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 spectrophotometric 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 9.7×10⁵ 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 C₁₁₁₅NO₃, and its molecular weight is 209.24 g/mol (2).

PROPERTIES

Structural formula (3)

Product name (4): Baygon
Synonyms (4): Propoxur
Molecular formula (4): C₁₁₁₅NO₃
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 spectrometry (7), Electro chromatography (8), Thin layer chromatography (10), Gas chromatography- mass spectrometry (9), HPLC-Mass spectrometry (10), FT-IR(10) , Liquid chromatography-Mass spectrometry (11), etc. are reported for their determination.

METHOD

A sensitive, selective, cheaper and extractive spectrophotometric 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
RESULT AND DISCUSSION
Baygon

Application: Determination of Baygon in Biological and Environmental samples

<table>
<thead>
<tr>
<th>Sample</th>
<th>Baygon Added (µg)</th>
<th>Baygon obtained in present method (c/b)</th>
<th>% Recovery (c/b)*100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>5</td>
<td>0.96</td>
<td>96.0</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>0.95</td>
<td>95.9</td>
</tr>
<tr>
<td>Potato</td>
<td>5</td>
<td>0.78</td>
<td>77.8</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>0.64</td>
<td>66.4</td>
</tr>
<tr>
<td>Apple</td>
<td>5</td>
<td>0.84</td>
<td>84.4</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>0.83</td>
<td>83.1</td>
</tr>
<tr>
<td>Rice</td>
<td>5</td>
<td>0.81</td>
<td>81.3</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>0.87</td>
<td>88.7</td>
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<tr>
<td>Blood</td>
<td>5</td>
<td>0.82</td>
<td>84.2</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>0.83</td>
<td>83.3</td>
</tr>
<tr>
<td>Urine</td>
<td>5</td>
<td>0.93</td>
<td>93.6</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>0.92</td>
<td>93.2</td>
</tr>
</tbody>
</table>

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

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