

Application News

No. G294

Gas Chromatograph

Analysis of Organophosphorus Pesticides Using Nexis GC-2030

Cases have been reported of health problems due to foods contaminated with pesticides, and there is currently heightened interest in food safety countermeasures. Using a detector with high selectivity for specific components, or a mass spectrometer highly capable of qualitative analysis are effective when analyzing trace components in foods and other samples in which there are many impurities.

The FPD-2030 flame photometric detector, which is installed in Nexis GC-2030 gas chromatograph, has the world's highest level of sensitivity* thanks to the optimized nozzle shape and the advanced dual focus system.

In the analysis of pesticides in foods, this detector provides high sensitivity and high stability.

In this Application News, we introduce an analysis of organophosphorus pesticides using Nexis GC-2030 gas chromatograph, which is equipped with the FPD-2030.

*As of February 2017

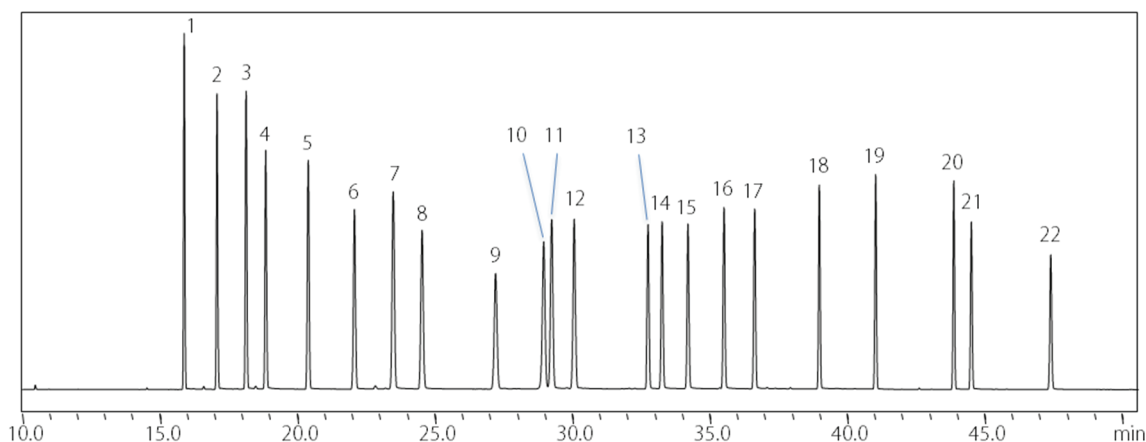
E. Kobayashi, T. Murata

■ Analysis Results

A mixture standard solution of organophosphorus pesticides (20 mg/L) was introduced via split injection, and the elution positions of each pesticide were confirmed.

Table 1 Analytical Conditions

Model	: Nexis GC-2030
Detector	: FPD-2030 (P-mode)
Column	: SH-Rtx-1701 (0.25 mm I.D. × 30 m, d.f. = 0.25 μm)
Column Temperature	: 60 °C (2 min) - 25 °C/min - 150 °C (0 min) - 5 °C/min - 200 °C (12 min) - 5 °C/min - 280 °C (7 min) Total 50.6 min
Injection Mode	: Split 1 : 20
Carrier Gas Controller	: Constant Linear Velocity (He)
Linear Velocity	: 30 cm/sec
Injection Temperature	: 250 °C
Detector Temperature	: 275 °C
Injection Volume	: 1 μL



1: Ethoprophos	7: Dimethoate	13: Isofenphos	19: Fensulfothion
2: Phorate	8: Tolclofos-methyl	14: PAP (Phenthoate)	20: EPN
3: Thiometon	9: Chlorpyrifos	15: Prothiofos	21: PMP (Phosmet)
4: Terbufos	10: Formothion	16: DMTP (Mathidathion)	22: Pyraclofos
5: Etrimfos	11: MPP (Fenthion)	17: Butamifos	
6: ECP (Dichlofenthion)	12: MEP (Fenitrothion)	18: Sulprofos	

