Application Note

820020SRE

Separation of Aromatics in Diesel Fuel by Supercritical Fluid Chromatography (ASTM D5186)

Introduction

Many components including aliphatic hydrocarbon and aromatic hydrocarbon such as paraffin and olefin are contained in petroleum fuel such as gasoline, gas oil, etc. Analyzing these components is now very important, because these components greatly affect the efficiency of fuel and the amount of environmental pollutant which is discharged from engine after burning. Separation analysis method such as High Performance Liquid Chromatography (HPLC), Gas Chromatography (GC) or Supercritical Fluid Chromatography (SFC) is widely used for analyzing petroleum fuel.

Among those methods, Supercritical Fluid Chromatography has been carried on ASTM (The American Society for Testing and Material), because the components in petroleum fuel can be separated with high resolution and can be analyzed in a short time with high stability by using Supercritical Fluid Chromatography.

This time polycyclic aromatic components in diesel fuel were analyzed using Supercritical Fluid Chromatography system in accordance with ASTM D5186 as reported below.

Keyword: SFC, 5 µm, Diesel fuel, ASTM

Experimental

[Equipment]

CO_2 Delivery Pump:	PU-2080-CO_2
Autosampler:	X-LC 3159AS
	(0.5 µL injection model)*1
Column Oven:	CO-2060
Detector:	FID (GC-390B)
Back Pressure Regulator:	BP-2080

*1 0 5 µL injection model of autosampler is a custom made product

[Conditions]

Column:	SFCpak SIL-PA
	(4.6 mmI.D. x 250 mmL, 5 µm)
Eluent:	Carbon dioxide
Flow rate:	2.0 mL/min
Column Temperature:	35 °C
Back Pressure:	20 MPa
Injection Volume:	0.5 µL
Standard Sample:	Hexadecane=75 mass%, Toluene=20 mass%, Tetraline=3 mass%, Naphthalene=2 mass%
GC:	Oven; 200 °C, FID; 350 °C

Results

Overlapped chromatograms of standard mixture by injecting ten times is shown as in Fig. 1, and the result of retention time repeatability is shown as in Table 1. The result of repeatability obtained was as good as RSD% = less than 0.2% and the resolution of Hexadecane and Toluene was 11.2, and the resolution of Tetralin and Naphthalene, 4.9.

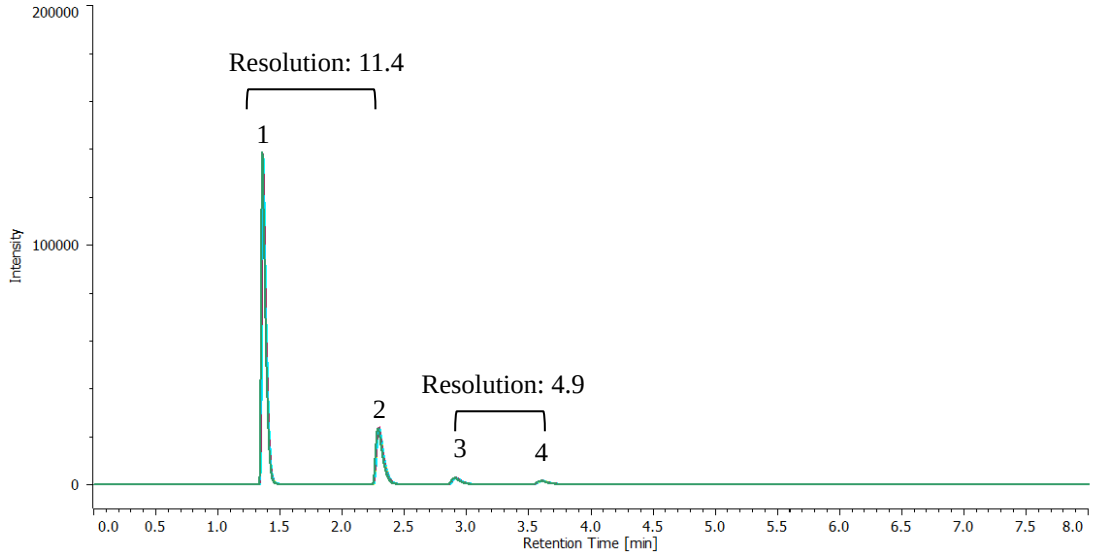

Fig. 1 Chromatogram of Standard Mixture
1.Hexadecane, 2.Toluene, 3.Tetralin, 4.Naphthalene

