Application Note

920012X

High-Speed Analysis of Ultraviolet Absorbers in Sunscreen by Ultra High-performance Liquid Chromatography with Photodiode Array Detection

Introduction

In recent years, there has been an increasing concern about the influence on human body by ultraviolet radiation from the sun, and ultraviolet absorbers are often added to various cosmetics as well as sunscreen. However, such ultraviolet absorbers cause skin rashes, therefore, type of ultraviolet absorbers and their contents are regulated by regulatory agency of many countries. There are many such absorbers that are subjected to HPLC analysis.

In this report, multi-component ultraviolet absorber used in a sunscreen was analyzed by Ultra High-performance Liquid Chromatography (UHPLC) with a PDA detector that enables high-speed data acquisition of 100 spectra/sec.

Keyword : UHPLC, Sunscreen , Ultraviolet Absorbers 1.8 µm, C8 column, PDA detector

Experimental

[Equipment]

Pump:	X-LC 3185PU x 2
Degasser:	X-LC 3080DG
Mixer:	X-LC 3180MX
Column oven:	X-LC 3067CO
Autosampler:	X-LC 3159AS
Detector:	X-LC 3110MD

Conditions

Column:	ZORBAX Eclipse Plus C8 (3.0 mmID x 50 mmL, 1.8 µm)
Eluent A:	0.2% Formic acid
Eluent B:	Acetonitrile
Gradient condition:	(A/B), 0 min(75/25) → 3 min(35/65) → 6.5 min(30/70) → 6.55 min(5/95) → 7 min(5/95) → 7.05 min(75/25) 1 cycle; 9.5 min
Flow rate:	0.8 mL/min
Column temp.:	40ºC
Wavelength:	200-650 nm
Injection volume:	1 µL
Standard sample:	12 ultraviolet absorbers 0.042 mg/mL each in Acetonitrile

Fig. 1 shows the structures of 12 compounds used as Ultraviolet Absorbers.

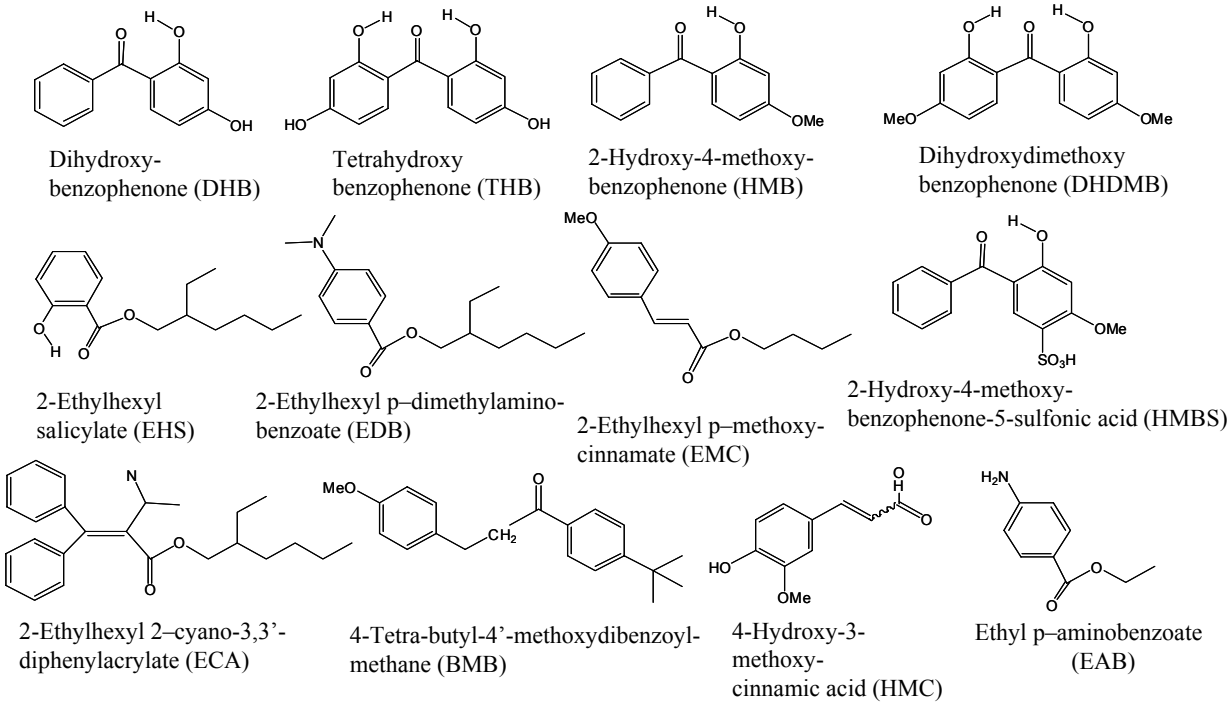

Fig. 1. Structures of ultraviolet absorbers.

copyright©JASCO Corporation

JASCO INTERNATIONAL CO., LTD
4-21, Sennin-cho 2-chome, Hachioji, Tokyo 193-0835, Japan
Tel: +81-42-666-1322, Fax: +81-42-665-6512

Result

Fig. 2 shows the chromatogram and the contour plot of the standard mixture of Ultraviolet Absorbers. Twelve components were clearly separated within 7 minutes.

