

# Extraction of Glycols From Water Using ENVI-Carb™ Plus Reversible SPE Tubes



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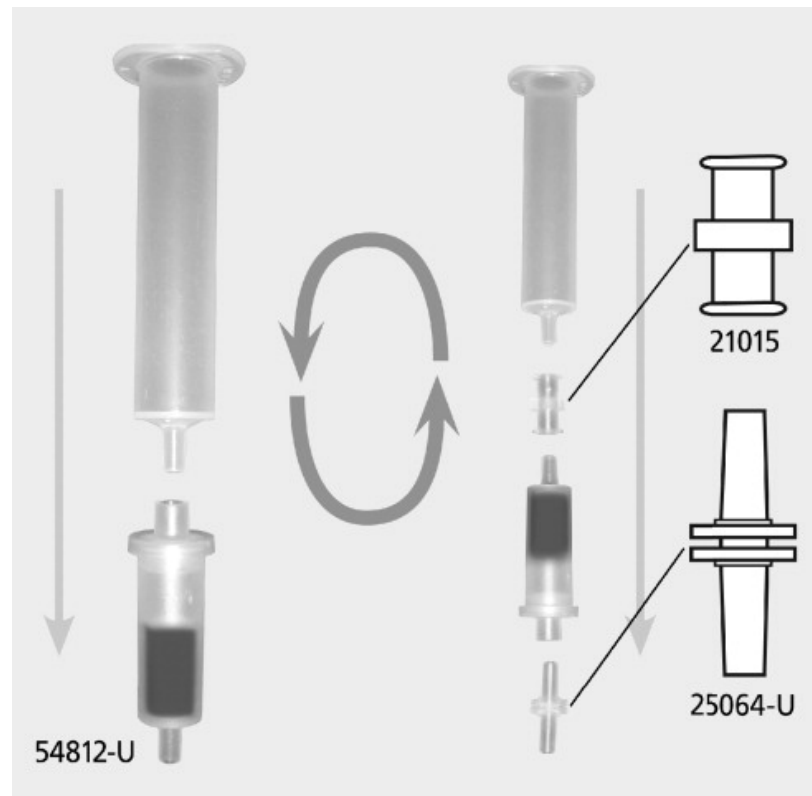


# Introduction

- Most traditional methods for extracting glycols from water fail because liquid/liquid extraction and standard SPE phases cannot adequately retain the glycols.
- ENVI-Carb Plus is a microporous amorphous carbon molecular sieve whose surface is less hydrophobic than other types of carbons, giving it a high affinity for water.
- The higher affinity for water of ENVI-Carb Plus helps to draw analytes from aqueous solution into the pore structure, allowing them to be retained.

# ENVI-Carb Plus Reversible Tubes

- ENVI-Carb Plus tubes are 1 mL Reversible SPE tubes packed with 0.4 g of sorbent.
- Reversal of the tube allows for more efficient elution of strongly retained analytes using minimal solvent.
- Supelco Catalog # 54812-U





## Experimental

- Samples of deionized water were spiked at varying levels with propylene and ethylene glycols.
- Extraction was done with ENVI-Carb Plus reversible cartridges.
- The cartridge was reversed prior to elution.
- GC analysis was performed directly on the extracts without further concentration or solvent exchange.

# Experimental – SPE Extraction

## ENVI-Carb Plus Extraction Protocol

Cartridge:	ENVI-Carb Plus reversible tube, 0.4 g/1 mL (54812-U)
Conditioning:	Stepwise: 1 mL methylene chloride, 2 x 2 mL methanol, 3 mL deionized water (do not allow cartridge to go dry after first aliquot of methanol)
Sample:	5 mL water sample spiked with ethylene and propylene glycols
Drying:	10 minutes
Elution:	5 mL of 50:50 methanol:methylene chloride

# Experimental – GC Analysis

## GC Analysis Conditions

Column:	SPB™-1000, 30 m x 0.53 mm I.D. x 1.5 µm (25445)
Oven:	100 °C (1 min.), 10 °C/min. to 200 °C
Inj.:	250 °C
Det.:	FID, 220 °C
Carrier Gas:	helium, 35 cm/sec constant
Injection:	1 µL, splitless