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

Table 1 Retention Time Repeatability of Standard Mixture (n=10)

	Hexadecane	Toluene	Tetraline	Naphthalene
1	1.362	2.293	2.908	3.602
2	1.363	2.295	2.910	3.603
3	1.363	2.295	2.912	3.602
4	1.363	2.295	2.912	3.607
5	1.367	2.298	2.915	3.608
6	1.363	2.293	2.908	3.602
7	1.360	2.290	2.905	3.597
8	1.363	2.293	2.908	3.598
9	1.360	2.290	2.903	3.597
10	1.358	2.287	2.902	3.590
Sum	13.623	22.930	29.083	36.005
Average	1.362	2.293	2.908	3.601
S.D.	0.0024	0.0033	0.0041	0.0053
CV%	0.175	0.145	0.141	0.148

Chromatogram of commercially available gas oil is shown as in Fig. 2 Area% of each component was Non-Aromatics: 71.8%, and Aromatics: 28.2%.

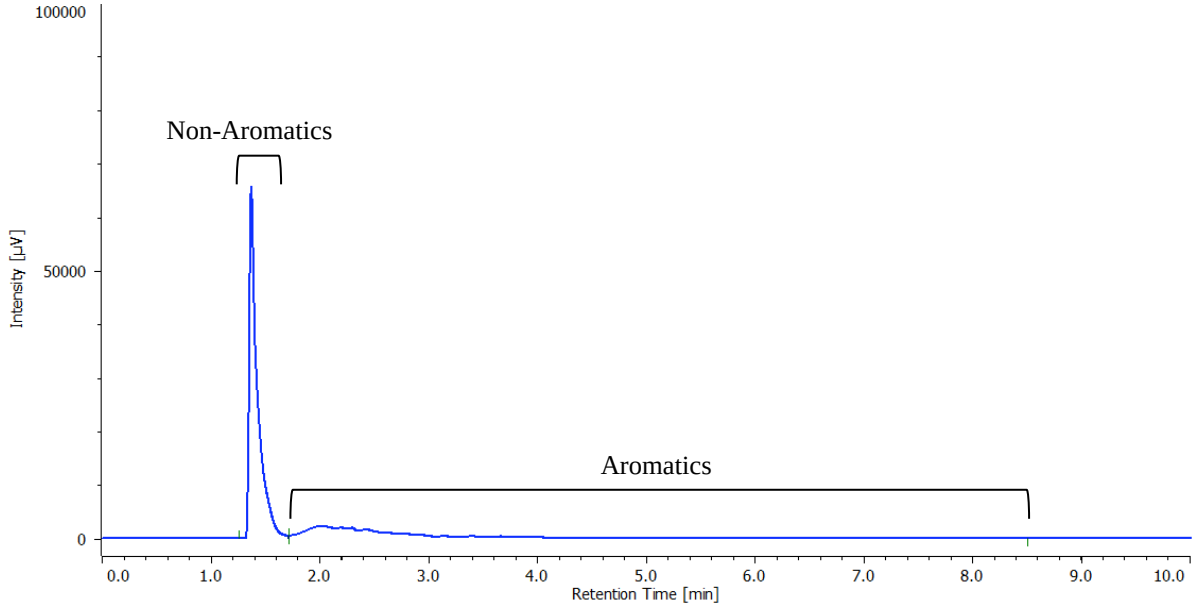

Fig. 2 Chromatogram of Gas Oil

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