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Supel-Q PLOT Columns for Analyzing a Wide Range of Compounds

W. Betz

The Supel-Q PLOT column can separate a wide range of compounds, from subambient to high temperatures. As an alternative to packed columns, this porous layer open tubular column features a unique glue that eliminates bleed and particle loss, and a porous polymer that efficiently separates many compounds.

The use of porous layer open tubular (PLOT) columns for gas chromatographic (GC) separation of volatile, organic compounds has been ongoing during the last three decades. Unlike conventional packed columns, which contain particles in a packed bed, PLOT columns utilize porous solids — such as activated charcoal, porous polymers, molecular sieves and other high surface area particles — that are adhered to the inside wall of a capillary column. These columns provide improved separations, due to narrower column diameters and a reduction in the lateral diffusion encountered in packed beds.

Supelco recently developed a glue■ that effectively chemically bonds the micron-diameter porous particles to the column wall, thus preventing particle loss during column use. Our Supel-Q™ PLOT column combines the use of this glue with a special porous polymer — a highly porous divinylbenzene polymer (approximately 725m²/gram) that is synthesized in our labs as sub-micron, spherical particles. The broad working range of this porous polymer (max. temp. = 275°C), as well as the functional aspects of the glue technology, provide a unique column to evaluate a wide range of compounds — from volatile sulfur compounds with boiling points below ambient to high molecular weight hydrocarbons.

The preparation of the Supel-Q PLOT columns with strict manufacturing tolerances for the mass of porous polymers adhered to the column wall ensures effective reproducibility within tight tolerances. These tolerances are exemplified with retention time windows as well as peak symmetries for key compounds. The quality assurance data obtained for 60 columns is illustrated in Table 1.

The Supel-Q PLOT column (max. temp.: 250°C) effectively resolves carbon dioxide and C1-C4 hydrocarbons at above ambient temperatures without bleed. Also, it is suitable for analyses of other gases, such as sulfur gases, and alcohols, ketones, aldehydes, and many polar compounds. Gasoline and other petroleum fractions can be analyzed as well.

Table 1. Reproducibility Data for 0.53mm ID Supel-Q Columns

k′ (benzene)	standard deviation (n = 60)
6.86	0.47

The analysis of several volatile sulfur compounds illustrates the efficient performance of this PLOT column for hydrogen sulfide (boiling point of -60.2°C) through ethyl mercaptan (boiling point of 36.0°C) or even higher molecular weight sulfur compounds (Figure A).

An analysis of trace levels of water in fuels is illustrated in Figure B. The ability to quickly temperature-program the column assists in providing rapid analysis of this wide range of molecular size analytes. Permanent gas impurities can be evaluated using this same approach (Figure C).

The analyses of polar compounds, such as C3-C5 alcohols, is readily accomplished using the Supel-Q column, as illustrated in

Figure A. Light Sulfur Gases

Column: **Supel-Q PLOT**, 30m x 0.53mm ID
Cat. No.: **25462**
Oven Temp.: 50°C (1 min) to 250°C at 10°C/min, hold 10 min
Carrier: helium, 3mL/min
Det.: FPD, 260°C
Inj.: 25µL (approx. 16% each analyte), direct injection, 230°C

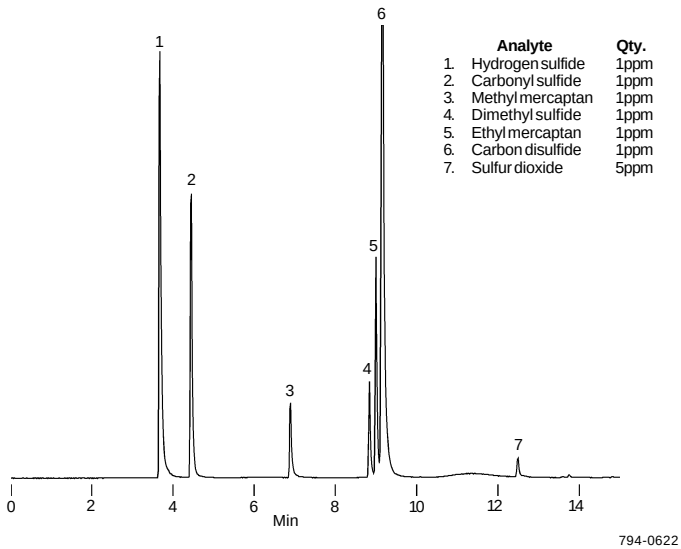

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Figure D. Other polar organic compounds such as ketones and aldehydes also can be analyzed using Supel-Q PLOT columns.

Relative to packed columns, the Supel-Q PLOT column offers better resolution in less time and a higher level of reproducibility. It can separate a large assortment of compounds, and can be fitted to packed and capillary column chromatographs.

■ Patent pending.

