

# Application

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## High Temperature HT-5 Capillary GC Columns

HT-5 aluminum-clad fused silica capillary GC columns are designed for high temperature analyses – up to 480°C in temperature programmed applications. They are well-suited for simulated distillations of high boiling waxes and oils, and analyses of fatty acid methyl esters, polynuclear aromatic hydrocarbons, porphyrins, siloxanes, triglycerides, and other thermally stable, high molecular weight samples currently analyzed by HPLC or SFC. (ChromFax: 394036)

### Key Words:

- high-temperature GC • simulated distillation
- triglycerides

The development of high temperature stationary phases and use of aluminum as an outer coating for capillary columns have expanded the application range of gas chromatography. SGE's aluminum-clad HT-5 capillary columns, available now from Supelco, can be used at temperatures as high as 480°C in temperature programming applications. This means fast, high resolution GC techniques can replace other techniques, such as HPLC and SFC, for analyses of thermally stable high molecular weight materials.

A high temperature application that illustrates this is the simulated distillation (SIMDIS) of high boiling oils. Temperature limits for packed GC columns, 350 - 380°C, can result in difficult and lengthy SIMDIS analyses of fractions with components that boil above 650°C. In contrast, a 6m x 0.53mm ID HT-5 capillary column (0.10µm phase film) is ideally suited for this type of analysis, due to its 480°C upper temperature limit and its very large phase ratio ( $\beta$ ) value of 1325. By using this column with cool on-column injection, compounds with boiling points of up to 800°C can be eluted and detected.

Figure A shows a standard that is used to establish the boiling point-retention time calibration of the chromatographic system prior to the analysis of an oil sample. In this analysis, carbon number 110 is eluted during the temperature program, and a molecule containing 130 carbons elutes in less than 60 minutes. The boiling point-retention time curve is linear for boiling points as high as 750°C.

Figure B shows a refinery lubrication oil analyzed under the same conditions as the calibration standard. At the final temperature of 480°C, FID bleed is only 4 picoamps. Total analysis time again is less than an hour for a sample with a final boiling point of approximately 750°C.

Figure A. Polywax® 655 (Simulated Distillation)

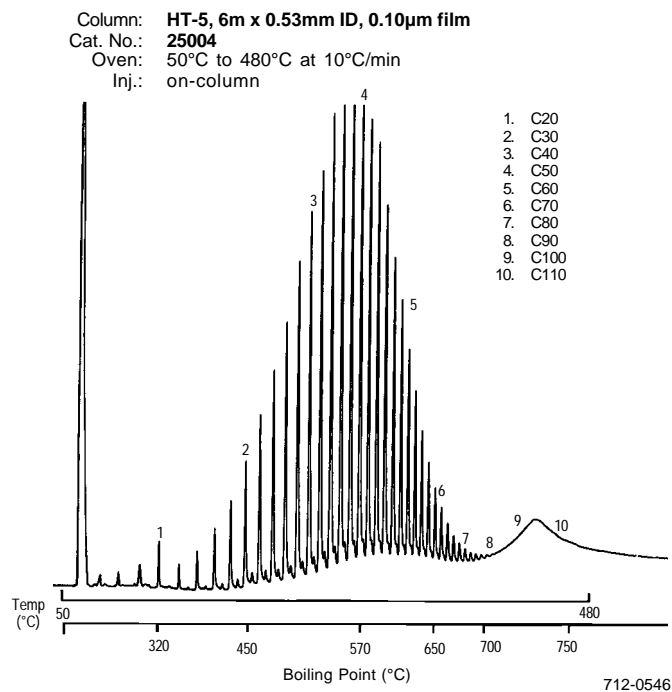
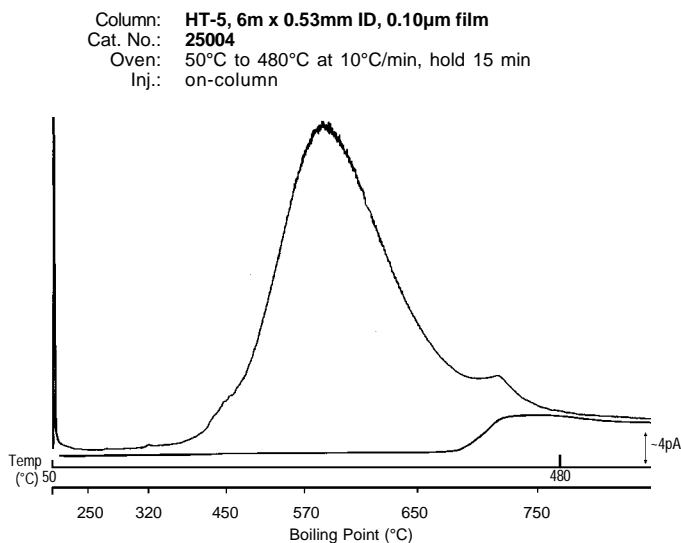


