

APPLICATIONS

Comparison of Antipsychotics Extracted from Human Plasma Using Microelution SPE

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Overview

This application describes a simple but effective sample preparation solution to increase productivity. Nine antipsychotics from human serum were extracted with ultra-sensitive Solid Phase Extraction (SPE) methods using Strata[®]-X-C Microelution 96-well plate and another product. While using a cation-exchange polymeric SPE sorbent packed in 96-well plate in microelution format, labs are able to skip the dry-down step saving at least 30 minutes without negatively impacting the sensitivity of their analysis. The small volume of biological samples loaded onto the ion-exchange sorbent, undergoes a 100 % organic wash to result in a clean extract. The miniature elution volume capability of the packed 2 mg sorbent results in a 4x concentration enrichment of the nine basic antipsychotic drugs tested. This pre-concentration feature bypasses the need for dry down and reconstitution of the extracted samples before injection onto the LC-MS/MS. Possibility of analyte loss during dry-down is also eliminated for heat labile drugs. The reduction of sample processing time in a microelution format speeds up laboratory workflow by at least 50 %.

The nine antipsychotics were accurately quantified by LC-MS/MS using a Kinetex[®] 2.6 µm PS C18 LC column. Kinetex has core-shell particle morphology that provides ultra-high column efficiency on any HPLC or UHPLC. The Kinetex PS C18 is a USP classified L1 column, that provides both a unique polar and hydrophobic selectivity and is 100 % aqueous stable.

Materials and Methods

Analytical reference standards and internal standards were purchased from Cerilliant Corporation (Round Rock, TX, USA). Human plasma was obtained from BioreclamationIVT (Westbury, NY). All other reagents and chemicals were purchased from Sigma-Aldrich (St. Louis, MO). Ultrapure D.I. water was obtained from Sartorius arium comfort II, courtesy of Sartorius Corporation (Bohemia, NY).

SPE Protocol

| | |
|------------------------------------|--|
| 96-Well Microelution Plate: | Strata-X-C Microelution Plate, 2 mg/well Brand A Plate, 2 mg/well |
| Part No.: | 8M-S029-4GA (for Strata-X-C) |
| Condition: | 200 µL Methanol |
| Equilibrate: | 200 µL Water |
| Load: | 400 µL diluted human plasma (200 µL plasma diluted 1:1 with 4 % Phosphoric acid in Water) |
| Wash 1: | 200 µL 2 % Formic acid in Water |
| Wash 2: | 200 µL Methanol |
| Elute: | 2x 25 µL 5 % Ammonium hydroxide in Acetonitrile/Methanol (60:40) |
| Spike IS: | Spike 50 µL of internal standard in Methanol/Water (50:50) Sample was directly injected onto LC-MS/MS |

LC Conditions

| | | |
|------------------------------|---|------------|
| Column: | Kinetex 2.6 µm PS C18 | |
| Dimension: | 50 x 2.1 mm | |
| Part No.: | 00B-4780-AN | |
| SecurityGuard™ ULTRA: | AJ0-8951 | |
| Mobile Phase: | A: 0.1 % Formic acid in Water B: 0.1 % Formic acid in Methanol | |
| Gradient: | Time (min) | % B |
| | 0 | 5 |
| | 3 | 95 |
| | 3.5 | 95 |
| | 3.51 | 5 |
| | 5 | 5 |
| Flow Rate: | 0.5 mL/min | |
| Injection Volume: | 2 µL | |
| Temperature: | Ambient | |
| LC Instrument: | Agilent 1260 | |
| Detector: | SCIEX® Triple Quad™ 4500 (ESI, +ve Ionization) | |

Results and Discussions

Figure 1. Representative Chromatogram of Extracted Plasma Sample Using Strata®-X-C 96-Well Microelution Plate