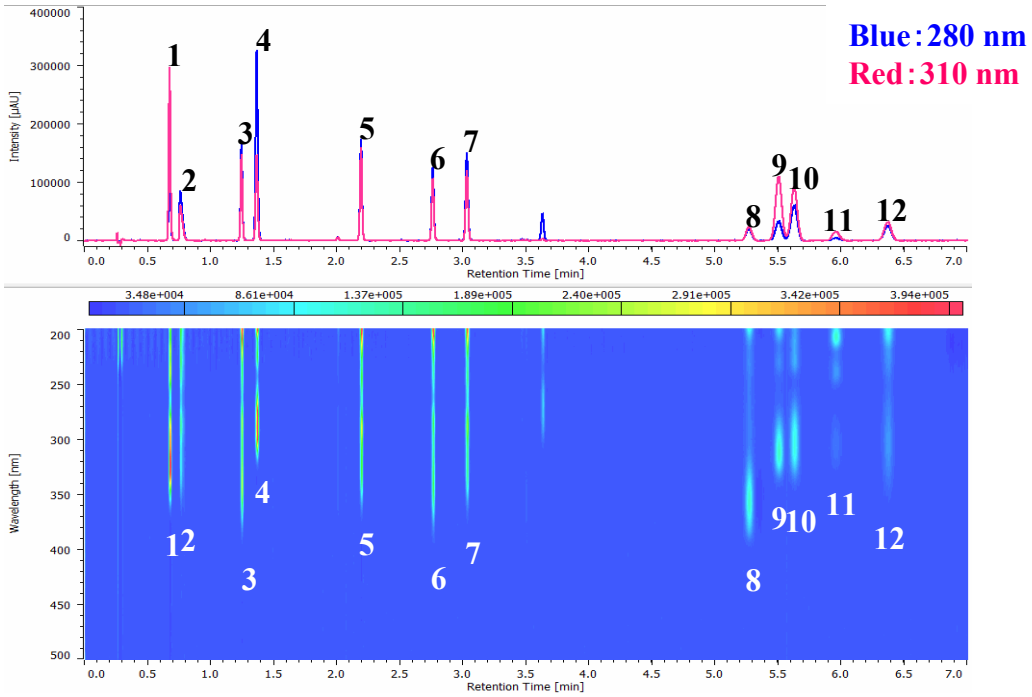

Fig. 2. Chromatogram of the standard mixture of Ultraviolet Absorbers
1: HMC, 2: HMBS, 3: THB, 4: EAB, 5: DHB, 6: DHDMB, 7: HMB, 8: BMB, 9: EDB, 10:EMC, 11: EHS, 12: ECA