Figure B. Refinery Lubrication Oil (Simulated Distillation)

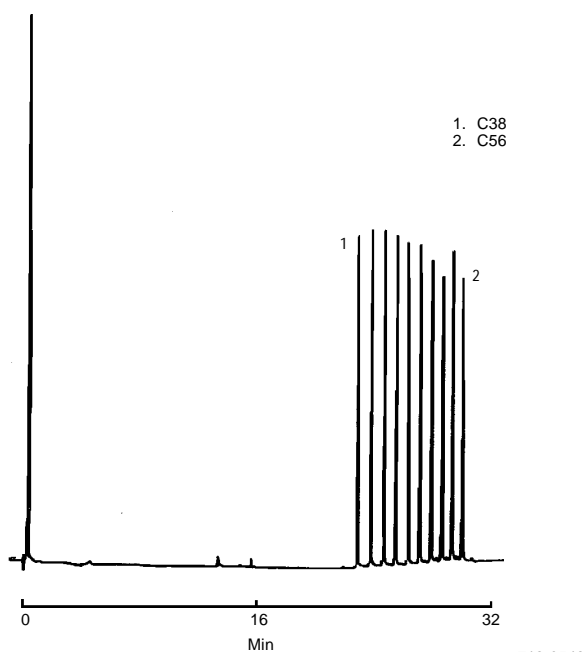


This same high temperature column can also be used in analyses of triglycerides. An HT-5 column will separate triglycerides by carbon chain length, simply and reliably. Because triglycerides are subject to thermal degradation, however, analysis temperatures for such samples are limited to 375°C or less. Figure C shows a triglyceride standard (10ng each compound on-column), analyzed using a final column temperature of 370°C. Compounds containing 38 to 56 carbons are well resolved and eluted in 30 minutes. Figure D is a chromatogram of a typical butterfat. Triglycerides with 26 to 54 carbons are separated in less than 20 minutes. Compared to Figure C, the initial temperature has been increased to 200°C to reduce analysis time.

These are just a few of the applications that can be performed using HT-5 capillary columns. Additional uses for these versatile, high temperature columns include analyses of polynuclear aromatic hydrocarbons, porphyrins, polyethylene waxes, fatty acid methyl esters, and siloxanes, and many GC/MS analyses.

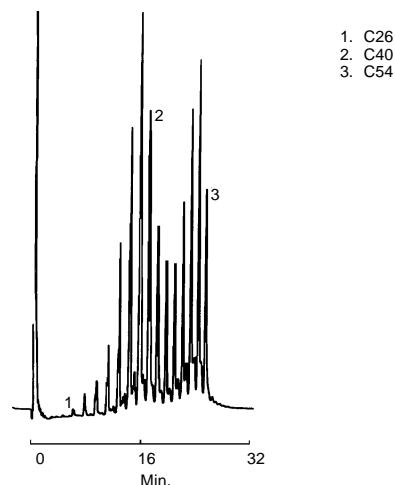
**Figure C. Triglycerides**

Column: **HT-5, 6m x 0.53mm ID, 0.10µm film**  
 Cat. No.: **25004**  
 Oven: 60°C to 370°C at 10°C/min, hold 5 min  
 Inj.: on-column



**Figure D. Butterfat**

Column: **HT-5, 6m x 0.53mm ID, 0.10µm film**  
 Cat. No.: **25004**  
 Oven: 200°C to 370°C at 10°C/min, hold 5 min  
 Inj.: on-column



**Ordering Information:**

**HT-5 High Temperature, Aluminum-Clad Fused Silica Capillary Columns**

12m x 0.22mm ID, 0.10µm film	<b>25000</b>
25m x 0.22mm ID, 0.10µm film	<b>25001</b>
12m x 0.32mm ID, 0.10µm film	<b>25002</b>
25m x 0.32mm ID, 0.10µm film	<b>25003</b>
6m x 0.53mm ID, 0.10µm film	<b>25004</b>
12m x 0.53mm ID, 0.15µm film	<b>25005-U</b>
25m x 0.53mm ID, 0.15µm film	<b>25006</b>

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Polywax – Petrolite Specialty Polymers Group  
 Fused silica columns manufactured under HP US Pat. No. 4,293,415.

Figures A - D courtesy of SGE, Inc., Austin, Texas, USA/SGE International Pty., Ltd., Ringwood, Australia.

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