SHIMADZU APPLICATION NEWS

LA190-E006

● HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

No.L279

Analysis of Pesticides for Use on Golf Courses (Part 3)

In December 2001, the Japanese Ministry of the Environment revised its provisional guidelines for the prevention of water pollution due to pesticides used on golf courses. This revision set control values for ten additional pesticides.
The application of HPLC to golf course pesticides was described previously in Application News No. L225 and L232. This Application News introduces the HPLC analysis of four of these ten additional pesticides: azoxystrobin, ethofenprox, flazasulfuron, and halosulfuron-methyl. It includes an example of the simultaneous analysis of all components in an agricultural chemical for golf courses that contains these four pesticides, in addition to analyses of the individual pesticides.

■ Simultaneous Analysis of 12 Golf Course Pesticides

Fig. 1 shows the chromatogram from the injection of 20µL of an acetonitrile standard solution containing 10mg/L each of asulam, azoxystrobin, isoxaben, siduron, thiram, triclopyr, halosulfuron-methyl, flazasulfuron, mecoprop, iprodione, bensulide, and oxine-copper. Table 1-1 shows the analytical conditions and Table 1-2 the time program.
Simultaneous analysis of all 12 components was possible in 60 minutes by gradient elution. As siduron is eluted from the column as two peaks, these peaks are labeled A and B, in time-sequence order.

Table 1-1 Analytical Conditions

Column	:	STR ODS2(250mmL.×4.6mmI.D.)
Mobile Phase	:	B 30% →100%
		A:50mM(Sodium) Phosphate buffer(pH=3.1)
		B:50mM(Sodium) Phosphate buffer(pH=3.1)
		/Acetonitrile = 40/60(v/v)
Flow Rate	:	1.0mL/min
Temperature	:	40˚C
Detection	:	SPD-10A*VP* at 260nm

Table 1-2 Time Program

Time(min)	Command	Value(%)
0	B.Conc.	30
5	B.Conc.	60
10	Wavelength	290
22.5	Wavelength	230
25	B.Conc.	60
40	B.Conc.	100
45	Wavelength	220
50	B.Conc.	100
50	B.Conc.	30
60	Stop	

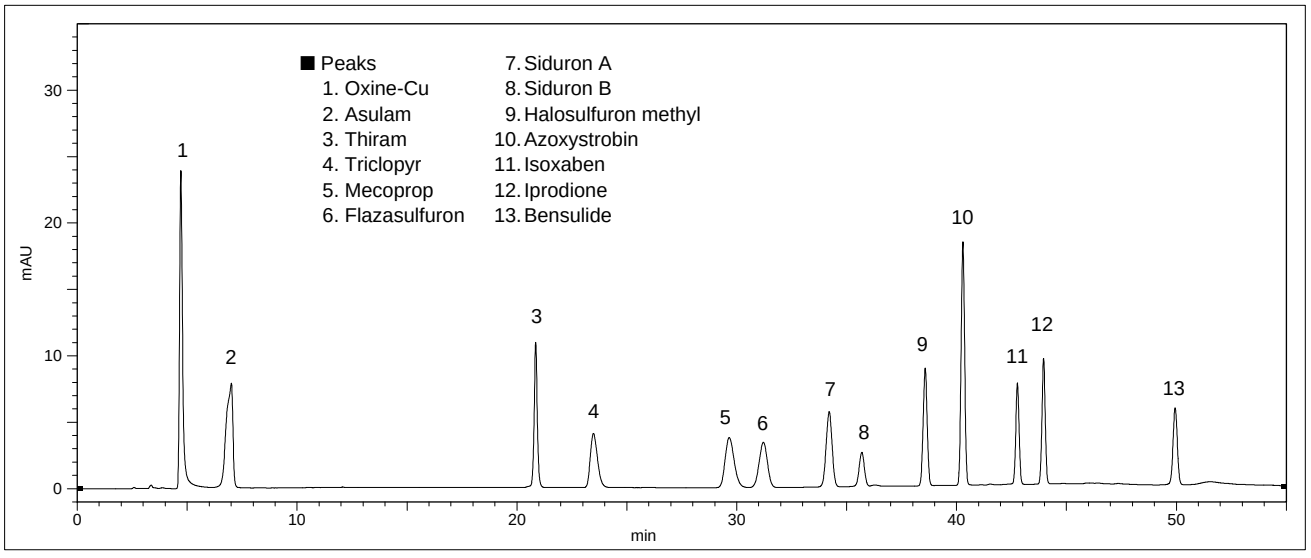

Fig. 1 Chromatogram of a Standard Mixture of 12 Components

■ Analysis of Azoxystrobin

Azoxystrobin is a methoxyacrylate-based fungicide that was registered in 1998.
Fig.2 shows the analysis results for the injection of 20µL azoxystrobin standard solution. The standard solution was prepared by diluting a 500mg/L acetonitrile solution with a 1:1 mixture of acetonitrile and distilled water to 10mg/L. Table2 shows the analytical conditions.

