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SUPELCO®

Product Information

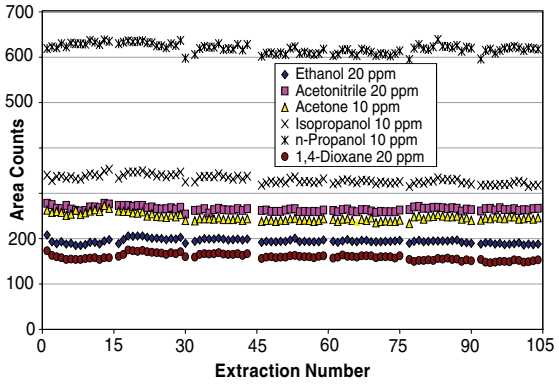
Polyethylene Glycol (PEG) SPME Fibers

A new polar SPME fiber has been developed with a polyethylene glycol phase coating. This new 60 µm PEG SPME fiber coating does not contain an adsorbent polymer. Eliminating the adsorbent produces a more polar, selective fiber. The new PEG phase is coated on an inert metal fiber core attached to the standard stainless steel assemblies. The metal fiber core also enables long lengths of the fiber to be coated continuously, helping improve reproducibility between fibers. Also, the metal fiber is unbreakable and the coating bonds to the metal core better than other surfaces.

Durability of Fiber Coating

Since Carbowax® is a water-soluble material, the durability of the coating often becomes a problem due to swelling and stripping when extracting analytes out of water. A top priority for the PEG fiber coating was to make it more durable and robust coating. To achieve this, the coating must bond securely to the fiber core and not swell significantly when inserted in water. This requires a highly cross-linked polymer. To demonstrate the durability of the PEG fibers, they were immersed for 10 minutes in water containing small polar solvents at ppm levels. The Varian 8200 autosampler was used, which agitates the fiber similarly to an electric razor. This fast vibration is often detrimental to fiber coatings. With the old CW-DVB fibers, the life of the fiber in the system ranged between 1 and 20 extractions before part or all of the coating came off the fiber core. With the new PEG fiber, the average life of the fibers was over 100 extractions. After 15 extractions, a water blank was extracted to remove salt on the fiber and the fiber was examined. Figure 1 shows the response of the solvents over 100 extractions. There was a slight reduction in analyte response of about 3% between the first 10 and the last 10 extractions. No visible decay in the appearance of the fiber coating was observed and the film thickness remained constant throughout the study.

Figure 1. Analyte Response from Repeated Extractions with 60 µm PEG SPME Fiber



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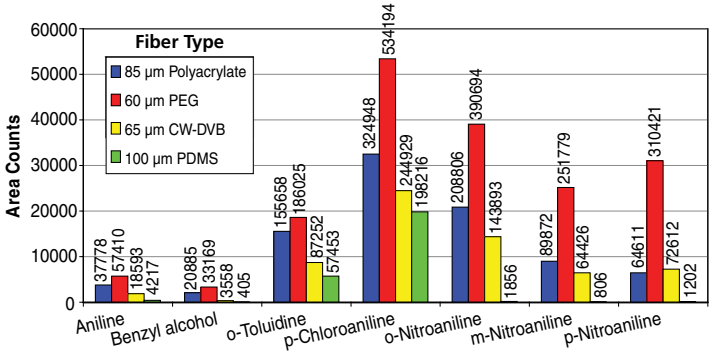
Applications Using 60 µm PEG Fiber

Since the 60 µm PEG fiber is being offered as a replacement for the CW-DVB fibers, applications comparing fiber performance is important. Several classes of analytes were evaluated and some examples are shown below. For a more detailed comparison please contact Supelco Technical Service (800-359-3041/814-359-3041) for additional information. A mixture containing base neutral analytes was evaluated with several different SPME fibers. Figure 2 compares the fibers for the extraction of the more polar analytes in the mixture. These analytes were extracted out of buffered salt water (pH 9) by immersion for 30 minutes with agitation using the CombiPAL™ autosampler.

