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TECHNICAL ARTICLE

BPX1-SimD

A New Era in Simulated Distillation Technology

Data supplied by Dr. J. Lubkowitz and the staff at Separation Systems Inc.

SGE's BPX capillary column range has already been shown to include the most thermally stable long life columns available. BPX1 is a new addition to the range and the BPX1-SimDist columns are specifically optimised for ASTM Method D2887 and the new High Temperature Simulated Distillation method (HTSD).

BPX1 was designed as a high temperature alternative to conventional 100% dimethylsilicone stationary phases. With a routine operating temperature of 430°C, extremely low bleed and excellent chemical inertness, the column is superior to all "MS" grade columns on the market.

The BPX1 column offers two major advantages over competitors'conventional dimethyl silicon columns. First, the low bleed at the upper temperatures required for the extended high temperature analysis results in better integration and therefore better quantitation for the higher hydrocarbon numbers. This results in the ability to quantify C110 without background subtraction or column compensation from a blank analysis. Second, lower column bleed means less loss of column phase and therefore a smaller decrease in capacity ratios. This is important to the practising chromatographer as the calibration can be carried out less often because of greater stability in retention times.

HTSD on BPX1

The analysis of a standard mixture used for HTSD is shown in **Figure 1.** This mixture uses hydrocarbons ranging from C10 to C20, Polywax 655 and C40. C40 is spiked into the mix as a reference point in the mixture. All major peaks are even numbered carbons. This chromatogram shows excellent separation, minimal bleed and the ability to quantify C110 without using background subtraction or

Figure. 1. Standard mix for HTSD using BPX1-SimD

Phase:	**BPX1, 0.1µm**		
Column:	**5m x 0.53mm ID**	**Separation Systems Injector**	
Initial Temp.:	40°C	Initial Temp.:	40°C
Rate:	15°C	Rate:	15°C
Final Temp.:	420°C, 5 min.	Final Temp.:	420°C, 5 min.
Detector Temp:	440°C		
Carrier Gas:	Helium, 10mL/min		
Instrument:	HP6890		
Part No:	**054800**		

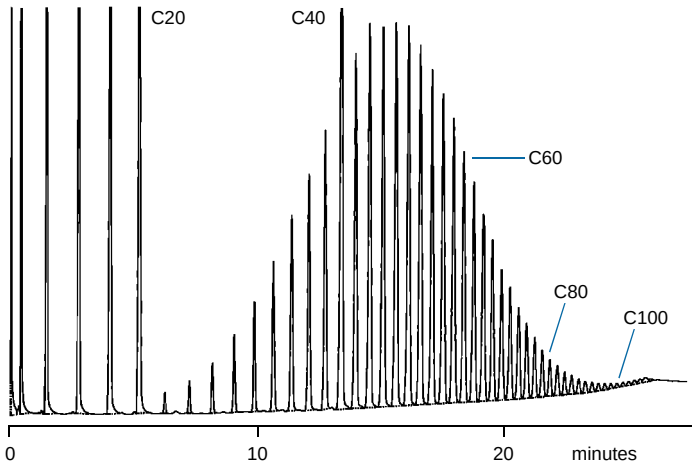

Figure. 2. Enlarged section of Figure 1.

