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A new spectrophotometric method for the determination of Baygon in environment and biological samples

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Abstract
A sensitive, selective, cheaper and extractive spectrophotometeric method has been developed for the detection and determination of Baygon in fruits, vegetables, and grains is based on the coupling of their hydrolysation products with diazotized aniline. The dyes formed are measured at 450nm for Baygon after extraction in chloroform. Beer's law is obeyed over concentration ranges of 0.8-5.0µg. The Molar absorptivity and Sandell's sensitivity were found to be 9.7×10^5 L mol^{-1} cm^{-1} and 0.5×10^{-4} µg cm^{-2} respectively. The standard deviation and relative standard deviation were observed as ± 0.00336 and 0.0145% respectively. Various important analytical parameters were evaluated. The method was applied successfully to the determination of Baygon in water, grain, fruits, plant material and biological sample.

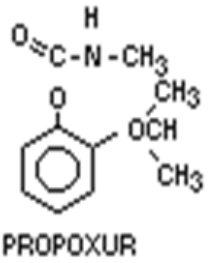
Keywords: Spectrophotometry, Baygon, environmental and biological samples

INTRODUCTION

Baygon the chemical composition consist of propoxur, 2-isoproproxyphenyl methyl carbamate, is a carbamate insecticide used to control cockroaches, flies, mosquitoes, and lawn and turf insects. The oral LD50 for rats ranged from 40 to 150 mg/kg (1). When persons are exposed to propoxur by any ways leads to cholinesterase inhibition of red blood cells, with mild cholinergic symptoms including blurred vision, nausea, vomiting, sweating, and tachycardia. Chronic inhalation exposure results in depressed Cholinesterase levels , headaches, effects the liver and bladder and also increase in neuropathy. The chemical formula for propoxur is C_{11} H_{15} NO_3, and its molecular weight is 209.24 g/mol (2).

PROPERTIES

Structural formula (3)



PROPOXUR

Product name (4):	:Baygon
Synonyms (4)	:Propoxur
Molecular formula (4)	:$C_{11}H_{15}NO_3$
Chemical family (4)	:Carbamate insecticide
Chemical name(4)	: 2-(1-methylethoxy) phenol methyl carbamate
IUPAC name (5)	:2-isoproproxyphenyl methyl carbamate
Molecular weight (5)	: 209.24
Solubility (5)	: 1.75g/L in water at 20°C
Melting Point	: 85.5°C
Vapor Pressure	: 3.75 mm Hg at 28.9°C

Because of the wide uses and toxicity of these insecticide several instrumental methods using, High performance liquid chromatography [6], Microbore liquid chromatography and positive ion electrospray mass spectrometery [7], Electro chromatography [8], Thin layer chromatography [10], Gas chromatography- mass spectrometery [9], HPLC-Mass spectrometery [10], FT-IR[10] , Liquid chromatography-Mass spectrometrey [11], etc. are reported for their determination.

METHOD

A sensitive, selective, cheaper and extractive spectro photometeric method has been developed for the detection and determination of Baygon in fruits, vegetables, and grains is based on the coupling of their hydrolysation products with diazotized aniline. A Systronic UV-VIS spectrophotometer model 104 with 1 cm. matched quartz cell, is used for all spectral measurement.

Apparatus

A Systronic UV-VIS Spectrophotometer model 104.
A Systronic digital pH meter model 335.

Chemicals

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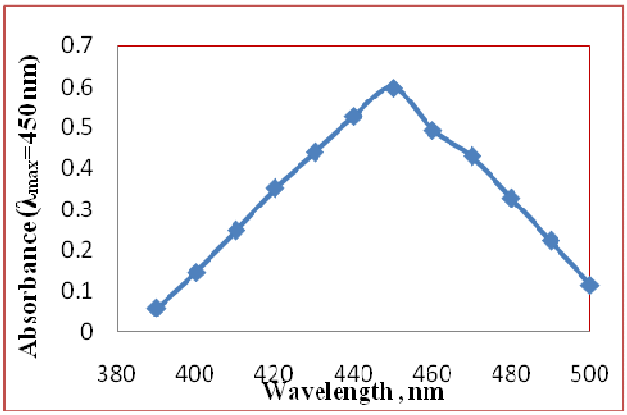
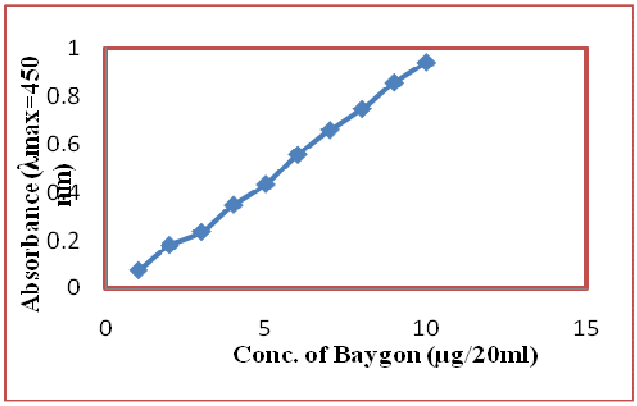
1. All chemical used were of Anal. R. grade
2. Distilled water was used.
3. Baygon supplied by JOHNSON A Family Company.
4. Aniline(1% solution used).
5. Hydrochloric acid (1 N solution in distilled water).
6. Sodium Hydroxide (8 M solution in distilled water).
7. Sodium Nitrite (0.2% solution in distilled water)
8. Chloroform (for extraction of orange dye)

