

CEREX uSPE (ultraSPE)
Faster / Cleaner Sample Preparation

Bio-analytical | Pharmaceutical
Specialist Environmental



crawford scientific

Chromatography...every step of the way



CEREX uSPE (ultraSPE) Faster / Cleaner Sample Preparation

General Information

- Sub 10micron SPE material in Tubes & Plates!
- Polymer and Silica sorbents
- Highest Efficiency SPE material available – improved reproducibility
- Cleanest SPE extracts for LC-MS
- ‘Elute and shoot’ - eliminate pre-concentration / reconstitution
- Increase recovery - drive down limits of detection
- Fastest SPE for acids, bases and neutrals
- Generic Methods for streamlined development
- pH stable 1-14

ultraSPE (uSPE)

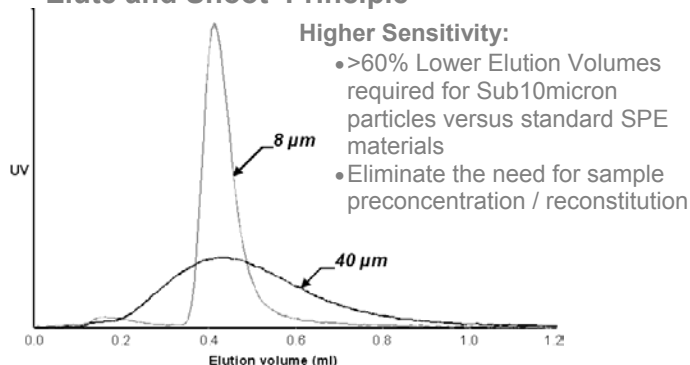
Why struggle with large particle SPE columns when you can use the advances of micro-particulate silica in SPE format?

Sub 10micron SPE particles have only ever been available in packed column format until the advent of CEREX uSPE technology.

Sub 10micron SPE particles take the technique to the next level:

- **3-5 times higher capacity (per mass) over standard polymer materials**
- **Approaching 30 - 40% capacity by analyte mass (typically 12mg per 20mg bed)**
- **Drastically reduces sample amount required**
- **Drastically reduces the amount of eluent volume required - ‘Elute and Shoot’**
- **Cleaner extracts – especially for MS detection**
- **Massive sensitivity improvements**

‘Elute and Shoot’ Principle



Sorbent Selection Table (Traditional / CEREX)

Sorbent Mass	Wash Volume (minimum)	Elution Volume (minimum)
Silica		
50 mg / 20 mg	300 μ l / 100 μ l	600 μ l / 200 μ l
100 mg / 35 mg	600 μ l / 200 μ l	1.2 ml / 400 μ l
500 mg / 150 mg	3 ml / 1 ml	6 ml / 2 ml
1g / 350 mg	6 ml / 2 ml	12 ml / 4 ml
Polymer		
50 mg / 20 mg	500 μ l / 200 μ l	1ml / 350 μ l
100 mg / 35 mg	1 ml / 350 μ l	2 ml / 800 μ l
500 mg / 150 mg	5 ml / 2 ml	10 ml / 3.5 ml
1g / 350 mg	10 ml / 3.5 ml	20 ml / 6 ml

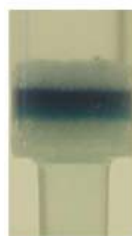
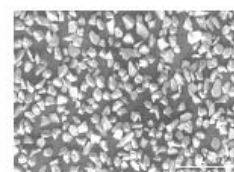
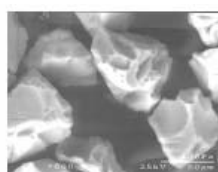
uSPE – Transferring from traditional sorbents



Capacity:

- Traditional silica sorbent – 5% of bed mass (5mg analyte per 100mg sorbent)
- Traditional polymer sorbent – 10-15% of bed mass (10mg analyte per 100mg sorbent)
- **CEREX silica sorbent – 15-20% of bed mass (15-20mg per 100mg)**
- **CEREX polymer sorbent – 40-60% of bed mass (40-60mg per 100mg)**

See ‘**Sorbent Selection Tables**’



Traditional sorbent (40 μ m)

- 20mg traditional polymer
- Poor relative analyte (Azure A blue dye) capture efficiency (1ml)
- Incomplete elution (250 μ l) (50 μ l aliquots of 2% HCl in methanol)

CEREX sorbent (<10 μ m)