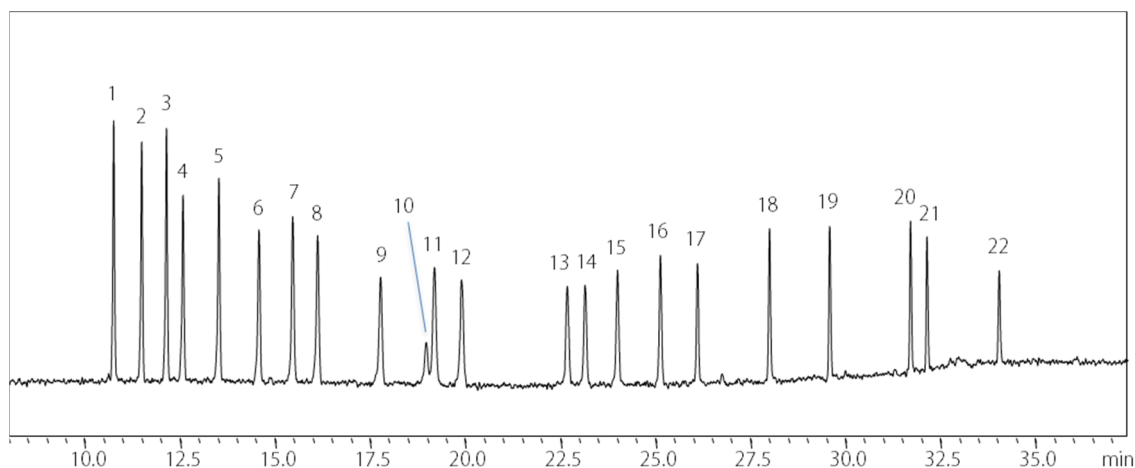
Fig. 1 Chromatogram of 20 mg/L Organophosphorus Pesticides

Trace Level Analysis

Table 2 and Fig. 2 show the analysis conditions and the chromatogram respectively for a trace level analysis of 5 µg/L organophosphorus pesticides via high-pressure splitless injection.

Table 2 Analysis Conditions for Low-Concentration Organophosphorus Pesticides

Model	: Nexis GC-2030
Detector	: FPD-2030 (P-mode)
Column	: SH-Rtx-1701 (0.25 mm I.D. × 30 m, d.f. = 0.25 µm)
Column Temperature	: 60 °C (1 min) - 20 °C/min - 180 °C (0 min) - 5 °C/min - 200 °C (10 min) - 7 °C/min - 280 °C (5 min) Total 37.4 min
Injection Mode	: High Pressure Splitless (300 kPa, 1 min)
Carrier Gas Controller	: Constan Linear Velocity (He)
Linear Velocity	: 46.8 cm/sec
Injection Temperature	: 260 °C
Detector Temperature	: 300 °C
Injection Volume	: 2 µL



1: Ethoprophos	: 42	12: MEP (Fenitrothion)	: 17
2: Phorate	: 39	13: Isofenphos	: 15
3: Thiometon	: 42	14: PAP (Phenthoate)	: 16
4: Terbufos	: 30	15: Prothiofos	: 18
5: Etrimfos	: 33	16: DMTP (Mathidathion)	: 21
6: ECP (Dichlofenthion)	: 24	17: Butamifos	: 19
7: Dimethoate	: 26	18: Sulprofos	: 25
8: Tolclofos-methyl	: 23	19: Fensulfothion	: 25
9: Chlorpyrifos	: 16	20: EPN	: 25
10: Formothion	: 5	21: PMP (Phosmet)	: 22
11: MPP (Fenthion)	: 18	22: Pyraclofos	: 15

Fig. 2 Chromatogram of Low-Concentration (5 µg/L) Organophosphorus Pesticides

First Edition: Jul. 2017



For Research Use Only. Not for use in diagnostic procedure.

This publication may contain references to products that are not available in your country. Please contact us to check the availability of these products in your country.

The content of this publication shall not be reproduced, altered or sold for any commercial purpose without the written approval of Shimadzu. Company names, product/service names and logos used in this publication are trademarks and trade names of Shimadzu Corporation or its affiliates, whether or not they are used with trademark symbol "TM" or "®". Third-party trademarks and trade names may be used in this publication to refer to either the entities or their products/services. Shimadzu disclaims any proprietary interest in trademarks and trade names other than its own.

The information contained herein is provided to you "as is" without warranty of any kind including without limitation warranties as to its accuracy or completeness. Shimadzu does not assume any responsibility or liability for any damage, whether direct or indirect, relating to the use of this publication. This publication is based upon the information available to Shimadzu on or before the date of publication, and subject to change without notice.

Shimadzu Corporation
www.shimadzu.com/an/