SHIMADZU APPLICATION NEWS

LA180-E009

● GAS CHROMATOGRAPHY

No.G211

Reduction of Analysis Time (Part 3)

The Application News No. G206 described the extent of possible reduction in analysis time when using the GC-17A, GC-2010 standard models with a 0.25 mm I.D. column. This Application News introduces investigations of further reducing the analysis time using a high-power oven model GC-2010.

The high-power oven model GC-2010 permits a maximum heating rate of 70˚C/minute (to 200˚C) compared with a maximum heating rate of 40˚C/minute (to 200˚C) with the GC-17A, 18A, 1700 and 2010 standard models. The GC-2010 standard and high-power oven models both permit a column inlet pressure setting up to 970 kPa.

As in the previous investigations, a common 0.25 mm I.D. column was used, with a mixture of gasoline, kerosene, and light oil as the sample. Fig. 1 shows the chromatogram from the Application News (G206) for the analysis that achieved the minimum analysis time: heating from 40˚C to 200˚C at 40˚C/minute followed by heating to 250˚C at 15˚C/minute at a pressure of 400 kPa. The analysis time of about eight minutes was only 1/6 of the 50 minutes required by conventional analysis methods. Fig. 2 shows the chromatogram obtained by the high-power oven model GC-2010 at a constant pressure of 970 kPa, with heating from 40˚C to 200˚C at 70˚C/minute followed by heating to 250˚C at 50˚C/minute. The analysis time halved again to four minutes approximately. The diagrams indicate that the analysis time can be reduced without deteriorating the chromatogram pattern. By way of reference, analysis was conducted with heating from 40˚C to 200˚C at 70˚C/minute followed by heating to 250˚C at 50˚C/minute at a constant pressure of 400 kPa. This chromatogram is shown in Fig. 3.