- 20mg CEREX polymer
- Excellent analyte (Azure A blue dye) capture efficiency (1ml)
- Complete elution (150 μ l) (50 μ l aliquots of 2% HCl in methanol)



CEREX uSPE (ultraSPE) Polymer Resin Sorbents

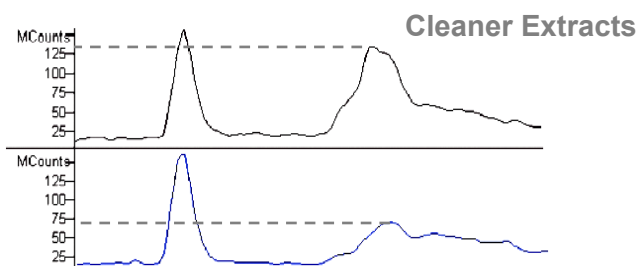
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CEREX PNP - General Screening Resin:

Selectivity over a wide polarity range – multiple reaction mechanism for extraction of polar and non-polar compounds

Everything you get with your usual polymer sorbents
PLUS:

- Higher recovery
- Cleaner extracts
- Improved reproducibility
- Better sensitivity



Plasma extract blank using a standard polymer resin (top) and Cerex PNP (bottom)

CEREX PNP Resin - Generic Method

(20mg sorbent or well plate) – see next page for reagents

Sample pre-treatment - 100µl sample, dilute 1:4 (v/v) with buffer (B)

Column solvation - Methanol (1 ml) (A)

Column equilibration - 0.05M buffer (500 µl) (B)

Sample application - Apply sample (500 µl)

Interference elution - Buffer : MeOH (95:5, v/v) (500 µl) (C)

Analyte elution - Methanol (250 µl) (A)

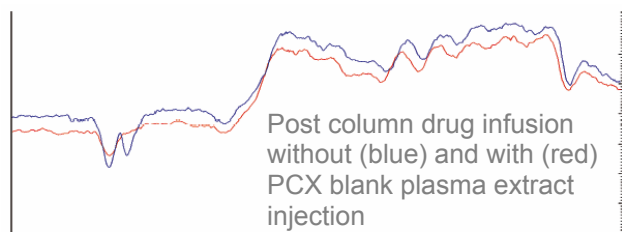
Optimisation:

- **Sample pre-treatment:** Adjust pH: acidify to improve recovery of acidics, or add base to improve recovery of basics
- **Column equilibration:** Equilibrate with 0.05M buffer at sample pH
- **Interference elution:**
 - Buffer : MeOH (95:5, v/v)
 - Increase % MeOH to improve extract cleanliness
- **Elution:** Elute in minimum volume of methanol for high throughput

CEREX PCX - Cation Exchange Resin:

Brings the ultimate selectivity for speciation of **acids, bases and neutrals** from biological fluids and pK buffers etc.

- Aggressive wash solvents (100% organic) possible due to dual mode interactions
- Combined with lower elution volumes leads to cleanest extracts available
- Resistant to de-wetting – can be dried for even cleaner extracts
- Allows bases and acids / neutrals to be speciated
- Generic Methodology



Lower Ion Suppression

CEREX PCX Resin – Generic Method

(20mg sorbent or well plate)

Sample pre-treatment - 100µl sample, dilute 1:4 (v/v) with buffer (B)

Column solvation - Methanol (1 ml) (A)

Column equilibration - 0.05M NH₄Ac pH 6.0 (250 µl) (B)

Sample application - Apply sample (500 µl)

Interference elution - 0.05M NH₄Ac pH 6.0 (250 µl) (B)

1M acetic acid (250 µl) (D)

Elute Acids / Neutrals - Methanol (250 µl) (A)

Elute Bases - MeOH : NH₄OH (95: 5, v/v)

(2 x 150 µl) (E)

Optimisation:

- **Screen** - CEREX 4CX for effect on recovery and extract cleanliness.
- **Weak basic drugs** - evaluate substituting acetonitrile for the methanol used in the acids / neutrals elution step

Sorbent Selection Table

Crawford Scientific CEREX	Phenomenex STRATA **	Waters Sep Pak	Varian Bond Elute	JT BAKER Bakerbond	IST Isolute
PNP	strata-X	Oasis HLB	NEXUS PPL Focus	H2O-philic DVB	ENV+
PCX	strata-X-C	MCX			