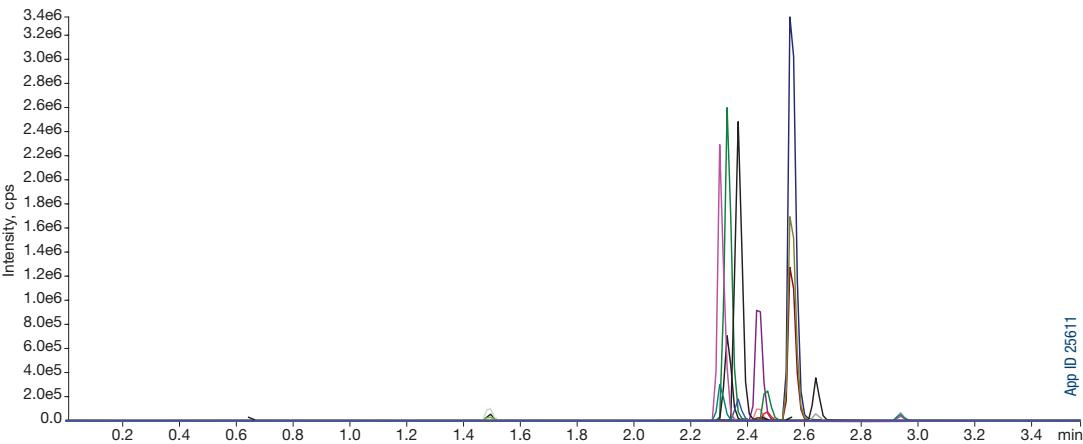


Figure 2. Representative Chromatogram of Extracted Plasma Sample Using Brand A Plate

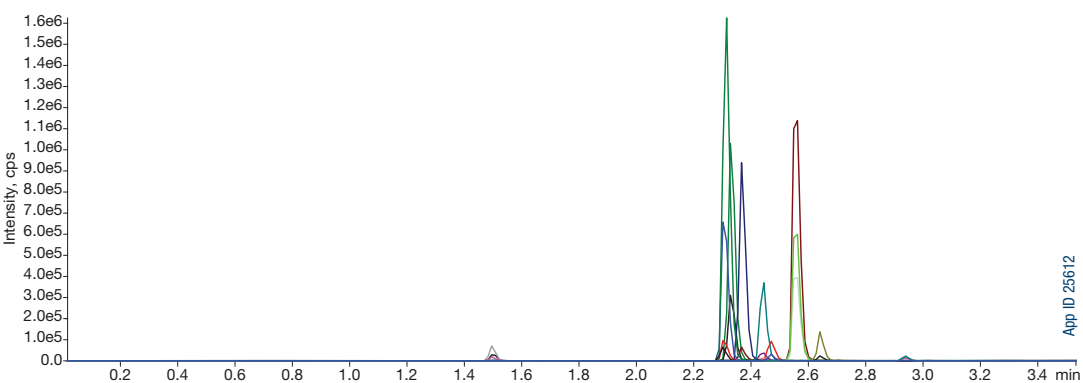


Table 1. % Absolute Recovery and CV for Extracted Plasma Samples

| | | | Strata-X-C Microelution | | Brand A | |
|------------------|----------------------|----------|-------------------------|------------|------------|------------|
| Antipsychotics | Spiked conc. (ng/mL) | RT (min) | % Recovery | % CV (N=4) | % Recovery | % CV (N=4) |
| 9-OH Risperidone | 25 | 2.33 | 90 | 6.6 | 97 | 7.9 |
| Olanzapine | 25 | 1.53 | 98 | 6.9 | 101 | 8.6 |
| Clozapine | 25 | 2.47 | 95 | 4.0 | 98 | 6.6 |
| Quetiapine | 25 | 2.58 | 91 | 2.7 | 95 | 5.2 |
| Norquetiapine | 25 | 2.5 | 71 | 5.5 | 70 | 5.9 |
| Risperidone | 25 | 2.39 | 98 | 6.0 | 111 | 4.1 |
| Norclozapine | 25 | 2.36 | 92 | 7 | 106 | 12 |
| Ziprasidone | 25 | 2.67 | 61 | 10.7 | 68 | 6.8 |
| Aripiprazole | 25 | 2.96 | 65 | 6.0 | 79 | 0.7 |

Comparative separations may not be representative of all applications.


The recommended LC conditions for the Kinetex[®] PS C18 LC column efficiently and sensitively resolved nine antipsychotics, which are basic in nature and closely related in chemical properties. The recovery values for Strata[®]-X-C averaged about 85 % and 92 % for Brand A respectively, with the % recovery for each analyte seen in **Table 1**. Strata-X-C displays predominantly consistent results with lower %CVs for more analytes compared to Brand A. The parallel study of the above two cation-exchange sorbent shows very minor differences in recovery while microelution format was utilized. When observing **Figure 1 and 2** sensitivities can be compared of the two microelution formats being used with a Kinetex PS-C18 LC column showing the separation.

