



## Gel permeation chromatography for sample clean-up

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### Introduction to GPC sample cleanup

In trace level analysis of complicated samples, such as analysis for pesticide residues and food additives, extensive sample cleanup is often needed prior to instrumental determination. The quality of final analytical results depends considerably on the effect of the cleanup and the skills of the chemists performing the work.

Gel permeation chromatography (GPC) is an effective technique for removing large molecule interferences from sample extracts prior to instrumental determination. As the separation of GPC is based on size of molecules, it can give good recoveries to analytes of different polarities. This feature makes GPC an excellent approach for simultaneous analysis of large variety of compounds (such as multi-residue analysis). The GPC cleanup can also be easily automated. As most of the work is done by instruments, the results are less affected by the skills of operators.

### Hardware requirements

GPC cleanup can be carried out using a very simple set up or using a dedicated automatic system, depending on available budget and the required sample throughput.

A low cost GPC system may be built using a manual injector, an isocratic HPLC pump, a single wavelength UV detector, a GPC column, and a fraction collector. Figure 1 shows a GPC system based on an Agilent 1100 isocratic HPLC and a 7-channel valve assembly from PromoChrom Technologies.

The LC-01 valve controller synchronizes the operation of the HPLC and the valve for convenient fraction collection.

Compared to a dedicated GPC system, this configuration can also be used for normal chemical analysis.



Fig 1. A configuration for GPC cleanup.

### GPC columns

Traditional GPC columns are of a dimension of 600 x 20mm ID. The large amount of packing is needed for handling sufficient amount of sample, so that satisfactory method detection limit can be achieved. GPC columns of such dimension require a large amount of elution solvent and a long elution time. Normally one sample consumes 300-500 mL solvent and needs one hour. Since the introduction of GPC for sample cleanup, the detection sensitivity of analytical instruments has improved considerably, making it possible to use smaller GPC columns. By using a smaller column, solvent consumption and analysis time can be drastically reduced.

PromoChrom Technologies provide GPC columns made by Jordi Associates. Jordi GPC columns use DVB gel material that is made by a proprietary process providing a maximum amount of cross-linking. Compared to other GPC columns available on the market, Jordi GPC columns are of more stable packing bed at high pressure and are less affected when a

solvent exchange is necessary. The same column can be run in toluene, THF, methanol, hexane, HFIP, or Freon. The columns can be used with 5% water in THF or with straight acetone (which some suppliers admit are a problem with styrene-divinylbenzene gels!).

Fluorinated DVB column packing is a recent Jordi's innovation. Columns packed with fluorinated divinylbenzene gel beads can use a flow rate 3-5 times higher than other GPC columns without loss of column efficiency (See figure 2). By adopting a higher flow rate, time on sample preparation can be reduced by 70%.

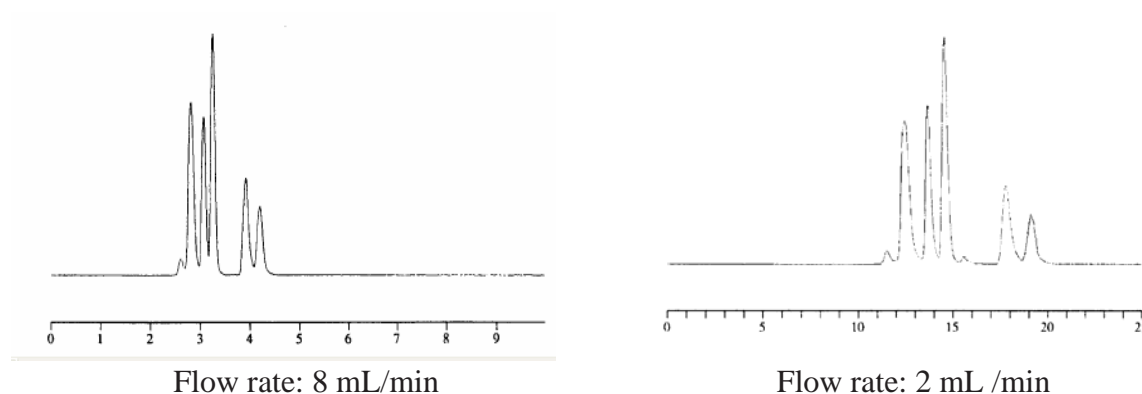


Fig. 2 Separation efficiency of fluorinated DVB gel columns at different flow rate. Column, Fluorinated DVB gel, 500 x 10 mm; mobile phase, methylene chloride; detection, 254 nm; injection volume, 250  $\mu$ L. Peak 1, Corn oil (25 mg/mL); peak 2, bis phthalate (1.0 mg/mL); peak 3, methoxychlor (0.2 mg/mL); peak 4, perylene (0.02 mg/mL); peak 5, sulfur (0.08 mg/mL).

### Ordering Information

- 1) PN 90002 10 x 500mm  
Fluorinated DVB Gel
- 2) PN 10002 21.2 x 500mm  
DVB Gel
- 3) PN 90032 21.2 x 500mm  
Fluorinated DVB Gel
- 4) PN 14000 600 x 22mm ID  
Small pore Bio Beads.



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