IMPORTANT: ***Keep this document for your records***

PLOT Columns

Installation and Conditioning

Column installation and conditioning

Thank you for purchasing this Agilent Technologies PLOT column.

Before proceeding, please read the following information regarding the proper installation and conditioning of your Agilent PLOT column. These steps are critical to proper performance and lifetime of the column.

PLOT columns are highly retentive. Trace amounts of water in your carrier gas stream can adversely affect chromatography. The use of a moisture trap on your carrier gas line is highly recommended.

1. Install the column according to the instructions enclosed in the column box.
2. After installing the column into the inlet, set the carrier gas flow rate. For all columns except the GS-GasPro and GS-CarbonPLOT, slowly increase the carrier gas pressure at a rate of 2 to 3 psi/min until reaching the appropriate flow rate:

Inner dia.	Standard flow rate
0.32 mm	2 to 4 mL/min
0.53 mm	6 to 9 mL/min

   Slow pressure ramping is not required for GS-GasPro and GS-CarbonPLOT – these columns can be brought to pressure rapidly due to their unique particle bonding technology.
3. Let the carrier gas purge for 3 to 5 minutes before connecting the column to the detector.
4. Condition the column per the guidelines in Table 1.

   Do not exceed the maximum operating temperature of the column when setting injector and detector temperatures.

Table 1. Conditioning Guidelines

Column	Conditioning temperature	Conditioning time
HP-PLOT Molesieve	300-350 °C	3-4 hours
HP-PLOT Al_2O_3 "KCl"	200 °C	8 hours
HP-PLOT Al_2O_3 "S"	200 °C	8 hours
HP-PLOT Al_2O_3 "M"	200 °C	8 hours
GS-Alumina	200 °C	8 hours
HP-PLOT Q	270 °C	3-6 hours
GS-Q	250 °C	8-10 hours
HP-PLOT U	190 °C	3-6 hours
GS-GasPro	260 °C	3-6 hours
GS-CarbonPLOT	300-350 °C	3-6 hours

Column maintenance

PLOT columns can become contaminated by water, polar compounds, and/or hydrocarbons in sample or carrier gas streams. When contamination is suspected, bake the column at its conditioning temperature for several hours, or until the baseline is stable.

Contaminant compounds vary depending on the retention and selectivity of the PLOT stationary phase. Consult Table 2, PLOT Column Selection Guide, for recommended applications and suggestions on possible contaminant compounds.

To maintain the installed column between uses, hold the oven temperature at 100 °C to 150 °C with continuous carrier gas flow. This helps to avoid problems associated with accumulation of water, CO_2, or other carrier gas impurities.

Particle traps for use with PLOT columns

Though highly stabilized, it is impossible to guarantee that no particles will dislodge from the column wall with the following phases: HP-PLOT Molesieve, HP-PLOT Al_2O_3 (any phase), GS-Alumina, HP-PLOT Q, HP-PLOT U, and GS-Q. When used in valve-switching applications, consider using a particle trap to prevent scarring of the valve rotors. Also consider a particle trap when interfacing one of the listed PLOT phases to a mass spectrometer.

Particle traps are short pieces of capillary column with a moderate film thickness of a siloxane stationary phase. Any particles eluting from the PLOT column are trapped on the siloxane phase layer. Agilent sells particle traps for your convenience. Please see Table 3 for dimensions and part numbers.

Table 3. Particle Traps

Inner dia. (mm)	Length (m)	Part no.
0.32	2.5	5181-3351
0.53	2.5	5181-3352

Agilent PLOT columns

Agilent offers a comprehensive line of PLOT columns for analysis of fixed gases, low molecular weight hydrocarbon isomers, volatile polar compounds, and reactive analytes such as sulfur gases, amines, and hydrides. Many of our PLOT phases are offered in dimensions from 0.25 to 0.53 mm ID, allowing for easy column selection for various detector and system requirements. For GC/MS systems, we offer several small diameter columns with truly bonded and immobilized stationary phases, eliminating potential detector fouling due to particle elution.

Refer to Table 2 for information on PLOT column selection. This reference table includes all of the Agilent PLOT column phases, common application areas in which they are used, and potential contaminants. Many PLOT column applications require the use of switching valves for a variety of reasons, including the avoidance of contaminant introduction to a PLOT phase.