RESULT AND DISCUSSION

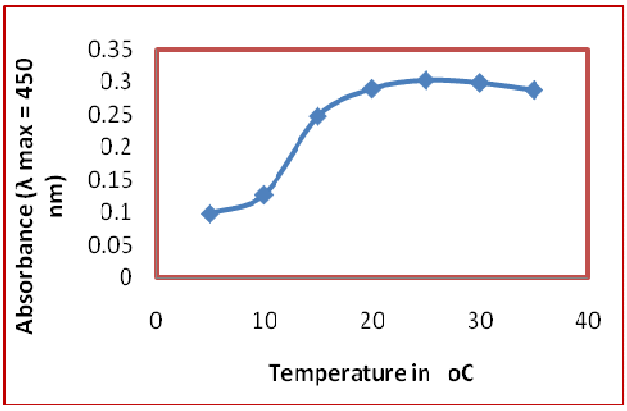
Baygon



Absorbance Curve of the Baygon



Calibration curve for the determination of Baygon.



Effect of Temperature

Application: Determination of Baygon in Biological and Environmental samples

Table 1. Recovery of Baygon in Water and Food Sample

Sample	Baygon Added(µg) (b)	Baygon obtained in present method*(c)	(c/b)	%Recovery (c/b)×100
Water**	5	4.78	0.956	95.6
	10	9.56	0.959	95.9
Potato***	5	3.89	0.778	77.8
	10	8.64	0.864	86.4
Apple***	5	4.42	0.884	88.4
	10	8.38	0.838	83.8
Rice***	5	3.98	0.796	79.6
	10	8.87	0.887	88.7
Blood	5	4.21	0.842	84.2
	10	8.63	0.863	86.3
Urine	5	4.68	0.936	93.6
	10	9.32	0.932	93.2

CONCLUSIONS

The proposed extractive method has been compared with other spectrophotometric method is found to be rapid, sensitive, selective, and cheaper, free from interference of a larger amount of foreign species. Due to extraction procedure very low amount of these insecticides in large volume of samples can be determined. The method has been applied for determination of baygon in water, grain, fruits, plant material and biological sample.

REFERENCES

[1] Kamanavali, C.M., Ninnekar, H.Z., 2000. "Biodegradation of Propoxur by Pseudomonas species", *World Journal of Microbiology and Biotechnology,* 16, 329-331.

[2] Yadav, C.V., Kumar, V., Suke, S.G., ahmed, R.S., Mediratta,P.K., Banerjrr, B.D., 2010. "Propoxur-induced Acetylcholine esterase inhibition and impairment of cognitive function: Attenuation by Withania somnifera*", Indian Journal of Biochemistry and Biophysics,* 47, 117-120.

[3] Graebing, P., Chib, J.S., 2004. "Soil Photolysis in a Moisture and Temperature-Controlled Environment, 2.Insecticides.", *J. Agric. Food Chem.* 52, 2606-2614.

[4] Standart, V.C., Eberhart, D.C., 2001. "Product Safty Manager" , *Material Safty Data Sheet, Bayer.*

[5] "Propoxur", 2011. *Health Canada Pest Management Regulatory Agency*, 1-15.

[6] Argauer, R.J., Eller, K.I., Ibrahim,M.A., Brown, R.T., 1995. "Determining Propoxur and other Carbamates in Meat Using HPLC, Fluoriscence and Gas Chromatography/Ion Trap Mass Spectroscopy After Supercritical Fluid Extraction", *J. Agric. Food Chem.,* 43(10), 2774-2778.

[7] Wang, N., Budde, W.L., 2001. "Determination of Carbamate,

Urea, and Thiourea Pesticides and Herbicides in Water", *J. Anal. Chem.* 73, 997-1006.

[8] Tegeler, T., Rassi, Z.E., 2001. "On-Column Trace Enrichment by Sequential Frontal and Elution Electrochromatography.1. Application to Carbamate Insecticides", *J. Anal. Chem.*73, 3365-3372

[9] "Effect of Cooking Process on the Residue of Three Carbamate Pesticide in Rice", 2011. *Iranian Journal of Pharmaceutical Research,* 10(1), 119-126.

[10] Sastry, C.S.P., Vijaya, D., and Rao, K.E., 1986. *Food Chem.,* 20, 157.

[11] Bogialli, S., Curini, R., Corcia, A.D., Nazzari, M., Tamburreo, D., 2004. "A Simple and Rapid Assay for Analyzing Residues of Carbamate Insecticides in Vegetables and Fruits: Hot Water Extraction followed by Liquid Chromatography-Mass Spectrometry", *J. Agric. Food Chem.* 52, 655-671.