviation of five determinations.

Recovery of the insecticides from water and grains was determined by adding known amounts of these insecticides to field samples and analysing them by the proposed method after extraction. The data are presented in Table II. Percentage recovery ranges from 96 to 98 in water and from 95 to 97 in grains.

The results reported here are comparable to those reported in the literature. Further, the method is very simple, rapid and sensitive. Hence, it may be used for routine analysis.

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