Agilent Technical Support

If you require more detailed technical information on column selection, or on column switching valves, please contact Agilent Technical Support. Also, for a complete listing of J&W Scientific columns and PerfectFit supplies, as well as ordering information, please visit our Web site at:

www.agilent.com/chem

Or, you can contact your authorized Agilent distributor or local Agilent representative.

Table 2. PLOT Column Selection Guide

Column	Stationary phase	Typical applications	Typical contaminants
HP-PLOT Molesieve	5Å zeolite molecular sieve	Permanent and noble gases. Thick and thin films available. Thick film column will resolve argon and oxygen at 35 °C.	Water; carbon dioxide; hydrocarbons larger than C3.
HP-PLOT Al_2O_3 "KCl"	Aluminum oxide deactivated with KCl	Least "polar" Al_2O_3 phase. Lowest retention of olefins relative to comparable paraffin. C1 to C8 hydrocarbon isomers. Column of choice for accurate quantitation of dienes, especially propadiene and butadiene from ethylene and propylene streams.	Water; carbon dioxide; large hydrocarbons and substituted aromatics; oxygen-containing compounds such as alcohols, ethers, ketones; sulfur-containing compounds.
HP-PLOT Al_2O_3 "S"	Aluminum oxide deactivated with sodium sulfate	Excellent midpolarity, general use Al_2O_3 column. C1 to C8 hydrocarbon isomers. Best for resolving acetylene from butane and propylene from isobutane.	Water; carbon dioxide; large hydrocarbons and substituted aromatics; oxygen-containing compounds such as alcohols, ethers, ketones; sulfur-containing compounds.
HP-PLOT Al_2O_3 "M"	Aluminum oxide with proprietary deactivation	Most "polar" of the Al_2O_3 columns. Highest retention of olefins relative to comparable paraffin. Excellent general use Al_2O_3 column. C1 to C8 hydrocarbon isomers. Good for resolving cyclopropane from propylene.	Water; carbon dioxide; large hydrocarbons and substituted aromatics; oxygen-containing compounds such as alcohols, ethers, ketones; sulfur-containing compounds.
GS-Alumina	Aluminum oxide with proprietary deactivation	Most "polar" of the Al_2O_3 columns. Highest retention of olefins relative to comparable paraffin. Excellent general use Al_2O_3 column. C1 to C8 hydrocarbon isomers. Best for resolving cyclopropane from propylene. Good stability and recovery from water saturation. Selectivity slightly different than "M" column.	Water; carbon dioxide; large hydrocarbons and substituted aromatics; oxygen-containing compounds such as alcohols, ethers, ketones; sulfur-containing compounds.
HP-PLOT Q	Polystyrene-divinylbenzene	C1 to C3 isomers, alkanes to C12, CO_2, methane, air/CO, water, oxygenated compounds, sulfur compounds, solvents.	Large hydrocarbons and substituted aromatics.
GS-Q	Polystyrene-divinylbenzene	C1 to C3 isomers, alkanes to C10, CO_2, methane, air/CO. Slightly different selectivity than HP-PLOT Q. Not recommended for quantitation of polar compounds.	Large hydrocarbons and substituted aromatics.
HP-PLOT U	Divinylbenzene/ethylene glycol dimethacrylate	More polar than HP-PLOT Q and GS-Q. C1 to C7 hydrocarbons, CO_2, methane, air/CO, water, oxygenates, amines, solvents, alcohols, ketones, aldehydes.	Large hydrocarbons and substituted aromatics.
GS-GasPro	Proprietary, bonded silica-based	C1 to C12 hydrocarbons, CO_2, trace-level sulfurs, hydride gases, inorganic gases, halocarbons, SF_6, oxygen/nitrogen separation at –80 °C.	Large hydrocarbons and substituted aromatics.
GS-CarbonPLOT	Bonded, monolithic carbon-layer	C1 to C5 hydrocarbons, CO_2, air/CO, trace acetylene in ethylene, methane.	Large hydrocarbons and substituted aromatics.

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J&W GC Column Performance Summary

Performance Results

Compound Identification	Retention Time (t_r)	Partition Ratio (k)	Peak Width ($w_{1/2}$)

Test Conditions

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