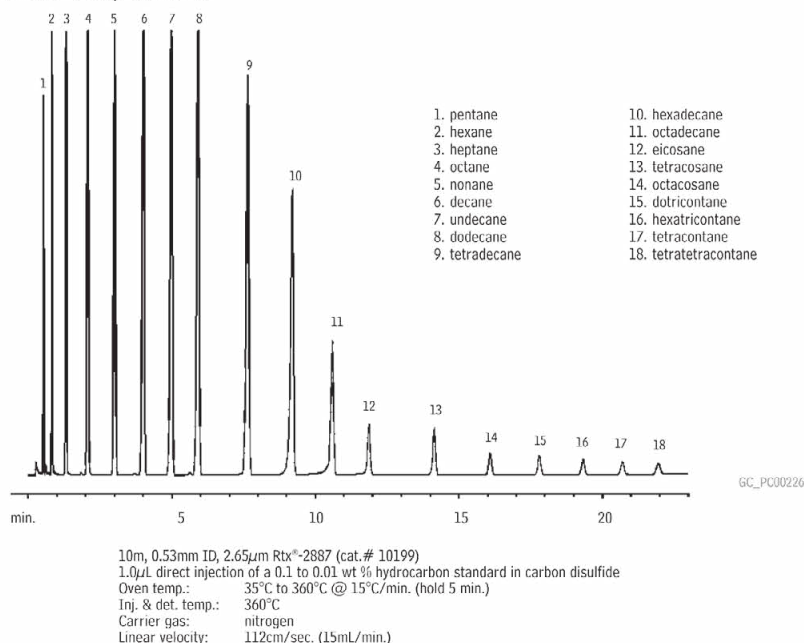


## Restek's Capillary GC Columns for Simulated Distillation of Petroleum Fractions

Simulated Distillation (Sim Dist) is an analysis which determines the boiling range distribution of petroleum samples using gas chromatography with temperature programming. Different Sim Dist methods are employed depending upon the boiling range of hydrocarbons in the product to be analyzed. ASTM Test Method D-2887 is most commonly used because its scope specifies petroleum products with a final boiling point less than 538°C (excluding gasoline). This boiling range includes samples such as jet fuel, kerosene, diesel, and gas oil. Although this technique has been in use for many years, using mostly packed columns, ASTM D-2887 permits the use of 0.53mm capillary columns.<sup>1,2</sup> Capillary columns with cross-bonded stationary phases offer several advantages compared to packed columns, including lower column bleed, shorter conditioning times, shorter analysis times, and longer column lifetimes. Although the analysis is, in principle, very simple, there are some important column and instrument parameters which must be optimized to meet the criteria for column resolution, bleed, and peak skewing specified in ASTM Method D-2887.<sup>3</sup>

It is possible to calculate boiling range distribution from GC data since a nonpolar stationary phase operated under temperature programmed conditions will elute hydrocarbons in order of increasing boiling points. The chromatographic system is calibrated by injecting a mixture of *n*-alkanes to cover the hydrocarbon range of the samples. Figure 1 shows the complete analysis of the Simulated Distillation Calibration Mixture in under 23 minutes, using the Rtx®-2887 capillary column. A computer program constructs a calibration curve from the hydrocarbon retention times and their atmospheric boiling points, then uses this curve to calculate the boiling range distribution of the petroleum fractions. Sample area is integrated into area "slices" vs. retention time, then the boiling point for each cumulative area % is determined by the computer program. An example analysis of ASTM Reference Gas Oil #1 appears in Figure 2. Note that it is not desirable to resolve all the components in a single sample when performing Sim Dist, since a typical laboratory distillation used for petroleum analysis generates a limited number of theoretical plates.

**Figure 1** Calibration of C5 to C44 standard, using an Rtx®-2887 capillary column (baseline compensated).



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50 mm	9319A52	9319A5E	9319A55
100 mm	9319A12	9319A1E	9319A15
150 mm	9319A62	9319A6E	9319A65
<b>5 µm Columns</b>			
30 mm	—	931953E	—
50 mm	9319552	931955E	9319555
100 mm	9319512	931951E	9319515
150 mm	9319562	931956E	9319565
250 mm	—	—	9319575

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