

HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

No. L225

HPLC Determination of Pesticides for Golf Course Use

Good shot! It really is pleasant to play golf on the beautiful greens and fairways, however, it is a shock that so many kinds of pesticides, disinfectants and herbicides are used for the maintenance of beautiful golf courses. The influence of such agricultural chemicals used on golf courses on the environment has raised much public attention and concern. Particularly, the influence on the environment close to us such as the pollution of drink water as well as ecological influence on fishes, animals and plants, is a growing problem.

Guidelines for the quality of tap water around the golf courses in Japan has been presented by the Ministry of Health and Welfare, and with respect to the waste water

from the golf courses, other guidelines have been established by the Environment Agency, and the testing methods have been determined and proposed respectively, urging various tests of water quality to be made. Along with this guidance, monitoring of water quality is being conducted at various institutions for verification.

Introduced in this article are some data with respect to the determination of compounds such as Asulam, Thiram, oxine-Cu, etc., for which HPLC is stipulated, and using the dual wavelength measurement mode or the wavelength programming mode of the SPD-10A UV spectrophotometric detector as well as absorption spectra obtained by the SPD-M6A photodiode array detector.

■ Determination of Pesticides with ODS-column

The wavelength programming permits assay of individual components at their optimum wavelengths, and is an effective function for the determination of a plural number of components. However, with respect to the wavelength programming over the shorter wavelength region, particularly around 210nm, the number of peaks increases, which makes it difficult to see target peaks in the presence of many interfering substances.

In the analysis shown in Fig.1, by using the dual wavelength simultaneous mode and the wavelength programming of the SPD-10A UV-spectrophotometric detector, program detection of oxine-Cu through Thiram was conducted in the long wavelength region (trace). On the other hand, Iprodione and Bensalide, which have no absorption in the long wavelength region, were detected with the wavelength fixed at 210nm.

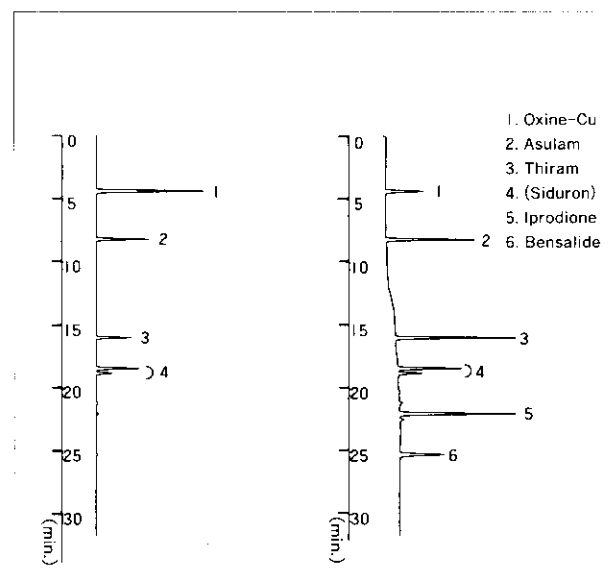


Fig. 1 Separation of Pesticides on an ODS Column
Left (ch 1) ... wavelength programmed
Right (ch 2) ... wavelength fixed at 210nm

Table 1 Analytical Conditions

| | |
|--------------|--------------------------------------|
| Mobile Phase | : B5%→100% Gradient Elution |
| | A ; 10mM (sodium) Phosphate (pH2.6) |
| | Acetonitrile ; 95/5 (v/v) |
| | B ; 100mM (sodium) Phosphate (pH6.1) |
| | Acetonitrile ; 40/60 (v/v) |
| Column | : L-Column |
| Flow Rate | : 1.0mL/min. |
| Temperature | : 40°C |
| Detection | : CH 1 ... 246nm→270nm→246nm |
| | CH 2 ... 210nm |

Table 2 Time Program with SCL-10A

| # | TIME | FUNC | VALUE |
|---|-------|--------|-------|
| 0 | 3.00 | B.CONC | 10.0 |
| 1 | 6.80 | WAVE A | 270 |
| 2 | 10.00 | B.CONC | 70.0 |
| 3 | 17.00 | WAVE A | 246 |
| 4 | 20.00 | B.CONC | 100.0 |
| 5 | 35.00 | B.CONC | 100.0 |
| 6 | 35.00 | B.CONC | 5.0 |
| 7 | 45.00 | STOP | |

■ Analysis of Pesticides with Isocratic Method

Fig.2 shows analysis of a 5-component mixture including Asulam, oxine-Cu, Thiram, Iprodione and Bensalide. Absorption spectra are shown of the respective components obtained with the SPD-M6A photodiode array detector under the same analytical conditions.

