



# Restek Advances PLOT columns – Again!

Porous polymers have been used for nearly three decades for separating light hydrocarbons and solvents. The columns traditionally used have been 2mm ID columns packed with 80/100 mesh material. The wizards at Restek have now made capillary PLOT columns available that utilize the same porous polymer materials. The Rt-S and Rt-Q PLOT columns offer a choice to the analyst who desires the selectivity of the divinylbenzene porous polymers but the efficiency of capillary columns. Figure 1 illustrates light hydrocarbons analyzed on an Rt-S and Rt-Q PLOT column. The incorporation of different vinyl monomers into the divinylbenzene porous polymer matrix produces noticeable selectivity variations. The Rt-S column provides baseline separation of ethylene and acetylene. PLOT columns offer higher efficiency when compared to packed columns, resulting in faster analyses.

Because of the large amount of porous polymer in packed columns, long conditioning times are necessary. However, with PLOT columns the actual amount of porous polymer is significantly lower. Not only does this shorten conditioning times and increase throughput, it also reduces the overall bleed level (critical with high temperature applications where low background levels are desired).

## TRUE SELECTIVITY OF TRADITIONAL POROUS POLYMER PACKINGS

Restek starts with high purity monomers for production of porous polymer PLOT columns. This ensures the columns will have a selectivity identical to that of the Porapak<sup>®</sup> and HayeSep<sup>®</sup> packings. When switching from packed columns to capillary columns, very little method development is required because the elution patterns remain the same. The Rt-Q PLOT column is a divinylbenzene homopolymer, whereas the Rt-S PLOT column is a divinylbenzene and 4-vinylpyridine copolymer.

## PLOT Columns

- PLOT columns offer an efficient alternative to packed columns.
- Selectivity identical to HayeSep<sup>®</sup> and Porapak<sup>®</sup> packings.
- All PLOT columns immobilized to eliminate particle generation.
- Unbreakable MXT-Q and MXT-Msieve 13X.
- Each column individually tested for reproducibility.

## NO PARTICLE TRAPS NECESSARY

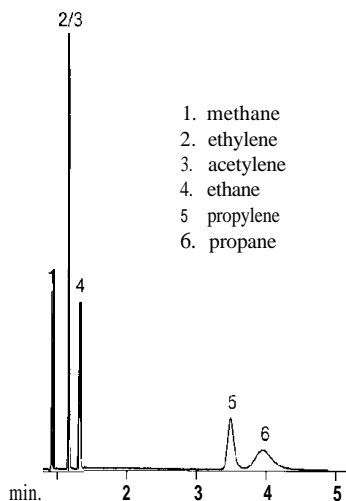
Because PLOT columns are made with submicron particles attached to the column wall, finding a good binder is critical. Restek has discovered a binding material that eliminates particle generation from PLOT columns. This process eliminates detector spiking and disruption of the valving system.

## NEW LINE OF UNBREAKABLE MXT PLOT COLUMNS

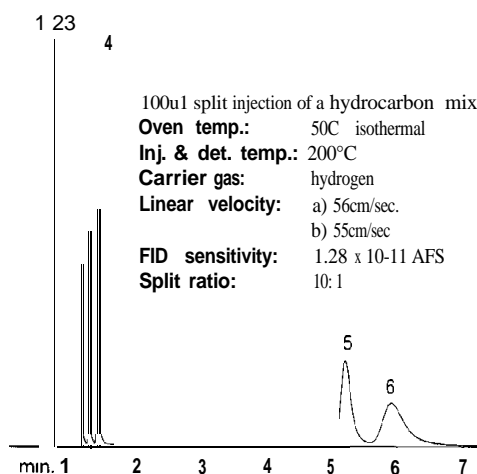
The wizards at Restek have coated PLOT columns utilizing Silcosteel<sup>®</sup> fused silica lined tubing. The Silcosteel<sup>®</sup> PLOT columns offer the analyst an unbreakable option to standard fused silica tubing with no compromise in performance. MXT<sup>®</sup> PLOT columns must meet or exceed the same rigorous specifications as fused silica PLOT columns. Because the tubing is stainless steel, field and process analyzers are no longer at the mercy of brittle fused silica tubing. Current metal PLOT columns are

Figure 1 - Selectivity changes with the incorporation of different monomers in the porous polymer.

a) 30m, 0.53mm Rt-Q (cat.# 19716)



b) 30m, 0.53mm ID Rt-S (cat.# 19712)





available with the Q porous polymer or Molecular sieve 13X zeolite. Figure 2 shows the analysis of light hydrocarbons on a T"-Q PLOT column and the analysis of permanent gases on an MXT"-Msieve 13X PLOT column.