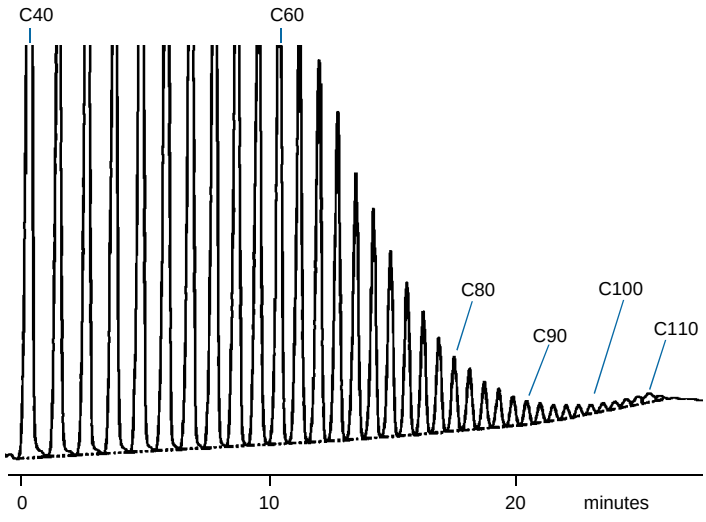

Figure 3. CS2 Blank

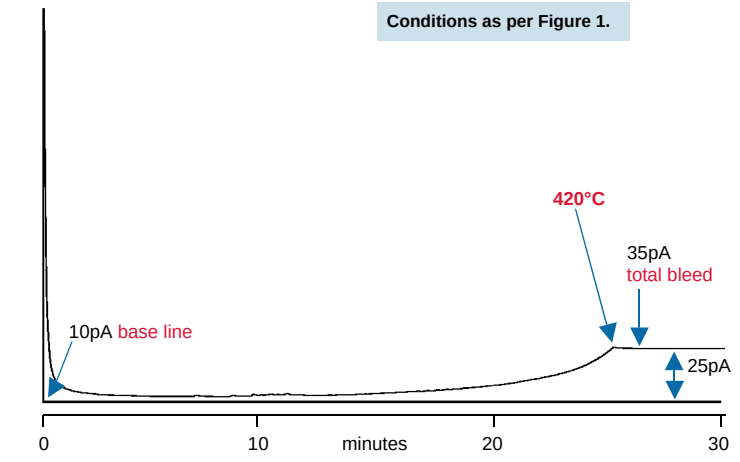

Figure 4. Reference Gas Oil MT-60

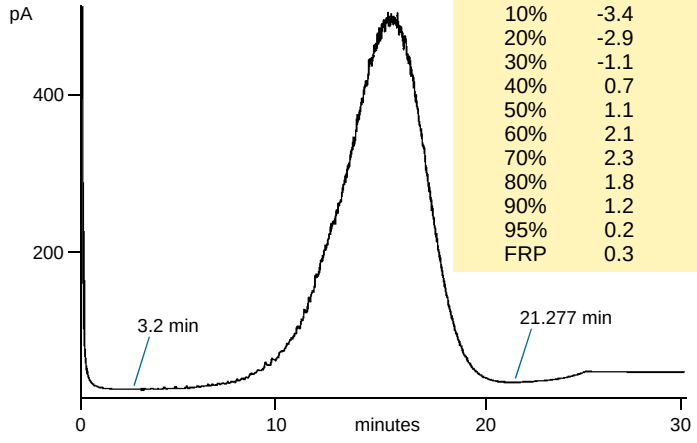

Table 1: Gas Oil Reference

Degrees difference (°F)	
IBP	0.6
5%	-6.2
10%	-3.4
20%	-2.9
30%	-1.1
40%	0.7
50%	1.1
60%	2.1
70%	2.3
80%	1.8
90%	1.2
95%	0.2
FRP	0.3

Table 2. QC Boiling Point Table ASTM D2887 High-Temp.

% Off	BP(°F)	QC(°F)	Diff
IBP	698.6	698.0	0.6
5.00	872.8	879.0	-6.2
10.00	918.6	922.0	-3.4
15.00	943.8		
20.00	963.1	966.0	-2.9
25.00	979.6		
30.00	993.9	995.0	-1.1
35.00	1005.8		
40.00	1016.7	1016.0	0.7
45.00	1027.3		
50.00	1037.1	1036.0	1.1
55.00	1046.3		
60.00	1055.1	1053.0	2.1
65.00	1063.5		
70.00	1072.3	1070.0	2.3
75.00	1081.3		
80.00	1091.8	1090.0	1.8
85.00	1103.3		
90.00	1117.2	1116.0	1.2
95.00	1138.2	1138.0	0.2
FBP	1194.3	1194.0	0.3

column compensation from a blank analysis - all in less than 25 minutes at a final temperature of 420ºC.

A portion of the previous chromatogram from C40 to the end of the analysis (expanded vertically) shows excellent resolution and the ability to see beyond C110 **(Figure 2).**

Figure 3 is a blank analysis of neat carbon disulfide. This displays the bleed from the column at 420ºC of 25 picoamps. This low bleed allows for easier integration of the peaks above C100.

The analysis of a reference gas oil **(Figure 4)** is used to verify the calibration of the system in regard to boiling points. It guarantees the effectiveness of the column to produce simulated distillation data that fits within specified guidelines of reproducibility.

The calculated data from this analysis are shown in **Table 2.** This data shows excellent correlation between the expected temperature at which a certain percentage of the reference gas oil is expected to elute and the calculated temperature from the calibration.

*Future articles will show applications of **BPX1** to approved ASTM D 2887 (Standard Test Method for Boiling Range Distribution of Petroleum Fractions by Gas Chromatography) and the "Extended " D 2887.*

Distillation of crude oil and petroleum products has been a mainstay for decades in refinery and commercial laboratories in order to evaluate crude oils or products. Only in recent years have engineers accepted distillation data produced by gas chromataography. These "distillations" are called "simulated distillations" since they are not true distillations in the strict sense. ASTM method D2887 (Standard Test Method for Boiling Range Distribution of Petroleum Fractions by Gas Chromatography) is simulated distillation products and fractions which have a final boiling point of 538°C (1000°F) or lower at atmospheric pressure (C44). This method has been extended (but is still to be accepted by ASTM) to boiling points of up to 750°C (1380°C). Two methods which are used are called extended D2887 (to C70) and High Temperature Simulated Distillation (HTSD) (to C90 and beyond). Up to this point two capillary column phases have been used for these methods. The two phases used are SGE's HT5 and polymethylsiloxane.

All of the data presented was produced by Dr. Lubkowitz and the staff at Separation Systems Inc. on a system using the Separation Systems programmed temperature vaporization injector (PTV) and the SIMDIS EXPERT® software.

BPX1-S imD ORDERING INFORMATION

ID mm	*Film µm*	*5m(Aluminium)*	*10m(Polyimide)*
0.53	0.1	**054800**	-
0.53	0.9	-	**054801**
0.53	2.65	-	**054802**