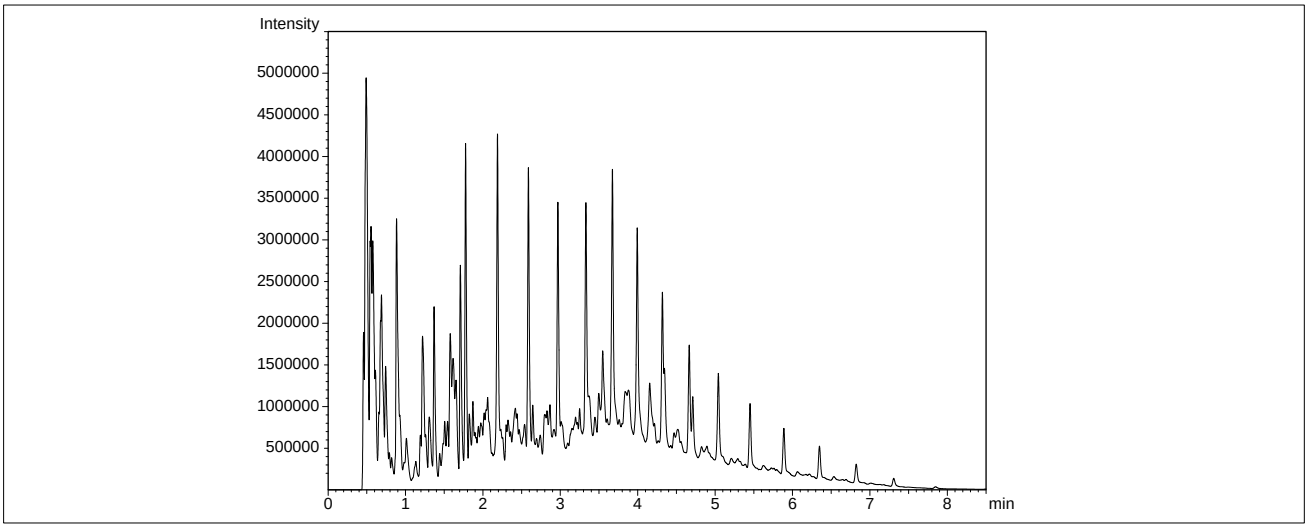

Fig. 1 40˚C→200˚C(40˚C/min)→250˚C(15˚C/min), 400kPa

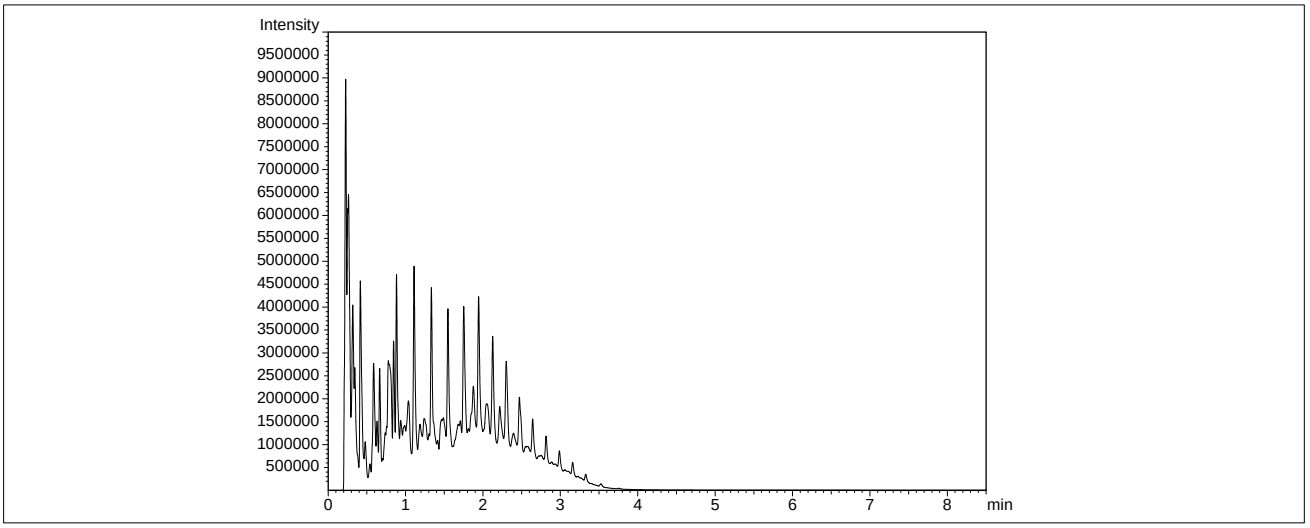

Fig. 2 40˚C→200˚C(70˚C/min)→250˚C(50˚C/min), 970kPa

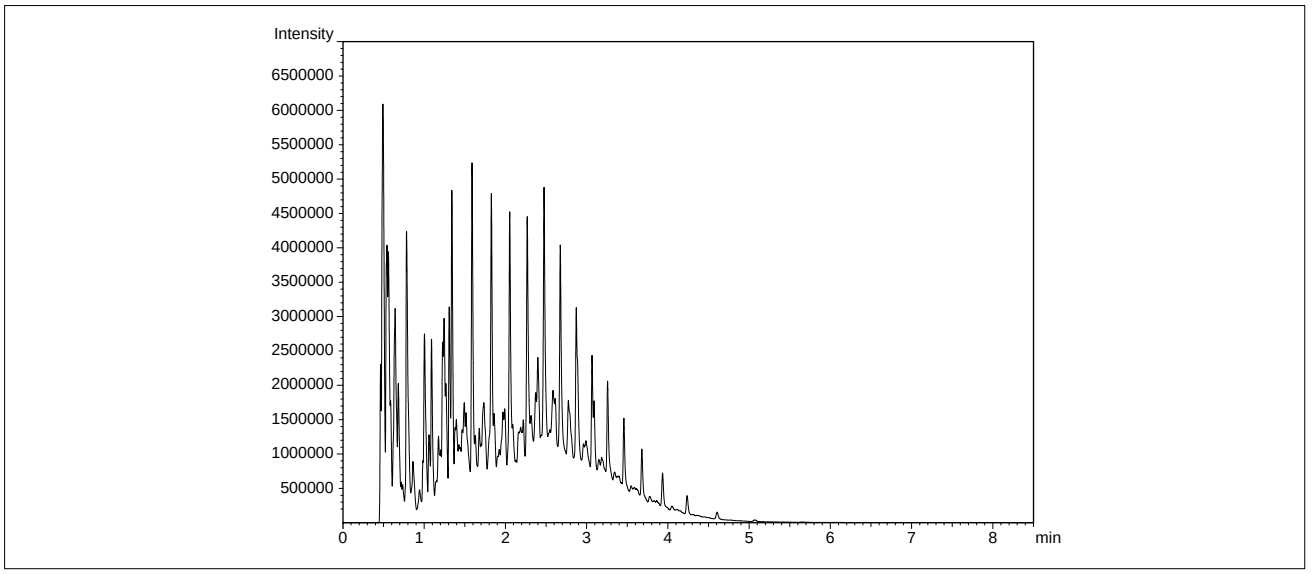

Fig. 3 40˚C→200˚C(70˚C/min)→250˚C(50˚C/min), 400kPa

■ Cooling Unit

Application News No. G206 also introduced the use of a cooling unit to reduce the cooling time. The cooling speed was measured under analytical conditions of heating from 40˚C to 200˚C at 40˚C/minute and heating to 250˚C at 15˚C/minute, with a 2-minute hold time. Fig. 4 shows the effect of the cooling unit. The diagram shows that the cooling unit reduces the time to achieve a stable initial temperature by approximately one minute compared to when no cooling unit is attached. The effect of the cooling unit becomes more significant as the final temperature increases and as the initial temperature comes close to the room temperature.