Fig. 3 shows on peak spectra of the standard mixture of Ultraviolet Absorbers

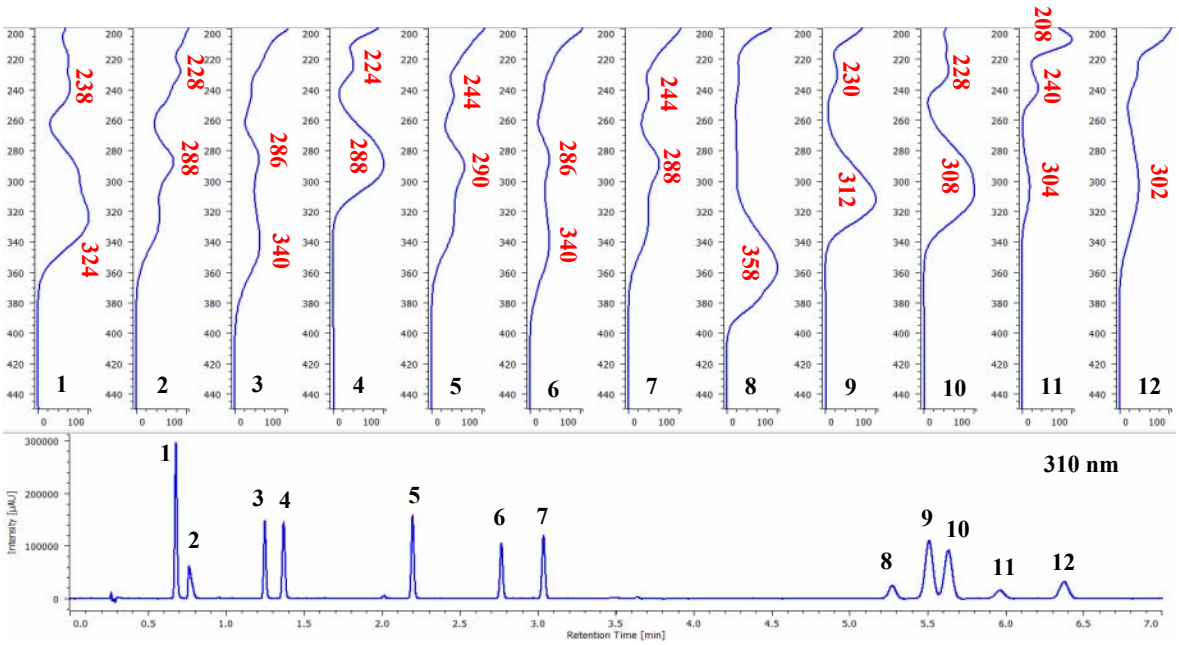

Fig. 3. On peak spectra of the standard mixture of Ultraviolet Absorbers. The peak numbers and corresponding compounds are the same as in Fig. 2.

copyright©JASCO Corporation

JASCO INTERNATIONAL CO., LTD
4-21, Sennin-cho 2-chome, Hachioji, Tokyo 193-0835, Japan
Tel: +81-42-666-1322, Fax: +81-42-665-6512

Fig. 4 shows the UHPLC chromatogram of a commercial sunscreen. The principal component was eluted without any interference from other components contained in the sunscreen.

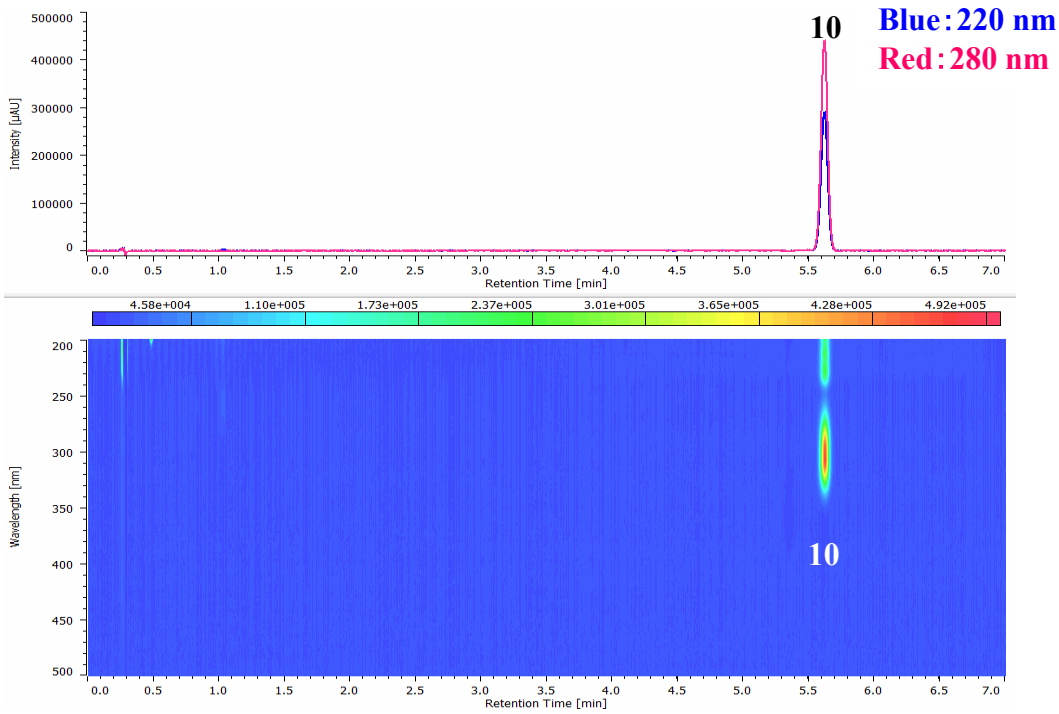

Fig. 4. Chromatogram of the sunscreen. 10:EMC

Preparation of the sample
1) Weigh 0.4 g of the sunscreen.
2) Dissolve in 4 mL of THF.
3) Mix by adding 6mL of acetonitrile.
4) Sonicate for 10 minutes.
5) Add 10 mL of acetonitrile.
6) Filter the supernatant liquid using 0.45 and then 0.2 µm membrane filters.
7) Dilute the filtrate by ten times with acetonitrile.

copyright©JASCO Corporation

JASCO INTERNATIONAL CO., LTD
4-21, Sennin-cho 2-chome, Hachioji, Tokyo 193-0835, Japan
Tel: +81-42-666-1322, Fax: +81-42-665-6512