

Extraction of hydrophobic weak bases from complex liquid samples with SOLA SCX SPE

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Introduction

Thermo Scientific™ SOLA™ is a solid-phase extraction (SPE) cartridge featuring mixed-mode polymeric sorbent and a fritless design for small sample sizes (typically 25–400 µL). It is available in SOLA 10 mg and Thermo Scientific™ SOLAµ™ 2 mg formats. The fritless design reduces hold-up volume and improves consistency of extraction. The SOLA SCX has reversed-phase (RP) and strong cation exchange (SCX) functions. The typical use is for the extraction of hydrophobic weak bases from complex liquid samples.

Important notes

- Maximum loading capacity is ~10% of sorbent weight
- Sample should be processed through the cartridge at about 1 mL/min; too high a flow can lead to inconsistent results
- The volumes given are typical, and should be optimized for the analyte and matrix of interest

Materials required

- Methanol, LCMS grade
- 2% formic acid in water, LCMS grade
- 5% ammonium hydroxide in methanol, LCMS grade
- 10–30% acetonitrile in water (optional), LCMS grade
- SPE vacuum manifold, vacuum regulator, vacuum pump
- 96-well collection plate, appropriate to final extract volume, 25–200 µL per sample
- Waste-collection tray or plate, ~1800 µL per sample
- Pipettes and tips

Protocol

1. Prepare the sample for extraction
 - Dilute viscous samples (e.g., plasma) 1:1 with water
 - When the analytes bind to matrix proteins, 1:1 dilution with 10–30% aqueous acetonitrile can improve recovery
 - Acidify to a $\text{pH} \leq \text{pKa} - 2$ as necessary to ionize the analytes
 - Add internal standard if desired
2. Prepare the SOLA SPE for sample loading
 - Wash with $2 \times 100 \mu\text{L}$ of methanol (optional)
 - Wash with $2 \times 100 \mu\text{L}$ of 2% formic acid. Do not let cartridge dry before loading sample.
3. Load the sample onto the SOLA SPE at a flowrate of about 1 mL/min
 - Up to 800 μL of prepared sample
4. Wash away interferences
 - Wash with $2 \times 100 \mu\text{L}$ of 2% formic acid in water. This removes salts, acids, proteins, carbohydrates.
 - Wash with $2 \times 100 \mu\text{L}$ of methanol. This removes hydrophobic, neutral and acidic matrix components. Acidified methanol can improve recovery of basic analytes for some cases. Let cartridge dry a few minutes before elution.
5. Collect analyte fraction in the sample well plate
 - Elute with $\geq 2 \times 12.5 \mu\text{L}$ (SOLA μ) or $\geq 2 \times 50 \mu\text{L}$ (SOLA) of 5% ammonium hydroxide in methanol. Elute each aliquot initially by gravity then apply vacuum/pressure to ensure all solvent is eluted from the cartridge.
6. Post-extraction
 - If necessary, acidify, evaporate and re-constitute in a compatible solvent
 - For RP-LC analysis, dilute to $\leq 50\%$ organic solvent

Related products

Description	Part Number
Thermo Scientific™ Hypersep™ Universal SPE Vacuum Manifold, for 96-well plate or 24/48 cartridges	60104-230
Thermo Scientific™ Hypersep™ Vacuum Pump, European version	60104-241
Thermo Scientific™ Hypersep™ Vacuum Pump, North American version	60104-243

Current versions of product instructions are available at separatedbyexperience.com/chromexpert

Learn more about SOLA and SOLA μ Solid Phase Extraction at thermofisher.com/solaspe

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