Table 2 Analytical Conditions

Column	:	Shim-pack VP-ODS(150mmL.×4.6mmI.D.)
Mobile Phase	:	Water/Acetonitrile = 1/1(v/v)
Flow Rate	:	1.0mL/min
Temperature	:	40˚C
Detection	:	SPD-10A*VP* at 235nm

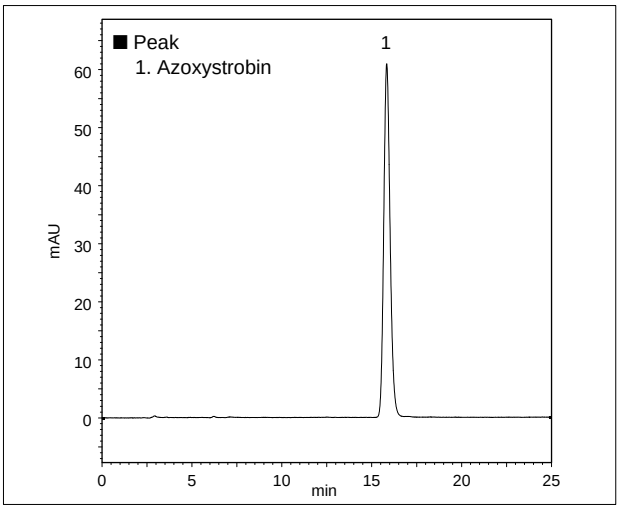

Fig. 2 Chromatogram of Azoxystrobin

■ Analysis of Ethofenprox

Ethofenprox is a pesticide similar to pyrethroid that is widely used as an insecticide.
Fig.3 shows the analysis results for the injection of 20µL ethofenprox standard solution (10mg/L methanol solution). Table3 shows the analytical conditions.

Table 3 Analytical Conditions

Column	:	Shim-pack VP-ODS(150mmL.×4.6mmI.D.)
Mobile Phase	:	Methanol/Water = 9/1(v/v)
Flow Rate	:	1.0mL/min
Temperature	:	40˚C
Detection	:	SPD-10A*VP* at 225nm

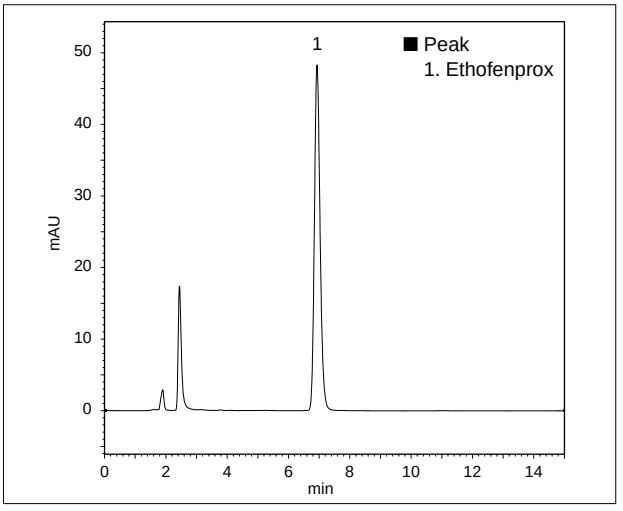

Fig. 3 Chromatogram of Ethofenprox

■ Analysis of Halosulfuron-methyl and Flazasulfuron

Both halosulfuron-methyl and flazasulfuron are commonly used herbicides.
Fig.4 shows the analysis results for the injection of 20µL standard solution that is a mixture of halosulfuron-methyl and flazasulfuron. The standard solution was prepared by diluting a 500mg/L acetonitrile solution of each component with a 1:1 mixture of acetonitrile and distilled water to 5mg/L. Table4 shows the analytical conditions.

Table 4 Analytical Conditions

Column	:	Shim-pack VP-ODS(150mmL.×4.6mmI.D.)
Mobile Phase	:	Acetonitrile/Water/Phosphoric Acid
	:	= 60/40/0.1(v/v/v)
Flow Rate	:	0.6mL/min
Temperature	:	40˚C
Detection		SPD-10A*VP* at 245nm

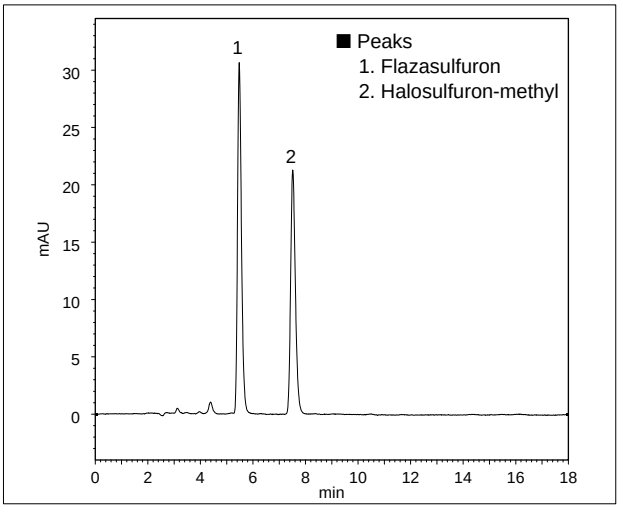

Fig. 4 Chromatogram of Halosulfuron-methyl and Flazasulfuron

SHIMADZU

SHIMADZU CORPORATION. International Marketing Division

3. Kanda-Nishikicho 1-chome, Chiyoda-ku, Tokyo 101-8448, Japan Phone: 81(3)3219-5641 Fax. 81(3)3219-5710
Cable Add.:SHIMADZU TOKYO

Printed in Japan 3100-06322-10A-IK