Figure 2. Comparison of SPME Fibers by the Extraction of Basic Analytes



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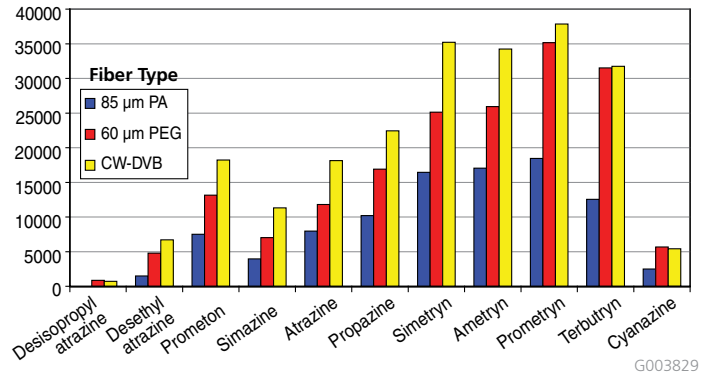
The results show that the 60 µm PEG fiber extracts the more polar analytes better than the other fiber coatings, while it extracts less of the non-polar analytes compared to the other fibers. Triazine herbicides have both polar and non-polar properties and most of the analytes are extracted well with a variety of fibers. However, for the extraction of the metabolites of atrazine, desethyl atrazine and desisopropyl atrazine, more polar fibers are recommended. Figure 3 (over) shows a comparison of the fibers for the extraction of the herbicides.

Figure 3. Comparison of Fiber Coatings for the Extraction of Herbicides



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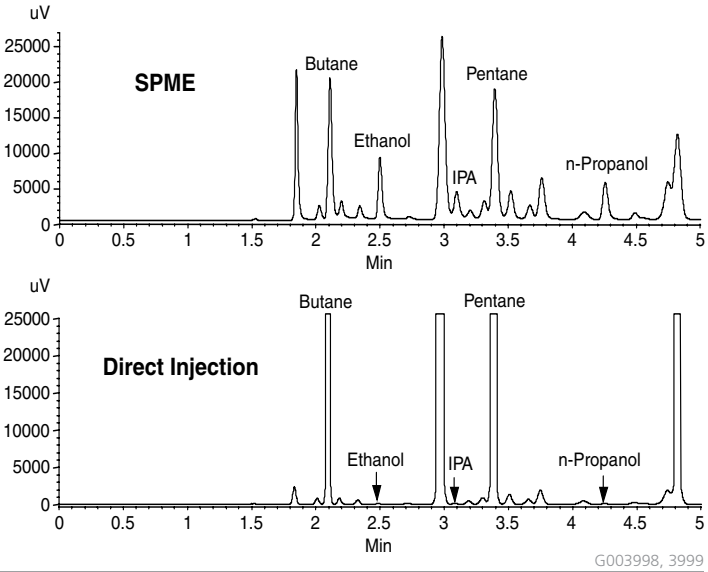
All three polar fibers extract the triazine herbicides well. The most polar analyte, desisopropyl is best extracted by the PEG fiber. Since the PEG fiber extracts polar analytes well, and reduces the amount of less polar analytes extracted, the fiber is ideal for samples containing both polar and non-polar analytes.

The PEG coating is suitable for the extraction of polar analytes out of a non-polar matrix. Figure 4 shows an example of the extraction of oxygenated compounds out of gasoline compared to a direct injection of the same sample. The fiber was immersed 15 minutes in gasoline containing 400 ppm each of several alcohols. The polar phase repels hydrocarbons and has a high affinity for the small polar alcohols.

Figure 4. Comparison of Oxygenates in Gasoline, Direct Injection vs. SPME (Chromatograms normalized)



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Conclusions

The new polar, PEG SPME fibers are more durable and selective toward polar analytes. Also, the fiber is suitable for extracting polar analytes out of a hydrocarbon matrix. The PEG fiber coating should be a good compliment to the PDMS fibers particularly for the extraction of semi-volatile analytes.

Ordering Information

Description	Cat. No.
60 µm PEG SPME Fiber, autosampler	**57354-U**
60 µm PEG SPME Fiber, manual	**57355-U**

Trademarks

Carbowax — Union Carbide Chemicals & Plastics Technology Corp.
CombiPAL — CTC Analytics

SPME - Technology licensed exclusively to Supelco. US patent #5,691,206; European patent #523,092

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