Sample Prep - Solid Phase Extraction

United Chemical Technologies (UCT) product guide

CLEAN SCREEN®

Drugs of Abuse Columns
- DAU = Acidic, Basic & Neutral Drugs
- THC = Carboxy THC
- THCA = THC Δ9 Carboxylic Acid
- GHB = Gamma-Hydroxybutyrate
- ETG = Ethyl Glucuronide
- BNZ = Benzodiazepine
- CLEAN-THRU® Tips

STYRE SCREEN®

Polymeric Based Columns
- DBX = Copolymeric
- DVB = Divinylbenzene
- BCX = Benzenesulfonic Acid
- C18 = Octadecyl C18
- CCX = Carboxylic Acid
- QAX = Quaternary Amine

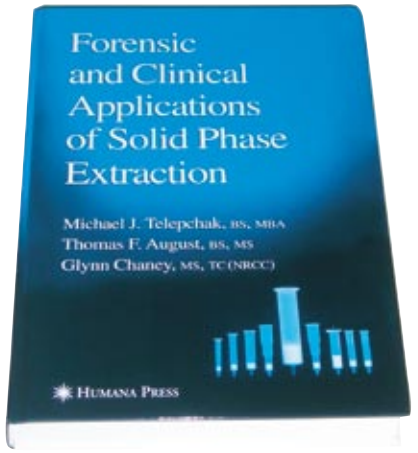
CLEAN-UP®

Solid Phase Extraction Columns
- Ion Exchange
- Hydrophobic
- Hydrophilic
- Copolymeric
- Covalent

ENVIRO-CLEAN®

- Products
- Environmental SPE Cartridge
- SPE Inert Glass Syringe Barrels

First of its kind in the field of forensic and clinical toxicology !

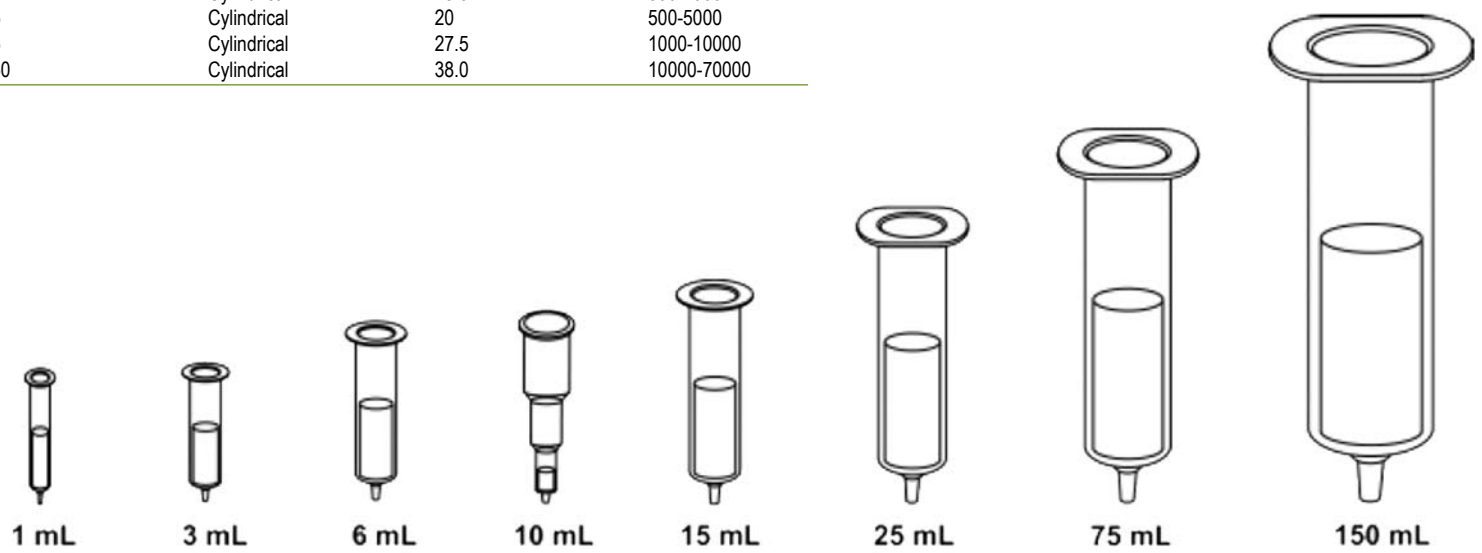


The recently published Forensic and Clinical Applications of Solid Phase Extraction, by Michael J. Telepchak, Thomas August and Glynn Chaney, has been met with enthusiasm by those in the SPE field, and has been recommended as a valuable laboratory reference. Dr. Terry Danielson, Ph.D., who reviewed the book for the American Society of Crime Laboratory Directors, calls attention to the "extensive details of many currently available SPE separation procedures", and describes the book as a convenient compendium of SPE technology, and is relevant to the development, implementation and practice of modern SPE appropriate to students, and experienced practitioners."
In the Canadian Society of Forensic Science Journal, Dr. Karen Woodall, Ph.D., of the Toronto Centre of Forensic Sciences, calls the book a "must read" for anyone interested in SPE, especially helpful in resolving the day-to-day problems that can occur when using [SPE] and gives some excellent examples of how to deal with some of these occurrences such as recovery variability, contamination, flow, and non-extraction problems."

BOOK "FORENSIC AND CLINICAL APPLICATIONS OF SOLID PHASE EXTRACTION"
P/N : ZZ3801

Reservoirs for Bonded Phase Extractions

Stated Volume (mL)	Tube Configuration	Bed Diameter (mm)	Sorbent Mass (mg)
1	Cylindrical	5.5	50-200
3	Cylindrical	8.5	50-1000
6	Cylindrical	12.5	200-2000
10	Expanded	8.5	50-1000
15	Cylindrical	15.5	500-2000
25	Cylindrical	20	500-5000
75	Cylindrical	27.5	1000-10000
150	Cylindrical	38.0	10000-70000

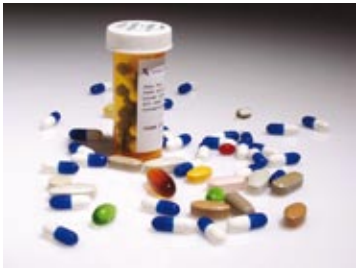


Copolymeric bonded phases for drug abuse testing

Analytical demand for more efficient, robust and clean extraction of drugs from biological matrices led to the development of Clean Screen® sorbents. Since 1986, Clean Screen® has led the industry with dependable and reproducible Solid Phase Extraction products and applications. Clean Screen phases are true copolymeric sorbents that contain hydrophobic and ion exchange functional groups uniquely polymerized to a silica substrate. The design and quality of Clean Screen provides superior sample clean up, recovery and reproducibility.

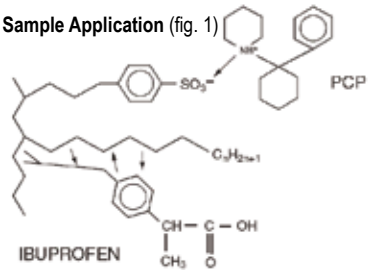
Mixed mode separations allow maximum selectivity for extraction of acids, neutrals and bases. This selectivity makes Clean Screen ideal for both screening and confirmation analysis for virtually all drug categories. Clean Screen DAU, THC, and GHB columns are used extensively by forensic and clinical chemists including :

- Post Mortem Investigations
- Criminal Investigations
- Urine Drug Testing
- Athletic Drug Testing
- Racing Laboratories
- Therapeutic Drug Monitoring
- Medical Drug Screening



Recent additions to this product line include Clean Screen® Ethyl Glucuronide and Clean Screen® Benzodiazepines.

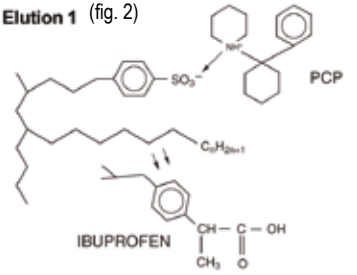
Sample Application (fig. 1)



Mechanism of Clean Screen®

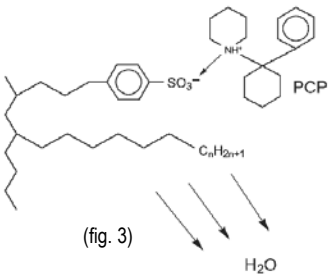
Carboxylic acid functionalities present in the sample are ionized. This creates a repulsion between the column and many sample borne interferences, thereby reducing the likelihood of their adsorbing onto the column.
At this pH, ibuprofen & barbiturates are not ionized and are hydrophobically adsorbed onto the column (figure 1). At the same time, drugs with amine functionalities such as cocaine and phencyclidine adsorb onto the column via both hydrophobic and ionic attraction (fig. 1).

Elution 1 (fig. 2)



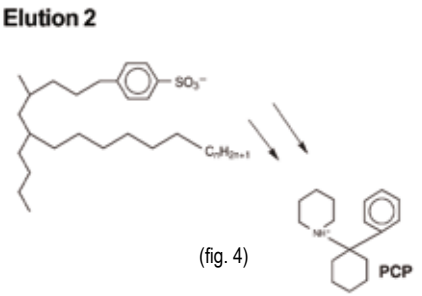
The column can then be washed with water or weak aqueous buffers at or below pH 6 without risking loss of the analytes. After drying the column, it is possible to elute the hydrophobically bound analytes using solvents of minimal polarity such as methylene chloride or a hexane/ethyl acetate mixture (fig. 2). Cationic analytes will remain bound to the column. Many compounds of intermediate polarity and potential interferences will also remain on the column. The majority of these potential interferences can be removed by using a methanol wash.

Cationic analytes bound to the column can be eluted after another drying step. The drying steps are necessary to remove water which would have prevented the water-immiscible elution solvents from optimally interacting with the analytes (fig. 3).



(fig. 3)

To elute the cationic analytes, an organic solution with a high pH (between 11 & 12) should be used. A methylene chloride isopropanol-ammonium hydroxide mixture will simultaneously disrupt these ionic interactions and successfully elute the desired compound (fig. 4).



(fig. 4)

Clean Screen® DAU

This column is copolymerized on a rigid, purified silica gel support. The two functional groups include a reverse phase, and an ion exchanger, benzenesulfonic acid. This column is commonly used for analyzing a wide range of drugs of abuse, including acidic, basic & neutral drugs.
Application : Dual functionality for weak bases and hydrophobic compounds.

P/N	Weight /Vol.	Qty
CSDAU131	130 mg/1 mL	100
CSDAU133	130 mg/3 mL	50
CSDAU203	200 mg/3 mL	50
CSDAU303	300 mg/3 mL	50
CSDAU503	500 mg/3 mL	50
CSDAU206	200 mg/6 mL	50
CSDAU506	500 mg/6 mL	50
CSDAU1M6	1 g/6 mL	30
ZSDAU005	50 mg/10 mL	50
ZSDAU013	130 mg/10 mL	50
ZSDAU020	200 mg/10 mL	50
CSDAU515	500 mg/15 mL	50

Clean Screen® THC

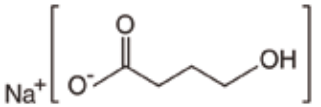
This column is copolymerized on a rigid, purified silica gel support. The two functional groups include a reverse phase, and an ion exchanger, primary amine. This column is commonly used for analyzing THC and its metabolites.
Application : Dual functionality for acids and hydrophobic compounds.

P/N	Weight /Vol.	Qty
CSTHC131	130 mg/1 mL	100
CSTHC203	200 mg/3 mL	50
CSTHC303	300 mg/3 mL	50
CSTHC503	500 mg/3 mL	50
CSTHC206	200 mg/6 mL	50
CSTHC506	500 mg/6 mL	50
CSTHC1M6	1 g/6 mL	30
ZSTHC013	130 mg/10 mL	50
ZSTHC020	200 mg/10 mL	50
CSTHC515	500 mg/15 mL	50

Clean Screen® GHB

The small polar nature of the molecule and the lack of a UV chromatophore complicate the chromatographic and spectrophotometric analysis of GHB. Chemically, GHB is unstable and readily forms Gamma-butyrolactone when heated in acid conditions. Most analytical methods are based upon the interconversion to the lactone and chemical derivatization to form the TMS derivative. This column is for the extraction of free GHB.

P/N	Weight /Vol.	Qty
CSGHB203	200 mg/3 mL	50
ZSGHB020	200 mg/10 mL	50
ZCGHB020	200 mg/10 mL	50



Hydrophobic Extraction Columns

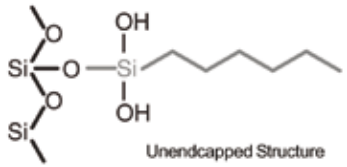
This sorbent is composed of a silica backbone bonded with hydrocarbon chains. It is used to extract compounds which exhibit non-polar or neutral characteristics out of complex matrices. The C18 phase is the most widely used for non-polar interactions because of its nonselective nature; C18 will extract a large number of compounds with differing chemical properties. To enchance selectivity, UCT offers a wide range of hydrophobic sorbents, from C2 to C20. Multiple chain configurations are available for some sorbents. Endcapped or unendcapped sorbents are available for all chain lengths.

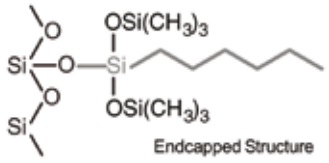
Mechanism of hydrophobic bonding

Compounds are retained by non-polar interactions from polar solvents or matrix environments. They are bound by dispersion forces / van der Waals forces. Elution, or disruption of the non-polar interactions is achieved by solvents or solvent mixtures with sufficient non-polar character. Some polar solvents, such as acetonitrile have enough non-polar characteristics to disrupt non-polar binding to cause elution of a compound from the sorbent. Methanol can be used as well, although it should be noted that it will take off both polar & non-polar analytes of interest & interferences.

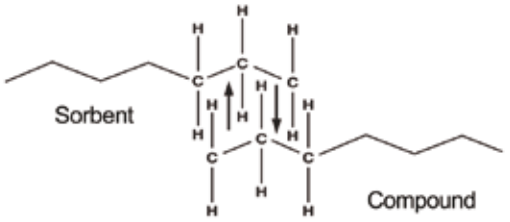
Unendcapped vs. Endcapped

Bonded phases are manufactured by the reaction of organosilanes with activated silica. During the polymerization reaction of carbon chains to the silica backbone, a very stable silyl ether linkage forms. Our unendcapped columns allow hydroxyl sites to remain, thus making these columns slightly hydrophilic. In order to decrease this slight polarity, these hydroxyl sites are deactivated. Proprietary bonding techniques ensure that these sites are 100% reacted, leading to a complete endcapping. Because there are no hydroxyl sites left, our endcapped columns are more hydrophobic than our unendcapped columns.





Example of Hydrophobic Bonding



Functionalized hydrophobic silica based phases

Sorbent	Product code	Structure	% Carbon
C2 ethyl	C02	-SiCH2CH3	6.60
C3 propyl	C03	-Si-(CH2)2CH3	7.60
C4 n-butyl	Cn4	-Si-(CH2)3CH3	8.50
Ci4 isobutyl	Ci4	-Si-CH2CH(CH3)	8.80
Ct4 tertiary butyl	Ct4	-Si-C(CH3)3	8.50
C5 pentyl	C05	-Si-(CH2)4CH3	9.50
C6 hexyl	C06	-Si-(CH2)5CH3	11.00
C7 heptyl	C07	-Si-(CH2)6CH3	11.00
C8 octyl	C08	-Si-(CH2)7CH3	11.10
C10 decyl	C10	-Si-(CH2)9CH3	15.70
C12 dodecyl	C12	-Si-(CH2)11CH3	not tested
C18 octadecyl	C18	-Si-(CH2)17CH3	21.70
C20 eicosyl	C20	-Si-(CH2)19CH3	24.30
C30 tricontyl	C30	-Si-(CH2)29CH3	26.00
Cyclohexyl	CYH1	-Si-(CH)	11.60
Phenyl	PHY1	-Si-(PH)	11.00

UCT Clean-Up® columns

Weight/Vol.	Sorbent	Endcapped	Unendcapped	Sorbent	Endcapped	Unendcapped	Sorbent	Endcapped	Unendcapped	Qty
50mg/1mL	C2, Ethyl	CEC021L1	CUC021L1	C4, n-Butyl*	CECN41L1	CUCN41L1	C6, Hexyl	CEC061L1	CUC061L1	100
100mg/1mL		CEC02111	CUC02111		CECN4111	CUCN4111		CEC06111	CUC06111	100
100mg/3mL		CEC02113	CUC02113		CECN4113	CUCN4113		CEC06113	CUC06113	50
200mg/3mL		CEC02123	CUC02123		CECN4123	CUCN4123		CEC06123	CUC06123	50
500mg/3mL		CEC02153	CUC02153		CECN4153	CUCN4153		CEC06153	CUC06153	50
500mg/6mL		CEC02156	CUC02156		CECN4156	CUCN4156		CEC06156	CUC06156	50
1g/6mL		CEC021M6	CUC021M6		CECN41M6	CUCN41M6		CEC061M6	CUC061M6	30
100mg/10mL		CEC0211Z	CUC0211Z		CECN411Z	CUCN411Z		CEC0611Z	CUC0611Z	50
200mg/10mL		CEC0212Z	CUC0212Z		CECN412Z	CUCN412Z		CEC0612Z	CUC0612Z	50
500mg/10mL		CEC0215Z	CUC0215Z		CECN415Z	CUCN415Z		CEC0615Z	CUC0615Z	50
50mg/1mL	C3, Propyl	CECN31L1	CUCN31L1	C5, Pentyl	CEC051L1	CUC051L1	C7, Heptyl	CEC071L1	CUC071L1	100
100mg/1mL		CECN3111	CUCN3111		CEC05111	CUC05111		CEC07111	CUC07111	100
100mg/3mL		CECN3113	CUCN3113		CEC05113	CUC05113		CEC07113	CUC07113	50
200mg/3mL		CECN3123	CUCN3123		CEC05123	CUC05123		CEC07123	CUC07123	50
500mg/3mL		CECN3153	CUCN3153		CEC05153	CUC05153		CEC07153	CUC07153	50
500mg/6mL		CECN3156	CUCN3156		CEC05156	CUC05156		CEC07156	CUC07156	50
1g/6mL		CECN31M6	CUCN31M6		CEC051M6	CUC051M6		CEC071M6	CUC071M6	30
100mg/10mL		CECN311Z	CUCN311Z		CEC0511Z	CUC0511Z		CEC0711Z	CUC0711Z	50
200mg/10mL		CECN312Z	CUCN312Z		CEC0512Z	CUC0512Z		CEC0712Z	CUC0712Z	50
500mg/10mL		CECN315Z	CUCN315Z		CEC0515Z	CUC0515Z		CEC0715Z	CUC0715Z	50

*Available on request C4 Isobutyl and C4 Tertiary Butyl

Weight/Vol.	Sorbent	Endcapped	Unendcapped	Sorbent	Endcapped	Unendcapped	Sorbent	Endcapped	Unendcapped	Qty
50mg/1mL	C8, Octyl	CEC081L1	CUC081L1	C12, nDodecyl	CEC121L1	CUC121L1	Cyclohexyl	CECYH1L1	CUCYH1L1	100
100mg/1mL		CEC08111	CUC08111		CEC12111	CUC12111		CECYH111	CUCYH111	100
100mg/3mL		CEC08113	CUC08113		CEC12113	CUC12113		CECYH113	CUCYH113	50
200mg/3mL		CEC08123	CUC08123		CEC12123	CUC12123		CECYH123	CUCYH123	50
500mg/3mL		CEC08153	CUC08153		CEC12153	CUC12153		CECYH153	CUCYH153	50
500mg/6mL		CEC08156	CUC08156		CEC12156	CUC12156		CECYH156	CUCYH156	50
1g/6mL		CEC081M6	CUC081M6		CEC121M6	CUC121M6		CECYH1M6	CUCYH1M6	30
100mg/10mL		CEC0811Z	CUC0811Z		CEC1211Z	CUC1211Z		CECYH11Z	CUCYH11Z	50
200mg/10mL		CEC0812Z	CUC0812Z		CEC1212Z	CUC1212Z		CECYH12Z	CUCYH12Z	50
500mg/10mL		CEC0815Z	CUC0815Z		CEC1215Z	CUC1215Z		CECYH15Z	CUCYH15Z	50
50mg/1mL	C10, nDecyl	CEC101L1	CUC101L1	C18, Octadecyl	CEC181L1	CUC181L1	Phenyl	CEPHY1L1	CUPHY1L1	100
100mg/1mL		CEC10111	CUC10111		CEC18111	CUC18111		CEPHY111	CUPHY111	100
100mg/3mL		CEC10113	CUC10113		CEC18113	CUC18113		n.a.	n.a.	50
200mg/3mL		CEC10123	CUC10123		CEC18123	CUC18123		CEPHY123	CUPHY123	50
500mg/3mL		CEC10153	CUC10153		CEC18153	CUC18153		CEPHY153	CUPHY153	50
500mg/6mL		CEC10156	CUC10156		CEC18156	CUC18156		CEPHY156	CUPHY156	50
1g/6mL		CEC101M6	CUC101M6		CEC181M6	CUC181M6		CEPHY1M6	CUPHY1M6	30
100mg/10mL		CEC1011Z	CUC1011Z		CEC1811Z	CUC1811Z		CEPHY11Z	CUPHY11Z	50
200mg/10mL		CEC1012Z	CUC1012Z		CEC1812Z	CUC1812Z		CEPHY12Z	CUPHY12Z	50
500mg/10mL		CEC1015Z	CUC1015Z		CEC1815Z	CUC1815Z		CEPHY15Z	CUPHY15Z	50

Hydrophilic Normal Phase Columns

This sorbent is composed of a silica backbone bonded with carbon chains containing polar functional groups. Groups which will possess such polarity include amines, hydroxyls and carbonyls.

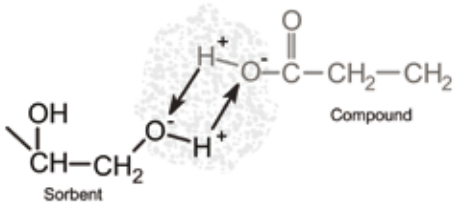
Functionalized hydrophilic silica based phases

Sorbent	Product code	Structure	% Carbon
Silica	SIL1	-SiOH	N/A
Diol	DOL1	-Si-(CH2)3OCH2CHOHCH2OH	8.00
Cyanopropyl	CNP1	-Si-(CH2)3CN	6.90
Florisil®	FLS		N/A
Alumina, Acidic	ALA		N/A
Alumina, Neutral	ALN		N/A
Alumina, Basic	ALB		N/A
Carbon	CARB		N/A

Mechanism of hydrophilic bonding

Compounds are retained on hydrophilic sorbents through polar interactions including hydrogen bonding, pi-pi or dipole-dipole interaction. These types of interactions occur when a distribution of electrons between individual atoms in functional groups is unequal, causing negative and positive polarity. Compounds typically extracted on a hydrophilic column include analytes which have polar groups, including amines, hydroxyls and carbonyls. Elution is performed by strong polar solvents.

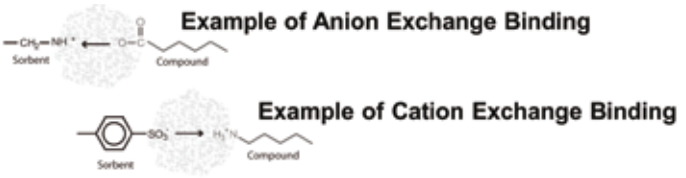
Example of Hydrophilic Bonding



Weight /Vol.	Sorbent	P/N	Sorbent	P/N	Sorbent	P/N	Sorbent	P/N	Qty
50mg/1mL	Unbonded	**CUSIL1L1**	Florisil®	**CUFLS1L1**	Alumina,	**CUALA1L1**	Alumina,	**CUALB1L1**	100
100mg/1mL	Silica	**CUSIL111**		**CUFLS111**	Acidic	**CUALA111**	Basic	**CUALB111**	100
200mg/3mL		**CUSIL123**		**CUFLS123**		**CUALA123**		**CUALB123**	50
500mg/3mL		**CUSIL153**		**CUFLS153**		**CUALA153**		**CUALB153**	50
500mg/6mL		**CUSIL156**		**CUFLS156**		**CUALA156**		**CUALB156**	50
1g/6mL		**CUSIL1M6**		**CUFLS1M6**		**CUALA1M6**		**CUALB1M6**	30
100mg/10mL		**CUSIL11Z**		**CUFLS11Z**		**CUALA11Z**		**CUALB11Z**	50
200mg/10mL		**CUSIL12Z**		**CUFLS12Z**		**CUALA12Z**		**CUALB12Z**	50
500mg/10mL		**CUSIL15Z**		**CUFLS15Z**		**CUALA15Z**		**CUALB15Z**	50
50mg/1mL	Alumina,	**CUALN1L1**	CN,	**CECNP1L1**	CN,	**CUCNP1L1**	Diol	**CUDOL1L1**	100
100mg/1mL	neutral	**CUALN111**	Cyanopropyl	**CECNP111**	Cyanopropyl	**CUCNP111**		**CUDOL111**	100
200mg/3mL		**CUALN123**	Endcapped	**CECNP123**	Unendcapped	**CUCNP123**		**CUDOL123**	50
500mg/3mL		**CUALN153**		**CECNP153**		**CUCNP153**		**CUDOL153**	50
500mg/6mL		**CUALN156**		**CECNP156**		**CUCNP156**		**CUDOL156**	50
1g/6mL		**CUALN1M6**		**CECNP1M6**		**CUCNP1M6**		**CUDOL1M6**	30
100mg/10mL		**CUALN11Z**		**CECNP11Z**		**CUCNP11Z**		**CUDOL11Z**	50
200mg/10mL		**CUALN12Z**		**CECNP12Z**		**CUCNP12Z**		**CUDOL12Z**	50
500mg/10mL		**CUALN15Z**		**CECNP15Z**		**CUCNP15Z**		**CUDOL15Z**	50

Ion Exchange extraction columns

This sorbent is composed of a silica backbone bonded with a carbon chain terminated by a negatively or positively charged functional group. Ion exchange interactions occur between a sorbent that carries a charge and a compound of opposite charge. This electrostatic interaction is reversible by neutralizing the sorbent and/or analyte. Ion exchange bonds can also be disrupted by introduction of a "counter ion" to compete with the analyte for binding sites on the sorbent.



Sorbent	Code	Structure	Pka	% Carbon	meq /g
Aminopropyl (1° amine)	NAX1	-Si-(CH2)3NH2	9.8	6.65	0.310
N-2 Aminoethyl (1° & 2° amine)	PSA1	-Si-(CH2)3NH(CH2)2NH2	10.1, 10.9	9.70	0.320
Diethylamino (3° amine)	DAX1	-Si-(CH2)3N(CH2CH3)2	10.6	8.40	0.280
Quaternary Amine Chloride	QAX1	-Si-(CH2)3N+(CH3)3 Cl-	always charged	8.40	0.250
Quaternary Amine Hydroxide	CHQAX1	-Si-(CH2)3N+(CH3)3 CH3CO2-	always charged	8.40	0.250
Quaternary Amine Acetate	CAQAX1	-Si-(CH2)3N+(CH3)3 OH-	always charged	8.40	0.250
Quaternary Amine Formate	CFQAX1	-Si-(CH2)3N+(CH3)3 CHO2-	always charged	8.40	0.250
Cation Exchange					
Carboxylic Acid	CCX1	-Si-CH2COOH	4.8	9.10	0.170
Propylsulfonic Acid	PCX1	-Si-(CH2)3SO3H	<1	7.10	0.180
Benzenesulfonic Acid	BCX1	-Si-(CH2)2-(PH)-SO3H	always charged	11.00	0.320
Benzenesulfonic Acid High Load	BCXHL1	-Si-(CH2)2-(PH)-SO3H	always charged	15.00	0.650

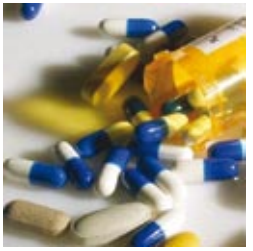
Mechanism of Ion Exchange bonding

Compounds are retained on the sorbent through ionic bonds. Therefore, it is essential that the sorbent and the analyte to be extracted are charged. Generally, the number of molecules with charged cationic groups increases at pH values below the molecules pKa value. The number of molecules with charged anionic groups decreases at pH values below the molecule's pKa value. To ensure 99% or more ionization, the pH should be at least two pH units below the pKa of the cation and two pH units above the pKa of the anion. Elution occurs by using a solvent to raise the pH above the pKa of the cationic group or to lower the pH below the pKa of the anion to disrupt retention. At this point, the sorbent or compound will be neutralized.

Weight /Vol.	Sorbent	P/N	Sorbent	P/N	Sorbent	P/N	Sorbent	P/N	Qty
50mg/1mL	Aminopropyl	**CUNAX1L1**	"PSA	**CUPSA1L1**	Diethylamino	**CUDAX1L1**	"Quaternary	**CUQAX1L1**	100
100mg/1mL		**CUNAX111**	N-2 Aminoethyl"	**CUPSA111**		**CUDAX111**	Amine	**CUQAX111**	100
200mg/3mL		**CUNAX123**		**CUPSA123**		**CUDAX123**	with Chloride	**CUQAX123**	50
500mg/3mL		**CUNAX153**		**CUPSA153**		**CUDAX153**	Counter Ion**"	**CUQAX153**	50
500mg/6mL		**CUNAX156**		**CUPSA156**		**CUDAX156**		**CUQAX156**	50
1g/6mL		**CUNAX1M6**		**CUPSA1M6**		**CUDAX1M6**		**CUQAX1M6**	30
100mg/10mL		**CUNAX11Z**		**CUPSA11Z**		**CUDAX11Z**		**CUQAX11Z**	50
200mg/10mL		**CUNAX12Z**		**CUPSA12Z**		**CUDAX12Z**		**CUQAX12Z**	50
500mg/10mL		**CUNAX15Z**		**CUPSA15Z**		**CUDAX15Z**		**CUQAX15Z**	50
50mg/1mL	Carboxylic	**CUCCX1L1**	Propyl	**CUPCX1L1**	Benzene-	**CUBCX1L1**	Benzene-	**CUBCX1H1L1**	100
100mg/1mL	Acid	**CUCCX111**	sulfonic	**CUPCX111**	-sulfonic	**CUBCX111**	-sulfonic	**CUBCX1HL11**	100
200mg/3mL		**CUCCX123**	Acid	**CUPCX123**	Acid	**CUBCX123**	Acid High	**CUBCX1HL23**	50
500mg/3mL		**CUCCX153**		**CUPCX153**		**CUBCX153**	Load	**CUBCX1HL53**	50
500mg/6mL		**CUCCX156**		**CUPCX156**		**CUBCX156**		**CUBCX1HL56**	50
1g/6mL		**CUCCX1M6**		**CUPCX1M6**		**CUBCX1M6**		**CUBCX1HLM6**	30
100mg/10mL		**CUCCX11Z**		**CUPCX11Z**		**CUBCX11Z**		**CUBCX1HL1Z**	50
200mg/10mL		**CUCCX12Z**		**CUPCX12Z**		**CUBCX12Z**		**CUBCX1HL2Z**	50
500mg/10mL		**CUCCX15Z**		**CUPCX15Z**		**CUBCX15Z**		**CUBCX1HL5Z**	50

**Available with Acetate , Hydroxide & Formate Counter Ion

Copolymeric Extraction columns
(ion Exchange + hydrophobicity)

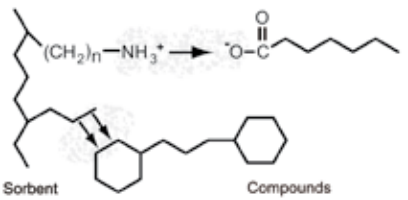


This sorbent is composed of a silica backbone with two types of functional chains attached - an ion exchanger or polar chain and a hydrophobic carbon chain. Our copolymeric phases are produced in a way to allow for equal parts of each functional group to attach to the silica backbone. This copolymerization technique yields reproducible bonded phases and unique copolymeric chemistries which allow the controlled use of mixed mode separation mechanisms. This type of dual chemistry is beneficial especially when one is looking for both a neutral & charged compound. This is common when a neutral parent drug metabolizes and becomes a charged compound.

Functionalized mixed mode silica based phases

Sorbent	Product code	Structure	% Carbon	meq/g
Aminopropyl + C8	NAX2	-Si-(CH2)3NH2 & -Si-(CH2)7CH3	12.3	0.163
Quaternary Amine + C8	QAX2	-Si-(CH2)3N+(CH3)3 & -Si-(CH2)7CH3	13.60	0.160
Carboxylic Acid + C8	CCX2	-Si-CH2COOH & -Si-(CH2)7CH3	12.50	0.105
Propylsulfonic Acid + C8	PCX2	-Si-(CH2)3SO3H & -Si-(CH2)7CH3	14.62	0.114
Benzenesulfonic Acid + C8	BCX2	-Si-(CH2)2-(PH)-SO3H & -Si-(CH2)7CH3	12.30	0.072
Cyanopropyl + C8	CNP2	-Si-(CH2)3CN & -Si-(CH2)7CH3	14.60	0.163
Cyclohexyl + C8	CYH2	-Si-(PH) & -Si-(CH2)7CH3	N/A	N/A

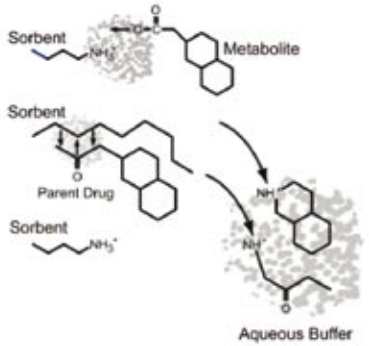
Example of Copolymeric Bonding



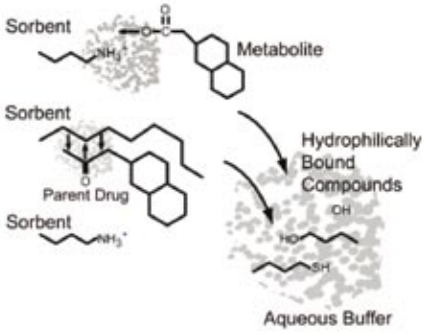
Mechanism of mixed mode bonding

Using a sample composed of a theoretical neutral parent drug and its charged (acidic) metabolite, it is applied at a pH of 6 (figure 1). At this pH, many amine groups are positively charged. Since the column is also positively charged, compounds with this chemistry (cations) are repelled. Depending on the pKa of the metabolite, carboxylic acid groups may be negatively charged, allowing the metabolite to bond to the positively charged sorbent. Since the column also possesses a hydrophobic chain, the neutral parent drug also bonds to the column. Water or a weak aqueous buffer (pH6) washes away hydrophilically bound interferences (figure 2). The column is then dried, careful to free the column of any residual aqueous phase that would interfere with elution.

Sample Application (Figure 1)

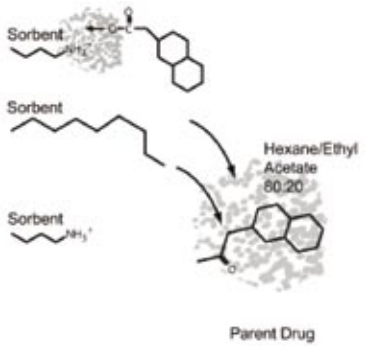


Column Wash (Figure 2)

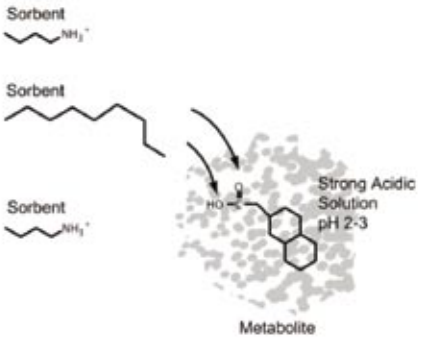


UCT Clean-Up® columns

Elution 1
(Figure 3)
The hydrophobically bound neutral parent drug is eluted with a solvent of minimal polarity, such as hexane/ethyl acetate - 80:20.



Elution 2
(Figure 4)
The final elution employs an acid to neutralize the charge of acidic analytes. Ionic interaction is released, and analytes are eluted in an appropriate solvent mixture.



Weight /Vol.	Sorbent	P/N	Sorbent	P/N	Sorbent	P/N	Sorbent	P/N	Qty
50 mg/1 mL	Hydrophobic	**CUPCX2L1**	Hydrophobic	**CUCCX2L1**	Hydrophobic	**CUBCX2L1**	Octadecyl	**CUBCX3L1**	100
100 mg/1 mL	plus	**CUPCX211**	plus	**CUCCX211**	plus	**CUBCX211**	plus	**CUBCX311**	100
200 mg/3 mL	Propylsulfonic	**CUPCX223**	Carboxylic	**CUCCX223**	Benzene-	**CUBCX223**	Benzene-	**CUBCX323**	50
500 mg/3 mL	Acid	**CUPCX253**	Acid	**CUCCX253**	-sulfonic	**CUBCX253**	-sulfonic	**CUBCX353**	50
500 mg/6 mL		**CUPCX256**		**CUCCX256**	Acid	**CUBCX256**	Acid	**CUBCX356**	50
1 g/6 mL		**CUPCX2M6**		**CUCCX2M6**		**CUBCX2M6**		**CUBCX3M6**	30
100 mg/10 mL		**CUPCX21Z**		**CUCCX21Z**		**CUBCX21Z**		**CUBCX31Z**	50
200 mg/10 mL		**CUPCX22Z**		**CUCCX22Z**		**CUBCX22Z**		**CUBCX32Z**	50
500 mg/10 mL		**CUPCX25Z**		**CUCCX25Z**		**CUBCX25Z**		**CUBCX35Z**	50
50 mg/1 mL	Hydrophobic	**CUPSA2L1**	Octadecyl	**CUPSA3L1**	Hydrophobic	**CUQAX2L1**	Hydrophobic	**CUNAX2L1**	100
100 mg/1 mL	plus	**CUPSA211**	plus	**CUPSA311**	plus	**CUQAX211**	plus	**CUNAX211**	100
200 mg/3 mL	N-2	**CUPSA223**	N-2	**CUPSA323**	Quaternary	**CUQAX223**	Aminopropyl	**CUNAX223**	50
500 mg/3 mL	Aminoethyl	**CUPSA253**	Aminoethyl	**CUPSA353**	Amine	**CUQAX253**		**CUNAX253**	50
500 mg/6 mL		**CUPSA256**		**CUPSA356**		**CUQAX256**		**CUNAX256**	50
1 g/6 mL		**CUPSA2M6**		**CUPSA3M6**		**CUQAX2M6**		**CUNAX2M6**	30
100 mg/10 mL		**CUPSA21Z**		**CUPSA31Z**		**CUQAX21Z**		**CUNAX21Z**	50
200 mg/10 mL		**CUPSA22Z**		**CUPSA32Z**		**CUQAX22Z**		**CUNAX22Z**	50
500 mg/10 mL		**CUPSA25Z**		**CUPSA35Z**		**CUQAX25Z**		**CUNAX25Z**	50

Sample Prep - Solid Phase Extraction

UCT Styre Screen® Polymeric Resign columns

Styre Screen® extraction columns contain an ultra clean, highly cross-linked styrene and divinylbenzene copolymer sorbent that is functionalized with both a reverse phase, hydrophobic component and a strong cation exchanger. High & reproducible recoveries for acidic, neutral and basic compounds are achievable with a single column. The Styre Screen® particles have an average particle size of 30 microns and a very high analyte capacity making them ideal for standard solid phase extraction applications. The increased analyte capacity means that less sorbent bed mass is needed which results in faster flow rates and less solvent use. Higher throughput and less solvent waste disposal translate into significant savings in both time and money. In addition, no conditioning steps are required for most drugs of abuse applications.

Advantage

- No conditioning steps
- Copolymer allows for extraction of acids, neutrals and bases
- High and reproducible recoveries
- Clean extractions
- Highly cross-linked styrene/divinylbenzene polymer
- Reduction in sorbent mass
- Faster flow rates
- pH stable (1 to 14)
- Reduction in solvent use
- High sorbent capacity
- Methods for NIDA/SAMHSA 5 Drugs

Weight /Vol.	Sorbent	P/N	Application	Qty
30 mg/1 mL	DBX - Benzenesulfonic	**SSDBX031**	Dual functionality for weak	100
30 mg/3 mL	Acid + C18	**SSDBX033**	acids and	50
50 mg/6 mL		**SSDBX056**	hydrophobic compounds.	50
30 mg/1 mL	DVB - Polystyrene	**SSDBX031**	n.a.	100
30 mg/3 mL	Divinylbenzene	**SSDBX033**	n.a.	50
50 mg/6 mL		**SSDBX056**	n.a.	50
30 mg/1 mL	BCX - Reverse Phase	**SSBCX031**	Scavenger for amines,	100
30 mg/3 mL		**SSBCX033**	alcohols and other	50
50 mg/6 mL		**SSBCX056**	nucleophiles.	50
30 mg/1 mL	C18 -Reverse Phase	**SSC18031**	Removes hydrophobic impurities,	100
30 mg/3 mL		**SSC18033**	de-salting and purification of	50
50 mg/6 mL		**SSC18056**	hydrophobic compounds.	50
30 mg/1 mL	CCX - Carboxylic Acid	**SSCCX031**	Scavenger for strong anions	100
30 mg/3 mL		**SSCCX033**	(Quaternary amines or metals)	50
50 mg/6 mL		**SSCCX056**		50
30 mg/1 mL	QAX - Quaternary Amine	**SSQAX031**	"Removes large or more	100
30 mg/3 mL		**SSQAX033**	hydrophobic compounds."	50
50 mg/6 mL		**SSQAX056**		50

UCT Enviro-Clean® - Universal cartridges

The Enviro-Clean® Universal Cartridge is the choice of modern contract labs. This inexpensive, easy to use cartridge provides consistent extractions with clean blanks. Built in flow control allows for consistent flow rates. Enviro-Clean® sorbents UCT polypropylene, and PTFE frits offer a clean blank with every batch. Designed for the environmental lab, the cartridge is made to handle large volumes of waste water. An optional bottle holder is available for continuous feed from Boston Round and wide mouth bottles.

SPE-DEX® is a registered trademark of Horizon Technology, Inc.

Product Name	P/N	Weight /Vol.	Description / Application	Qty
UNIVERSAL C18	**ECUNIC18**	1100 mg/83 mL	1100 mg of endcapped C18 for pesticides, PCBs and a large assortment of applications.	8
UNIVERSAL 525	**ECUNI525**	1500 mg/83 mL	1500 mg of our special C18 blend. This cartridge is specifically designed for EPA Method 525.	8
UNIVERSAL PAH / DRO	**ECUNIPAH**	2000 mg/83 mL	2000 mg of C18 specifically designed for PAH extraction.	8
UNIVERSAL OIL & GREASE	**ECUNIOAG**	4000 mg/83 mL	4000 mg of large particle C18 with an assortment of PE frit filters. No more liquid/liquid emulsions or clogged disks.	15

The cartridge will fit all standard manifolds and disk manifolds with adapter.

Sample Prep - Solid Phase Extraction

UCT dispersive SPE – "QuEChERS"

Quick, Easy, Cheap, Effective, Rugged and Safe Approach for determining pesticide residues in fruits, vegetables and other foods.

The QuEChERS method is gaining in popularity around the world as the method of choice for food testing. The QuEChERS method offers the advantages of high recoveries, accurate results, high sample throughput, low solvent and glassware usage (no chlorinated solvents), less labor and bench space and lower reagent costs. Organic acids and other potential contaminants are removed during the cleanup process.

UCT provides a variety of QuEChERS products containing primary secondary amine (PSA), C18, magnesium sulfate anhydrous and graphitized carbon black. These products are used in the method's clean-up step. Bulk, pre-cleaned magnesium sulfate anhydrous is available for the extraction part of the method.

PSA is used to remove various polar organic acids, polar pigments, some sugars and fatty acid co-extractables from QuEChERS extracts. Combined with C18, samples containing less than 1% lipids can be cleaned of most lipids and sterols. Graphitized carbon is used to remove sterols and pigments such as chlorophyll. The downside to carbon is its ability to retain planar molecules. Schenck and Vega (April 2001) reported that 3/1 acetone : toluene performed well at eluting many compounds from carbon.

P/N	Description	Qty
CUMPSCB2CT	2 mL micro-centrifuge tubes with 150 mg Anhydrous Magnesium Sulfate,50 mg PSA & 50mg Carbon	100
CUMPS2CT	2 mL micro-centrifuge tubes with 150 mg Anhydrous Magnesium Sulfate, 50 mg PSA	100
CUMPSC18CT	2 mL micro-centrifuge tubes with 150 mg Anhydrous Magnesium Sulfate, 50 mg PSA & 50 mg endcapped C18	100
ECMPSCB15CT	15 mL centrifuge tubes with 900 mg Anhydrous Magnesium Sulfate, 300 mg PSA & 50 mg endcapped C18	50
ECMPSC1815CT	15 mL centrifuge tubes with 900 mg Anhydrous Magnesium Sulfate, 300 mg PSA & 150 mg endcapped C18	50
ECPSACB6	6 mL columns with 400 mg PSA on bottom, 200 mg Graphitized Carbon-Black on top, separated by a Teflon frit*	30
ECPSACB256	6 mL columns with 250 mg Graphitized Carbon on top, 500 mg PSA on the bottom, separated with a Teflon frit*	30
ECPSACB506	6 mL columns with 500 mg Graphitized Carbon on top, 500 mg PSA on the bottom, separated with a Teflon frit*	30
ECMSSA50CT	50 mL PP centrifuge tube with 6 g Anhydrous Magnesium Sulfate, 1.5 g Anhydrous Sodium Acetate	250
ECMSSC50CT	50 mL PP centrifuge tube with 4 g Anhydrous Magnesium Sulfate, 1 g NaCl	250

Example of procedure

1. Transfer 15 g of homogenized sample into a 50 ml FEP centrifuge tube.
2. Add 15 ml of 1% acetic acid in acetonitrile, 1.5 g sodium acetate anhydrous, 6 g of UCT magnesium sulfate anhydrous and an internal standard.
3. Shake vigorously for 1 minute.
4. Centrifuge for 3 minutes at 3700 rpm.
5. Transfer an aliquot of the supernatant to the UCT product.
6. Shake for 1 minute.
7. Centrifuge for 3 minutes at 3700 rpm.
8. Analyze.

* Products available with Polyethylene or Teflon frits. Choice depends application and price requirements.

Polypropylene and Inert Glass Extraction columns

Enviro-Clean® solid phase extraction columns are designed especially for the isolation and separation of environmental analytes such as pesticides, herbicides, polyaromatic hydrocarbons, polychlorinated biphenyls and other environmentally related compounds.

Enviro-Clean® offers a selection of high quality solid phase extraction columns geared to support the environmental chemist with a very broad range of analytical applications. The most important function of the solid phase extraction column for the environmental chemist is the clean separation of an analyte from a variety of compounds. An important function of the extraction column is that it will concentrate a low level of analyte from large samples for accurate analysis. When evaluating analyte extraction or separation, Enviro-Clean® offers nonpolar, polar, ion-exchange and copolymeric phases for application in the environmental laboratory.

Hydrophobic Extraction Columns

Non-polar phases are often referred to as hydrophobic and function by the interactions of the carbon-hydrogen bond of the analyte and the sorbent. C18 is the most widely used of these phases. EPA approved methods for analyzing organics in drinking water specify the C18 hydrophobic phase. This method requires that large sample volumes (liters) be analyzed which utilizes the compound concentration function of the hydrophobic sorbent.

Weight /Vol.	Sorbent	Endcapped	Unendcapped	Sorbent	Endcapped	Unendcapped	Sorbent	Endcapped	Unendcapped	Qty
50 mg/1 mL	C2, Ethyl	**EEC021L1**	**EUC021L1**	C4, n-Butyl	**EECN41L1**	**EUCN41L1**	C6, