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Application Note SI-01984

High Temperature SimDist Analysis According to IP507/07

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Introduction

The IP507/07 standard specifies a method for the determination of the boiling range distribution of petroleum products by capillary gas chromatography using flame ionization detection. The standard is applicable to materials having a vapor pressure low enough to permit sampling at ambient temperature and a boiling range of at least 100 °C. The standard is applicable to materials with initial boiling points (IBP) above 100 °C and final boiling points (FBP) above 750 °C, for example, heavy distillate fuels and residuals. The method is not applicable to bituminous samples.

Instrumentation

GC: Varian 450-GC/Simulated Distillation Analyzer
Injector: Temperature controlled with Varian SPI injector for capillary column with full EFC control
Column oven: With cryogenic (CO₂) cooling
Detector: FID with EFC control
Autosampler: CP-8400 or CP-8410

Software

GC control and data handling: Galaxie™ GC Workstation
SimDist calculations: SimDist software plug-in fully integrated into Galaxie

Materials

Column: Varian CP-SimDist column, 5 m x 0.53 mm x 0.1 µm Ultimetel (pn: CP7569)
Calibration mix for determination of TBP range
Motor oil for 100% recovery determination

Sample Preparation

All samples and calibration mixtures are dissolved in CS₂ at 2%.

Conditions

Oven temp/program: 35 °C/10 °C per min to 430 °C
Injector temp/program: 100 °C/15 °C per min to 430 °C
Detector temp: 450 °C
Carrier gas/flow rate: Helium, 19 mL/min
Sample size: 1 µL

Results

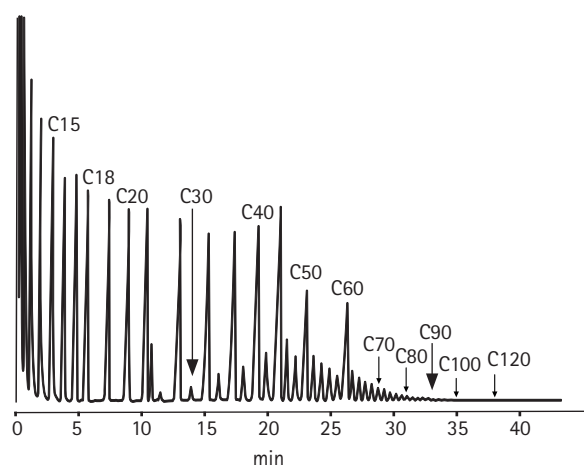


Figure 1. Typical chromatogram of a calibration mix.

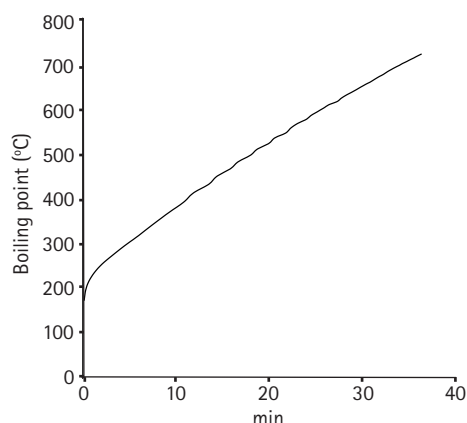


Figure 2. Typical calibration curve.

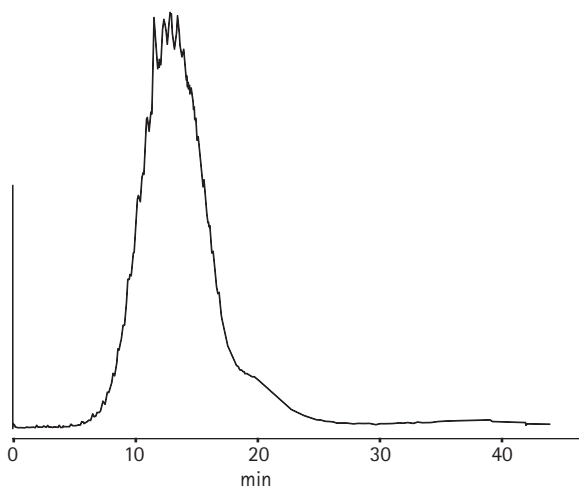


Figure 3. Chromatogram of a motor oil sample. Recovery is 100%.

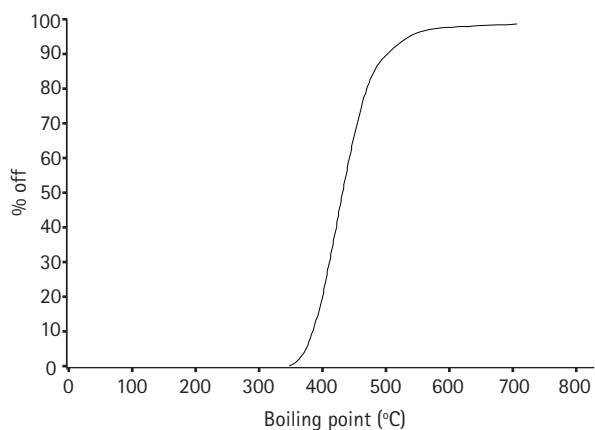


Figure 4. Result plot of the motor oil sample.

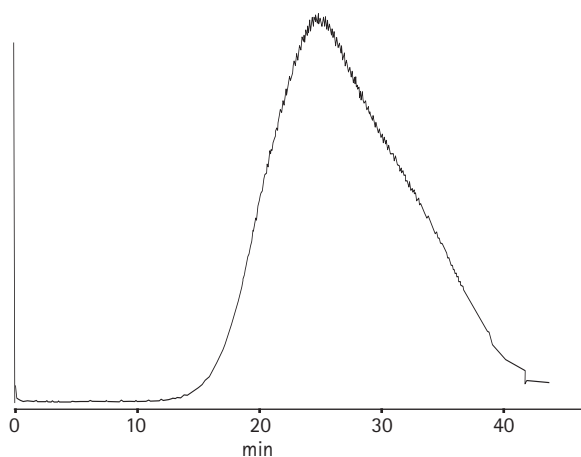


Figure 5. Chromatogram of a residue sample. Recovery is 88.7%.

Table 1. Results from the residue sample.

% off	°C	D86
IBP	476.7	504.8
1	487.8	
5	520.6	528.8
10	539.3	548.9
15	553.9	
20	566.9	572.6
25	578.1	
30	587.5	587.5
35	596.0	
40	605.8	
45	615.4	
50	626.1	613.3
55	637.5	
60	649.7	
65	662.4	
70	676.3	652.9
75	692.0	
80	709.1	537.6
85	728.8	
88	745.0	

Conclusion

The Varian SimDist Analyzer and its Galaxie™ based software provide the solution for high temperature simulated distillation applications as specified in SimDist method IP507/07.

Reference

IP 507: Determination of boiling range distribution by gas chromatography method - Part 2: Heavy distillates and residual fuels. Energy Institute, London.

These data represent typical results.
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