CEREX uSPE (ultraSPE) Silica Sorbents

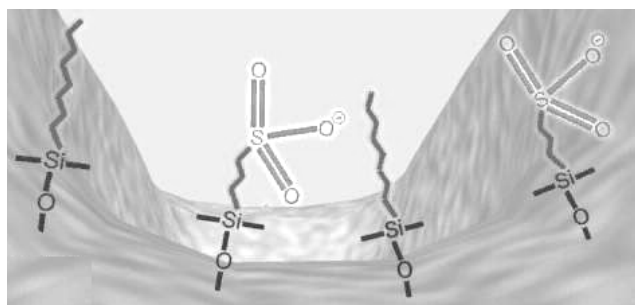
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CEREX 8CX / 8AX – Mixed Mode Silica:

Silica mixed mode sorbent featuring C8 and a Strong Cation Exchanger SCX or Strong Anion Exchanger SAX – designed for the extraction of drug molecules from biological fluids.

Everything you get with your usual mixed mode silica sorbent PLUS:

- Higher recovery
- Cleaner extracts
- Improved reproducibility
- Better sensitivity



Typical Silica surface of 8CX – C8 hydrophobic alkyl groups and strong sulphonic acid cation exchange ligands

CEREX 8CX Sorbent - Generic Method (20mg sorbent or well plate)

- Sample pre-treatment** - 100µl sample, dilute 1:4 (v/v) with buffer (B)
- Column solvation** - Methanol (1 ml) (A)
- Column equilibration** - 0.05M NH₄Ac pH 6.0 (250 µl) (B)
- Sample application** - Apply sample (500 µl)
- Interference elution** - 0.05M NH₄Ac pH 6.0 (250 µl) (B)
1M acetic acid (250 µl) (D)
- Elute Acids / Neutrals** - Methanol (250 µl) (A)
- Elute Bases** - MeOH : NH₄OH (95: 5, v/v)
(2 x 150 µl) (E)

Optimisation:

- **Screen** - CEREX 4CX for effect on recovery and extract cleanliness.
- **Weak basic drugs** - evaluate substituting acetonitrile for the methanol used in the acids / neutrals elution step

Generic Method Reagents:

- **Methanol (A)**
- **0.05M acetate buffer pH6 (B)**
Ammonium acetate 97+% reagent, FW 77.08. Dissolve 3.854g in 1 litre of water and adjust pH using 1M acetic acid (0.9635g in 250ml of water)
- **Acetate buffer : methanol (95:5, v/v) (C)**
Add 5ml HPLC grade methanol in a 100ml volumetric flask, make up to the mark with 0.05M acetate buffer pH6
- **1M acetic acid (D)**
Acetic acid glacial 99.99+%, FW 60.05. Add 6ml of acid to 50ml of HPLC grade water in a 100ml volumetric flask, make up to the mark with water
- **Methanol : ammonium hydroxide (95:5, v/v) (E)**
Add 5ml of ammonium hydroxide, FW 35.05, to 50ml of HPLC grade methanol in 100ml volumetric flask, make up to the mark with methanol.
- **Acetonitrile (F)**

Sorbent Selection Table

Crawford Scientific CEREX	Phenomenex STRATA **	Waters Sep Pak	Varian Bond Elute	JT BAKER Bakerbond	IST Isolute
8CX	Screen - C	-	Certify I	Narc-2	HCX
8AX	Screen - A	-	Certify II	Narc-1	HAX

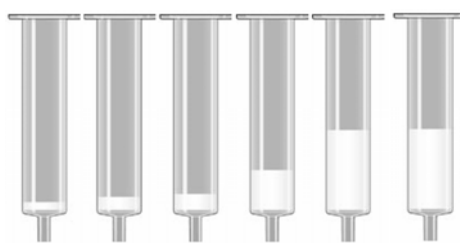
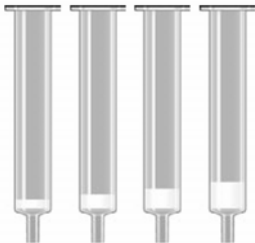
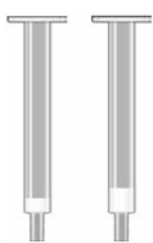


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Ordering Information

CEREX uSPE Products



96 Well Plates

1ml (100/box)

3ml (50/box)

6ml (30/box)

Sorbent Mass	1ml (100/box)		3ml (50/box)				6ml (30/box)						Plate	Populated Plate	96 Rimless Tubes
	20mg	35mg	20mg	35mg	100mg	150mg	20mg	35mg	100mg	150mg	350mg	650mg			
PNP (710 -)	0201	0351	0203	0353	1003	1503	0206	0356	1006	1506	3506	6506	0096	0201RH	0201R
PCX (709 -)	0201	0351	0203	0353	1003	1503	0206	0356	1006	1506	3506	6506	0096	0201RH	0201R
8CX (722 -)	0201	0351	0203	0353	1003	1503	0206	0356	1006	1506	3506	6506	0096	0201RH	0201R
8AX (723 -)	0201	0351	0203	0353	1003	1503	0206	0356	1006	1506	3506	6506	0096	0201RH	0201R

Ordering Information

CEREX uSPE Products



15ml (20/box)

25ml (20/box)

350mg 650mg

350mg

PNP (710 -)	3507	6507	3508
PCX (709 -)	3507	6507	3508
8CX (722 -)	3507	6507	3508
8AX (723 -)	3507	6507	3508



CEREX uSPE (ultraSPE) Faster / Cleaner Sample Preparation

Plate, Tube and Populated Array Processing

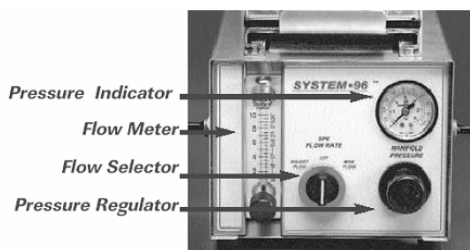
- **Positive Pressure Processor for Well Plates, Populated Arrays & Tubes**
- **Increased Reproducibility** – no more dry wells / highly uniform well to well flow
- **More convenient** – no plugs or caps for open wells or array spaces
- **Easier to use** – fine flow control and increased pressure differential for viscous samples
- **Reduced Carry Over** – pressure-sealed column processing
- **More Powerful** – rapid nitrogen or air drying of wells or extract solutions

CEREX System 96 (Well Plate Processor)

Advanced Positive Pressure Processing



- Processor avoids 'Dry Well' situations using restricted gas ports. These ports create independent gas flow control such that even if 95 processing channels are wide open, the remaining single channel will receive the appropriate pressure for facile processing.
- This feature provides uniform flow across all channels and eliminates the need for plugs or caps when processing fewer than 96 samples on a modular plate.
- CEREX System-96 is self-adjusting to plate height, thus accommodating all commercial 96-well plates, both modular and integrated, without the need for gaskets or spacers.
- Each well is individually sealed for reduced well to well carryover
- 30psi maximum pressure allows for fast processing and drying where appropriate



- Used with compartmentalised collection plates for convenient collection of wash and elution fractions for analysis during method development
- High quality pressure regulation for highly reproducible flow control
- Easy sliding mechanism for convenient application of protocol solvents



- 48 position processor for individual SPE tubes
- 48 x 1ml to 6ml tubes
- Can be used with 1 or 48 individual tubes – always the same reproducible flow in every tube
- Ideally configured for use with uSPE format sorbents as faster flows can be achieved with up to 30psi maximum operating pressure
- All System 96 processing benefits apply to the 48 processor
- Full range of racks and accessories available for both processing stations (see next page)



CEREX uSPE (ultraSPE) Faster / Cleaner Sample Preparation

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Ordering Information

CEREX Positive Pressure Processors



System 96



System 48

Part Number

Description

Part Number

Description

278-0031	System-96 Processor
278-0032	10 ml x 24 Collection Tray
278-0034	1 ml x 96 collection tray
278-0038	2 ml x 96 collection tray
278-0037	96 column holder
278-0035	96 Place sealing gasket
279-0010	Gas supply adapter
P-2ML-SQ	2 ml 96 deep well collection tray 5PK
RES-SW8-HP	Reservoir, single well , 8 bottom 25PK

279-0004	System-48 Processor
279-0021	1 ml SPE column rack
279-0022	3 ml SPE column rack
279-0023	6 ml SPE column rack
279-0015	12 x 75 mm collection rack
279-0016	13 x 100 mm collection rack
279-0017	16 x 100 mm collection rack
279-0018	12 x 32mm auto sample rack
279-0009	Waste bin (3 per pack)
279-0012	48-place sealing gasget