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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 organophsphorus pesticides using Nexis GC-2030 gas chromatograph, which is equipped with the FPD-2030.

*As of February 2017

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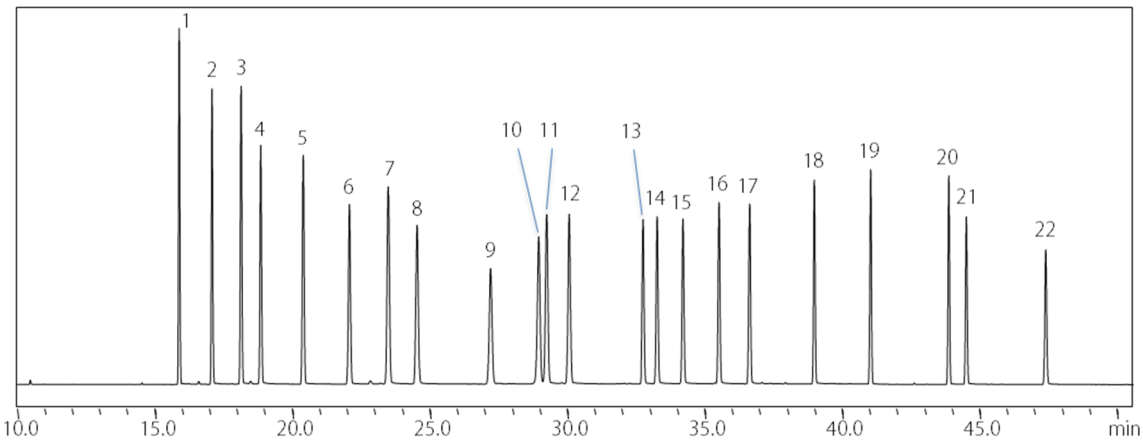
Analysis Results

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	

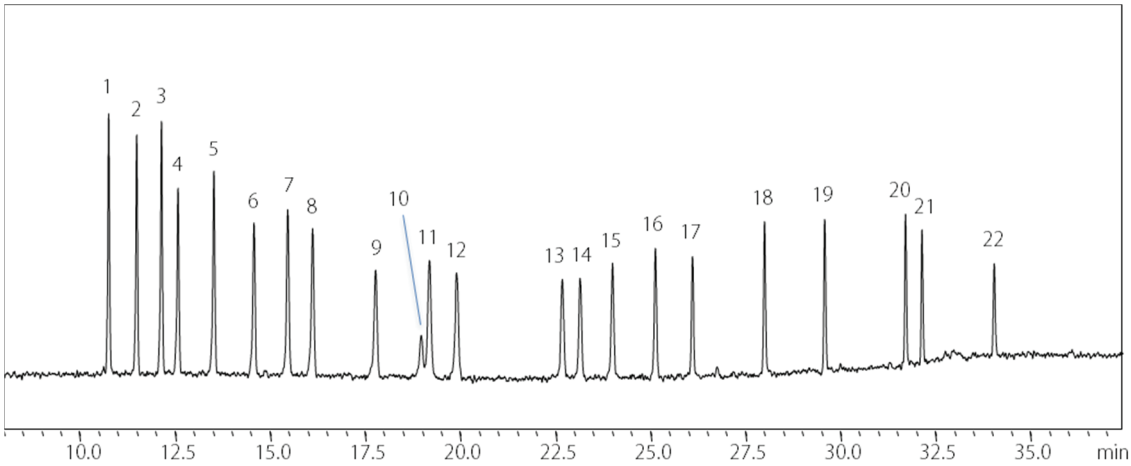
Fig. 1 Chromatogram of 20 mg/L Organophosphorus Pesticides

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	



	S/N		S/N
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

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