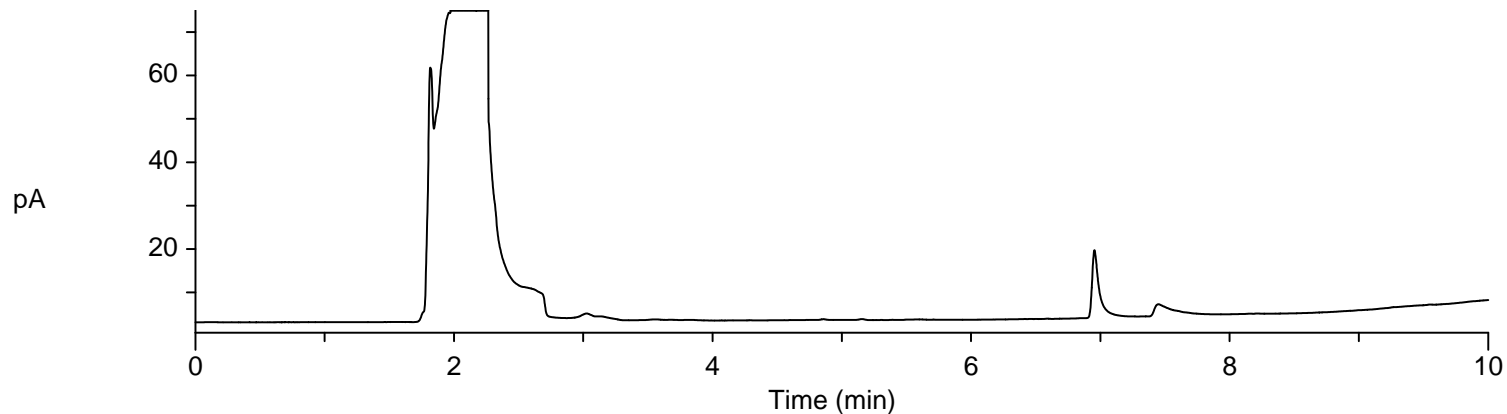


# ENVI-Carb Plus Gives Better Sensitivity

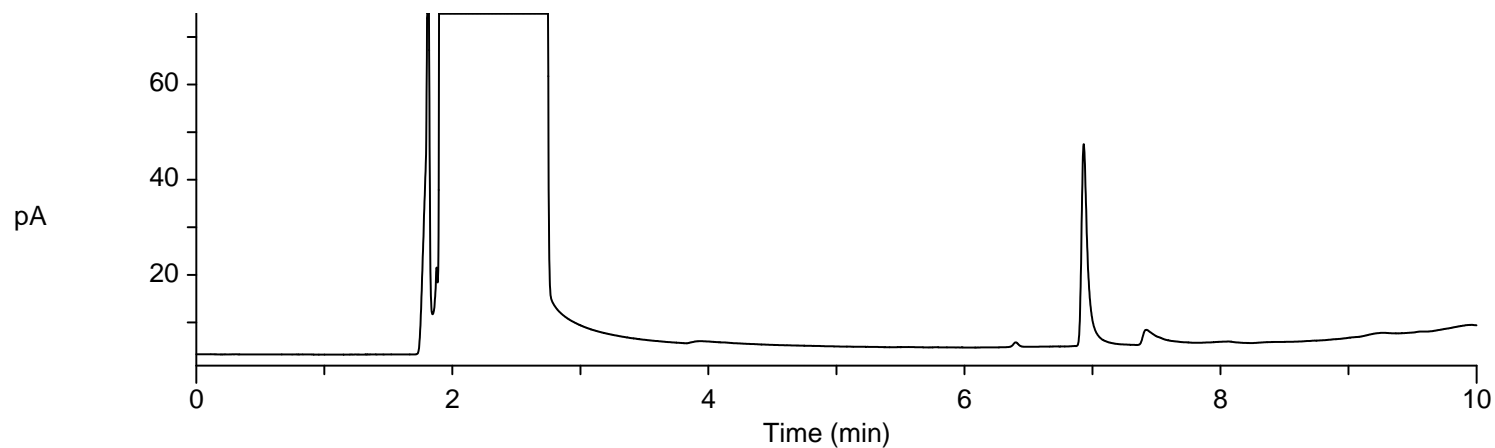
## Peak Shape and Height Improved for Propylene Glycol



Direct aqueous injection of 25  $\mu\text{g}/\text{mL}$  spiked water sample



Injection of 25  $\mu\text{g}/\text{mL}$  water sample extracted using ENVI-Carb Plus





# High Recovery of Propylene Glycol

Reproducibility and Recovery of Glycols from spiked DI water extracted using ENVI-Carb Plus

<b><u>25 µg/mL Spike</u></b>	<b><u>Propylene Glycol</u></b>	<b><u>Ethylene Glycol</u></b>
Avg Recovery	97%	25%
%RSD, n=3	4%	5%



## Conclusions

- ENVI-Carb Plus reversible cartridges were able to extract both propylene and ethylene glycols from water.
- The method proved to be both quantitative and reproducible.
- Elution was achieved with a combination of organic solvents, offering further options for GC analysis such as sample concentration or solvent exchange.
- The extraction protocol shown here appears to be optimized for propylene glycol.