#### COLUMN TO COLUMN REPRODUCIBILITY GUARANTEED

Each porous polymer PLOT column is tested with a hydrocarbon test mix to insure proper phase thickness and selectivity. Propane is used to calculate the partition ratio which is monitored to insure a reproducible film thickness. The number of plates per meter is calculated and used to evaluate column efficiency. Selectivity is ensured by calculating the retention indices of acetylene and methyl acetylene.

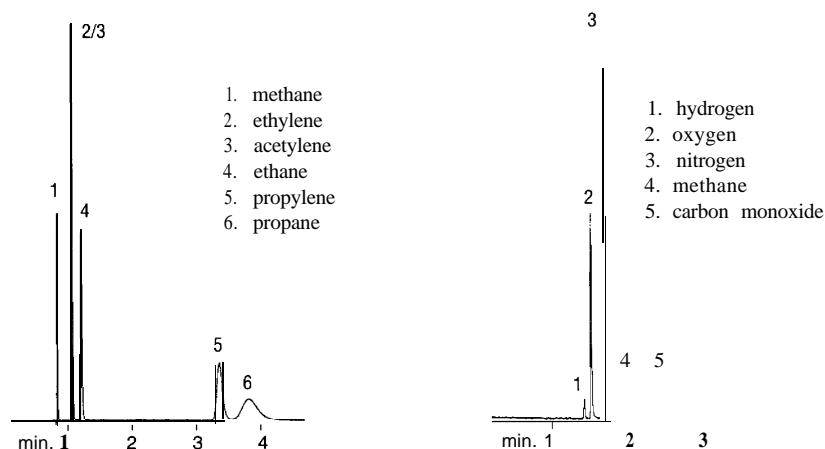
Molecular sieve PLOT columns are all tested with a mixture of permanent gases. In this test the peak height ratio of carbon monoxide is used to determine a uniform

film and to calculate the number of plates per meter.

Restek's expanding line of PLOT columns continue to bridge the gap from packed to capillary columns. Through continuing research Restek now offers unbreakable and particle free porous Layer Open Tubular capillary columns for the analysis of permanent gases, light hydrocarbons and volatile chemicals.



**Figure 2 - MXT" PLOT columns give fast, efficient separation of light hydrocarbons & permanent gases.**



30m, 0.53mm ID MXT-Q (cat.# 79716)  
100ul hydrocarbon  
**Oven temp.:** 50C isothermal  
**Inj. & det. temp.:** 200°C  
**Carrier gas:** hydrogen  
**Linear velocity:** 6.5cm/sec.  
**FID sensitivity:** 1.28 x 10<sup>-11</sup> AFS  
**Split ratio:** 10:1

30m, 0.53mm ID MXT-Msieve 13X (cat.# 79706)  
20ul split inj. of permanent gases.  
**Oven temp.:** 40C isothermal  
**Inj. & det. temp.:** 200°C  
**Carrier gas:** helium  
**Linear velocity:** 37cm/sec.  
**Detector:** TCD (212 mA)  
**Split ratio:** 15:1

## PLOT Columns

### Rt-S

(fused silica)

30m, 0.53mm ID cat.# 19712  
15m, 0.53mm ID cat.# 19713  
30m, 0.32mm ID cat.# 19710  
15m, 0.32mm ID cat.# 19711

### Rt-Q

(fused silica)

30m, 0.53mm ID cat.# 19716  
15m, 0.53mm ID cat.# 19715  
30m, 0.32mm ID cat.# 19718  
15m, 0.32mm ID cat.# 19717

### MXT"-Q

(SilcosteelP)

30m, 0.53mm ID cat.# 79716  
15m, 0.53mm ID cat.# 79715

### Rt-Msieve 13X

(fused silica)

30m, 0.53mm ID cat.# 19706  
15m, 0.53mm ID cat.# 19708  
30m, 0.32mm ID cat.# 19705  
15m, 0.32mm ID cat.# 19707

### MXT"-Msieve 13X

(Silcosteel")

30m, 0.53mm ID cat.# 79706  
15m, 0.53mm ID cat.# 79708

### Rt-Alumina

(fused silica)

30m, 0.53mm ID cat.# 19700  
50m, 0.53mm ID cat.# 19701  
30m, 0.32mm ID cat.# 19702  
60m, 0.32mm ID cat.# 19703