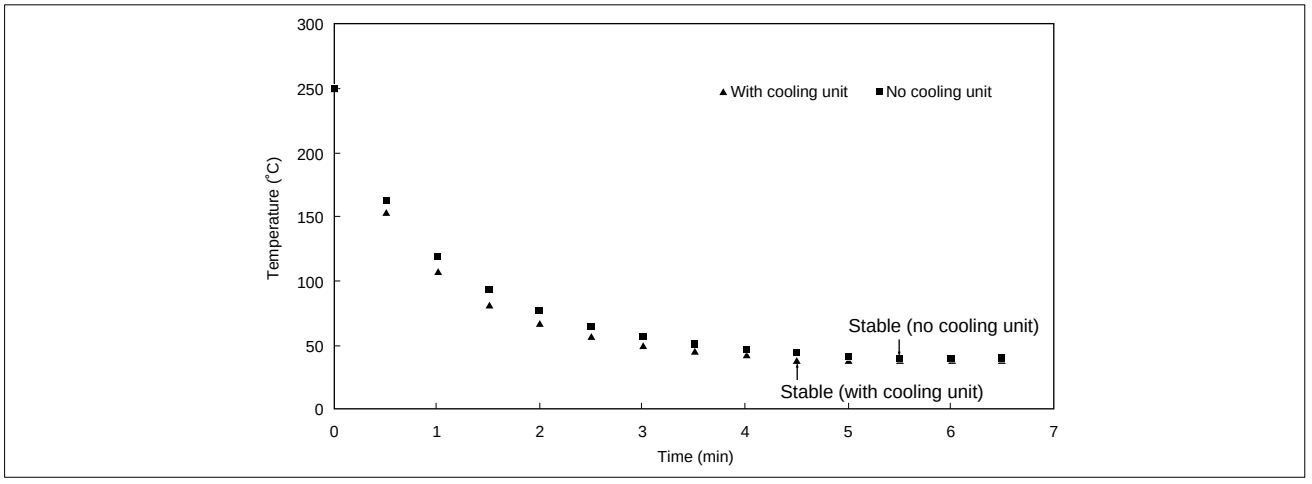

Fig. 4 Comparison of Cooling Rates

Table Analytical Conditions

Mode	:	GC-2010AF/AOC
Column	:	Rtx-1(Restek) 30m×0.25mmI.D., df=0.25μm
Column Temp.	:	40˚C–40˚C/min–200˚C–15˚C/min–250˚C
		40˚C–70˚C/min–200˚C–50˚C/min–250˚C
INJ.Temp.	:	280˚C
Detector	:	FID 300˚C
Carrier Gas	:	He, 400kPa or 970kPa (Constant Pressure Mode)
Split Ratio	:	1:50

SHIMADZU

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Related Products Some products may be updated to newer models.

GC-2010 Pro
Gas Chromatograph

Related Solutions

- Engineering Materials
- Electronics
- Automotive
- Hydrocarbon Processing Industry (Petrochemical, Ch

- Price Inquiry
- Product Inquiry
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