

***** Technical Fact Sheet *****
Gel Permeation Chromatography Clean-up

Gel Permeation Chromatography (GPC) is a high performance liquid chromatography system designed to perform cleanup of environmental samples in accordance with EPA Method 3640A.

EMA uses the Waters GPC System. The Waters System uses a 515 HPLC Pump, a 717 Plus Autosampler, the GPC Column, a 2-Channel UV/VIS Detector, and a Waters Fraction Collector. The GPC separates molecules according to their size in solution. A GPC column contains a highly porous, polymeric gel packing material. The size of the pores and the pore size distribution determine the molecular range of separation. Because small molecules enter and reside in a larger percentage of the gel pores than do large molecules, the small molecules take proportionally longer to elute from the gel. The resulting column eluent contains the component molecules sorted by size, with largest molecules eluting first, medium molecules slightly later, and the smallest molecules eluting last. Much like a mechanical sieve, but in reverse. This sorting mechanism makes GPC an ideal method for removing undesirable components in a sample into one fraction, while enabling retention and collection of desired components in another fraction.

Sample cleanup by GPC removes low volatility, high molecular weight materials, such as lipids, proteins, polymers, natural resins, and dispersed high molecular weight compounds from environmental samples such as tissues and sediments. These materials foul the injection port area and columns of the gas chromatography systems used to detect priority pollutants, pesticides, and PCB's in environmental samples. In addition, other interfering elements such as sulfur, which is commonly found in sediments and sludges, can be removed. This allows for cleaner chromatography that typically reduces the need for additional dilutions and makes the identification of compounds of interest less difficult.

EnviroMatrix Analytical, Inc. (EMA) uses GPC for all tissue, sediment, and sludge samples. Using the GPC allows us to process client samples more efficiently and with better quality data. This efficiency comes from the fact that our injection ports and GC columns run cleaner reducing the downtime required for maintenance or procurement. In addition, we usually don't have to run samples multiple times at higher dilution factors to reduce interference's or because of QC problems related with degradation or column loading.

GPC is recommended by the EPA in SW-846 for all environmental samples for SVOCs, pesticides, and PCB's. All quality control samples are processed throughout the GPC run which include method blanks, lab control samples, and matrix spike samples.

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