Table 3 Analytical Conditions

| | |
|-------------|--|
| Moble Phase | : 50mM (sodium) Phosphate (pH3.1) Acetonitrile : 9/11 (v/v) |
| Column | : RSpak DE-613 (6mmI.D.×150mmL.) |
| Flow Rate | : 1.0mL/min. |
| Temperature | : 30°C ; Controlled with CTO-10AC |
| Detection | : CH 1 ... 270nm→246nm CH 2 ... 210nm |

Table 4 Time Program with SCL-10A

| # | TIME | FUNC | VALUE |
|---|------|--------|-------|
| 0 | 6.00 | WAVE A | 246 |

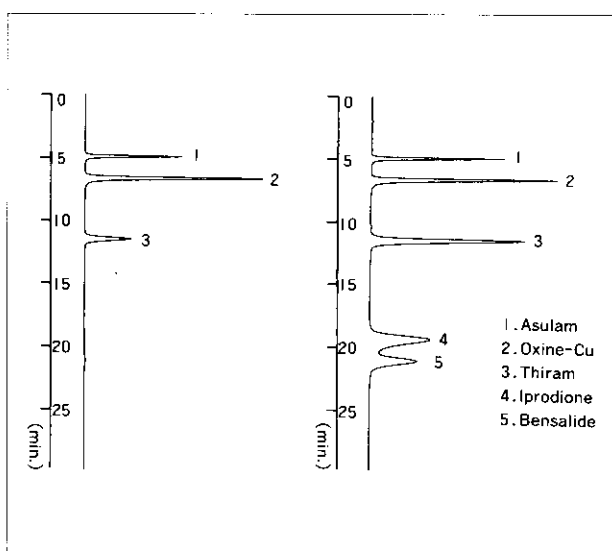


Fig. 2 Analysis of Pesticides with Isocratic Method
Left ... Wavelength programmed
Right ... Wavelength fixed at 210nm

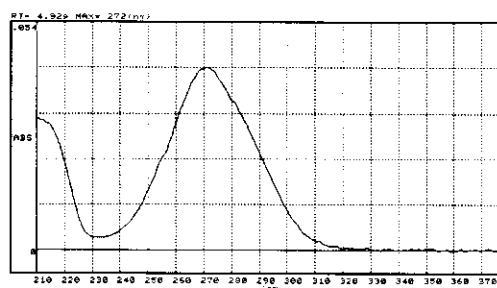


Fig. 3 Spectrum of Asulam

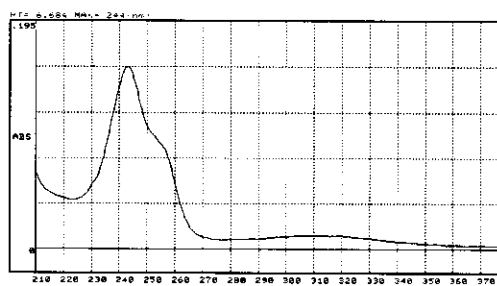


Fig. 4 Spectrum of Oxine-Cu

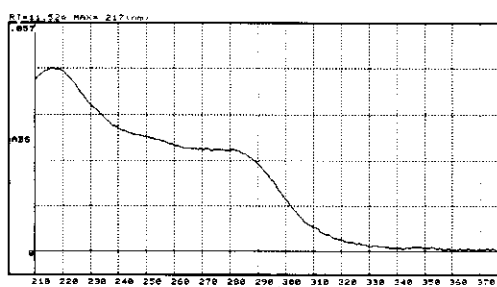


Fig. 5 Spectrum of Thiram

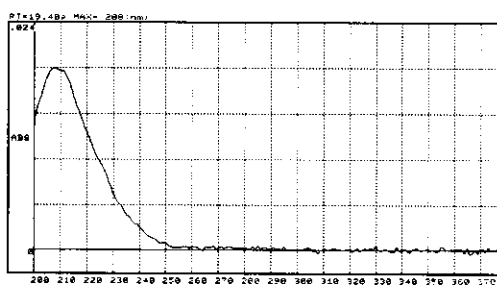


Fig. 6 Spectrum of Iprodione

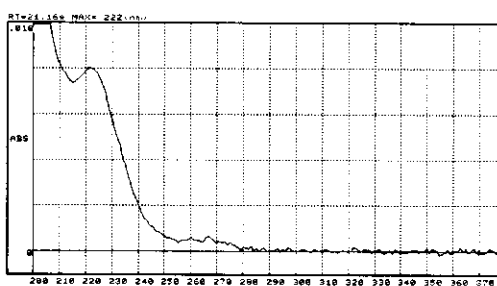


Fig. 7 Spectrum of Bensalide

 **SHIMADZU CORPORATION**

INTERNATIONAL MARKETING DIVISION

3, Kanda-Nishikicho 1-chome, Chiyoda-ku, Tokyo 101, Japan

Phone: (03) 3219-5641

FAX : (03) 3219-5710

Cable Add.: SHIMADZU TOKYO

Overseas Telex No.: 0232-3291 (SHMDT J)