Supelco®

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# Supel™ Swift HLB SPE

Supel™ Swift HLB is a co-polymer solid phase extraction (SPE) phase composed of both hydrophilic and lipophilic functional groups. This phase is ideal for extracting a broad range of compounds from aqueous samples, including food/environmental samples as well as biological samples (eg. serum and plasma). Because of the hydrophilic and lipophilic balanced (HLB) property, the polymer material can selectively retain a wide range of compounds with different polarities and LogP values. Traditional HLB SPE uses a five-step process for sample preparation that normally includes the conditioning of sorbents with an organic solvent followed by an equilibration step to return sorbents to sample loading conditions. The Supel™ Swift HLB sorbent design allows for direct sample loading onto the sorbent bed, thereby eliminating conditioning of the cartridge. This product feature can both save time and simplify sample preparation, which may also serve to reduce sample processing errors.

Table 1. Physical Properties and SPE Volume Guidelines for Supel™ Swift HLB Products

| Physical Properties | | SPE Volume Guidelines* | | |
|---|---|---|---|---|
| **Particle Size:** | 40–75 µm (>90%) | **Cartridges** | **SPE Step(s) Vol.** | **Elution Vol.** |
| **Pore Size:** | 80–210 Å | 30 mg/1 mL | 0.5–1 mL | 0.3–1 mL |
| **Pore Volume:** | 0.70–0.80 mL/g | 60 mg/3 mL | 1–3 mL | 0.5–3 mL |
| **Surface Area:** | 425–500 $m^2/g$ | 200 mg/6 mL | 3–6 mL | 1–6 mL |
| **MS Friendly:** | Yes | **Well Plates** | | |
| | | 10 mg/well | 0.2–1 mL | 0.15–0.3 mL |
| | | 30 mg/well | 0.5–2 mL | 0.4–1 mL |

* The SPE volumes listed are general guidelines and are dependent on analyte and sample matrix relative to desired SPE speed, recovery, and selectivity.

Table 2. Features & Benefits of Supel™ Swift HLB Material

| Features | Benefits |
|---|---|
| Hydrophilic Modified Styrene Resin | Extract and recover a broad range of analytes using a single sorbent (polar to nonpolar, acidic to basic) |
| Greater Capacity | Allows for smaller bed weights, lower elution volumes, and time savings in sample processing |
| Resistant to Over-Drying | Robust methodology, lower variability |
| Stringent Production & QC Standards | Greater product consistency for improved accuracy and precision over all SPE formats |

**SPE Method Guidelines:**

1. When the sample contains large amounts of particulates, it may require filtration before loading.
2. When the sample contains high percentages of organic solvent, it may require evaporation and reconstitution in aqueous buffer.
3. If the sample is highly viscous, such as plasma or serum, the sample may be diluted with 1:1 buffer before loading.
4. For polar, charged analytes, to increase retention and minimize analyte loss during washing, it is necessary to adjust sample pH two units above analyte pKa for basic compounds, and adjust pH two units below analyte pKa for acidic compounds.

## Traditional Bind and Elute Method

For strongly retained compounds, adjust the pH of the elution solvent:

Basic compounds—add up to 5% organic acid (e.g. acetic, formic)

Acidic compounds—add up to 5% ammonium hydroxide

**Load Sample**
Direct load of pre-treated sample

**Wash Sorbent**
5% methanol in water (Alternate: water or buffer)

**Elute Analyte**
Methanol (100%) with pH modifiers

**Evaporate and reconstitute SPE eluate as necessary prior to analysis**

## Troubleshooting:

| Issue | Recommendation |
|---|---|
| **Poor Absolute Recovery** | Poor analyte recovery is typically a result of one or more of the following:<br>1) poor analyte retention during sample load; 2) premature analyte elution during the wash step;<br>3) inadequate analyte elution; or 4) analyte loss during final evaporation/reconstitution.<br>Prior to troubleshooting, it is important to determine the primary cause of low recovery. The use of matrix-free standards is recommended to track and quantitate analyte breakthrough for each step of the SPE process (sample load, wash, and elution). |
| **Poor Analyte Retention** | • Use the pH modification strategies as described in sample pre-treatment.<br>• Equilibrate the sorbent prior to loading the sample.<br>• Reduce the amount of organic present in sample during the loading step.<br>• Increase SPE bed weight<br>• Reduce SPE sample load volume |
| **Premature Analyte Elution During the Wash Step** | • Use the pH modification strategies as described in the wash step.<br>• Reduce % organic modifier during wash.<br>• Increase SPE bed weight<br>• Reduce SPE wash volume(s) |
| **Inadequate Analyte Elution** | • Use the pH modification strategies as described in elution.<br>• Increase organic strength in elution solvent.<br>• Increase elution solvent volume.<br>• Elute in two separate fractions as opposed to one.<br>• Soak the packed bed in elution solvent for 1–3 minutes.<br>• Use a stronger (greater % organic modifier) wash solvent.<br>• Decrease SPE bed weight. |
| **Analyte Loss During Final Evaporation** | • Eliminate the evaporation step AND elute with a smaller volume of elution solvent followed by dilution with appropriate buffer or solvent. Note that a smaller bed weight may be necessary to maintain efficient analyte elution and adequate recovery.<br>• Eliminate the evaporation step AND elute with a weaker elution solvent (organic modified buffer) amenable to direct LC analysis. Recovery of this step needs to be closely monitored to prevent insufficient elution. Note that a smaller bed weight may be required to maintain recovery. The use of a stronger wash solvent (greater % organic modifier) can additionally minimize the matrix interference during evaporation.<br>• Review evaporation conditions for optimization (reduced temperature, sample adsorption on glassware, etc.) |
| **Poor Sample Clean-up — Ion-Suppression** | • Increase the wash solvent strength by increasing % organic modifier in conjunction with pH modifications.<br>• Reduce bed weight to minimize co-extraction of endogenous sample interferences.<br>• Adjust chromatographic conditions to separate analyte(s) of interest from co-extracted interferences. |
| **Poor Assay Sensitivity** | • Reduce elution volume. Note that a reduction in bed weight may be necessary to maintain adequate recovery.<br>• Reconstitute in smaller volume after eluent evaporation.<br>• Adjust chromatography efficiency (e.g., use smaller column particle size and dimension). |
| **Poor Reproducibility** | • Typically caused by one or more partially inadequate SPE steps. Use standards (no matrix) to track and quantitate analyte breakthrough or loss for each step of the SPE process (sample load, wash, and elution).<br>• Ensure consistent flow rate of each SPE step from sample load to elution.<br>• Ensure reagents used in the SPE procedure are miscible with the reagent used in the preceding and subsequent step. If any are immiscible, adequately dry the phase by applying a strong vacuum for ~10 min. between the two immiscible steps. |

| Description | Qty/Pk. | Cat. No. |
|---|---|---|
| **Supel™ Swift HLB SPE** | | |
| 30 mg/1 mL | 108 | 57493-U |
| 60 mg/3 mL | 54 | 57492-U |
| 200 mg/6 mL | 30 | 57491-U |
| **Supel™ Swift 96-well SPE** | | |
| 10 mg/well | 1 | 57495-U |
| 30 mg/well | 1 | 57494-U |

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