Conclusions

In a laboratory workflow, at least 50 % of the total time spent in preparing and processing samples are from dry-down and reconstitution. The microelution format of the SPE increases the productivity of the sample prep process by eliminating the prolonged solvent evaporation and reconstitution, leaving it more simple and efficient. Our study under equal and controlled conditions demonstrated equivalent results for Phenomenex's Strata-X-C and another brand products in microelution format. The Kinetex PS C18 HPLC/UHPLC column's unique multi-modal selectivity and improved chromatographic performance when applied to the analysis of polar basic compounds. The unique selectivity and performance benefits of the Kinetex PS C18 were compared across certain antipsychotics to confirm consistent peak performance and selectivity.

Ordering Information


Strata-X-C

| Format | Sorbent Mass | Part Number | Unit |
|--|--------------|-------------------------------|----------------|
| Tube | | | |
|  | 30 mg | 8B-S029-TAK** | 1 mL (100/box) |
| | 30 mg | 8B-S029-TBJ | 3 mL (50/box) |
| | 60 mg | 8B-S029-UBJ** | 3 mL (50/box) |
| | 100 mg | 8B-S029-FBJ | 3 mL (50/box) |
| | 100 mg | 8B-S029-FCH | 6 mL (30/box) |
| | 200 mg | 8B-S029-FBJ | 3 mL (50/box) |
| | 200 mg | 8B-S029-FCH | 6 mL (30/box) |
| | 500 mg | 8B-S029-HBJ | 3 mL (50/box) |
| | 500 mg | 8B-S029-HCH | 6 mL (30/box) |

96-Well Plate

| | | | |
|--|-------|-----------------------------|--------------|
|  | 10 mg | 8E-S029-AGB | 2 Plates/Box |
| | 30 mg | 8E-S029-TGB | 2 Plates/Box |
| | 60 mg | 8E-S029-UGB | 2 Plates/Box |

96-Well Microelution Plate

| | | | |
|--|------|-----------------------------|----|
|  | 2 mg | 8M-S029-4GA | ea |
|--|------|-----------------------------|----|

More part numbers available online.
**Tab-less tubes available.

On-line Extraction Cartridge

| Description | Part Number | Unit/Box |
|--|--------------------------------|----------|
| Strata-X-C on-line extraction cartridge, 20 x 2.0 mm | 00M-S048-B0-CB | ea |
| Cartridge holder, 20 mm | CH0-5845 | ea |

Kinetex Core-Shell LC Columns

More part numbers available online.

| 2.6 µm Minibore Columns (mm) | | | | | SecurityGuard [™] ULTRA Cartridges [†] |
|------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|--|
| Phases | 30 x 2.1 | 50 x 2.1 | 100 x 2.1 | 150 x 2.1 | 3/pk |
| PS C18 | 00A-4780-AN | 00B-4780-AN | 00D-4780-AN | 00F-4780-AN | AJ0-8951 |

for 2.1 mm ID

| 2.6 µm MidBore [™] Columns (mm) | | | | | SecurityGuard [™] ULTRA Cartridges [†] |
|--|-----------------------------|-----------------------------|-----------------------------|--|--|
| Phases | 50 x 3.0 | 100 x 3.0 | 150 x 3.0 | | 3/pk |
| PS C18 | 00B-4780-YQ | 00D-4780-YQ | 00F-4780-YQ | | AJ0-8950 |

for 3.0 mm ID

| 2.6 µm Analytical Columns (mm) | | | | | SecurityGuard [™] ULTRA Cartridges [†] |
|--------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|--|
| Phases | 50 x 4.6 | 100 x 4.6 | 150 x 4.6 | 250 x 4.6 | 3/pk |
| PS C18 | 00B-4780-EQ | 00D-4780-EQ | 00F-4780-EQ | 00G-4780-EQ | AJ0-8949 |

for 4.6 mm ID

[†] SecurityGuard ULTRA Cartridges require holder, Part No.: [AJ0-9000](#).



APPLICATIONS

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