Determination of Insect Repellents by HPLC

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Introduction

N,N-diethyl–m-toluamide (DEET), Dimethyl phthalate (DMP) and Ethyl butylacetyl aminopropionate (IR3535) are widely used as insect repellent products to reduce their risk of vector-borne diseases. The method for determination of three active ingredient in insect repellent products was developed and validated to serve quality control of hazardous substances used in Public health . The simultaneous method by High Performance Liquid Chromatography (HPLC) with UV detector is investigated as an alternative method.

Objective

To develop and validate method of the determination of DEET, DMP and Ethyl butylacetylaminopropionate by HPLC – reversed phase simultaneously

Method and Results

Condition for determination of insect repellents

HPLC- (Waters, USA)

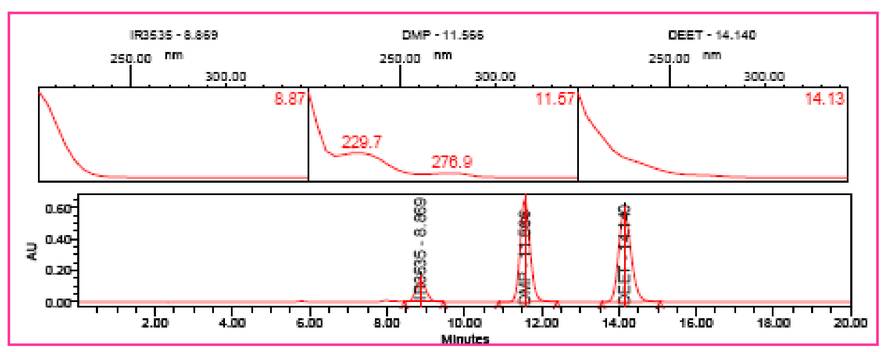
Column : XTerra RP8 (5 µm, 150 mm x 4.6 mm I.D.)

Wavelength : 220 nm

Mobile phase : Acetonitrile : Water , 25 : 75 v/v

Flow rate : 1.0 mL/min

Injection volume : 5 µL



Chromatogram of DEET, DMP and IR3535

- **Method validation was performed in samples of light lotion and cream. The validation showed the linear relationship between their concentration and peak area cover the range of 0.1 - 3 mg/mL**

Insect repellents	Parameters									
	specificity/ Selectivity	Linearity and Range		Precision			Accuracy	Limit of detection (LOD)	Limit of quantitation (LOQ),	Uncertainty
		System linearity	Method linearity	Repeatability	Intermediate precision					
	Retention time (min)	correlation coefficient, (r)	correlation coefficient, (r)	%RSD, n=7	between – days ANOVA, p-value, n=5	between – analysts ANOVA, p-value, n=3	% recovery	%w/w	%w/w	relative expanded, k=2
DEET	14.2	0.99998	0.9999	0.03-0.14	0.13-1.00	0.18-0.92	97.6-101.6	0.05	0.20	0.024
DMP	11.6	0.99998	0.9997	0.04	0.35-0.80	0.40	99.7-98.9	0.05	0.20	0.041
IR3535	8.9	0.99995	0.9997	0.06-0.12	0.06	0.22	99.7-104.6	0.08	0.30	0.027

Conclusions

- **A Simple and cost effective method for determination of DEET, DMP and IR3535 were obtained.**
- **This method gave appropriate for validation data and suitable for analysis of insect repellent in finished products.**

Selected Reference

- **World Health Organization, WHO SPECIFICATIONS AND EVALUATIONS FOR PUBLIC HEALTH PESTICIDES. ETHYL BUTYLACETYLAMIOPROPIONATE, 2006.**