Figure B. Water in Gasoline

Column: **Supel-Q PLOT**, 30m x 0.53mm ID
Cat. No.: **25462**
Oven Temp.: 35°C (3 min) to 250°C at 16°C/min
Carrier: helium, 3mL/min
Det.: TCD, 260°C
Inj.: 0.4µL gasoline, direct injection, 230°C

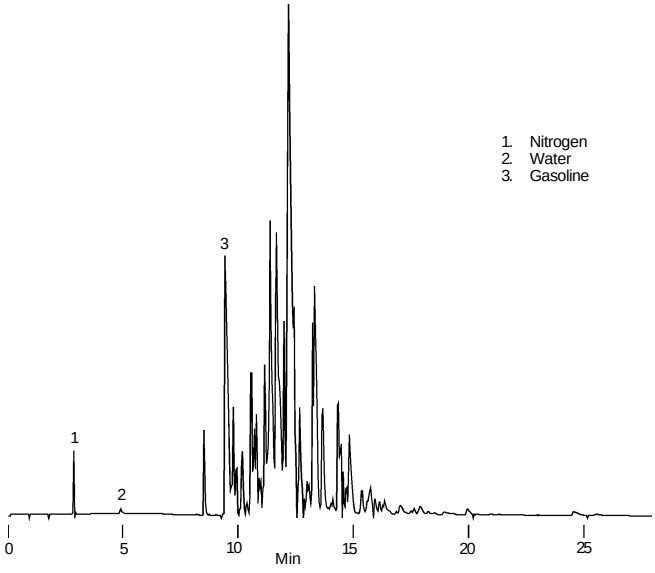


Figure C. Small Molecules in Jet Fuel

Column: **Supel-Q PLOT**, 30m x 0.53mm ID
Cat. No.: **25462**
Oven Temp.: 35°C (3 min) to 250°C at 16°C/min
Carrier: helium, 3mL/min
Det.: TCD, 250°C
Inj.: 0.6µL JP4 jet fuel, direct injection, 230°C

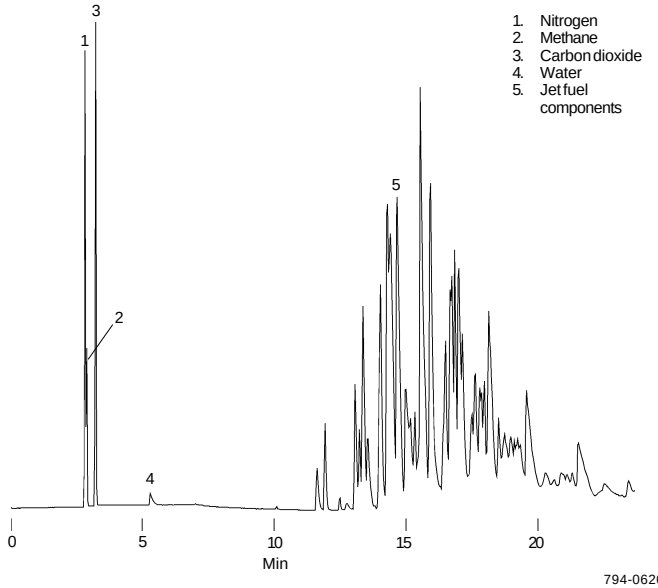
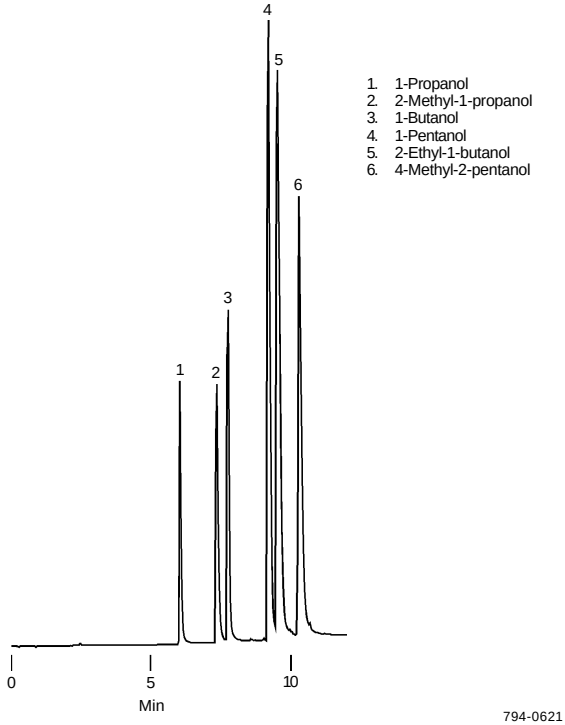


Figure D. Alcohols

Column: **Supel-Q PLOT**, 30m x 0.53mm ID
Cat. No.: **25462**
Oven Temp.: 35°C (3 min) to 250°C at 16°C/min
Carrier: helium, 3mL/min
Det.: FID, 250°C
Inj.: 0.1µL (approx. 16% each analyte), direct injection, 230°C



Ordering Information:

Description	Cat. No.
Supel-Q PLOT Columns	
30m x 0.32mm ID	**24242**
30m x 0.53mm ID	**25462**

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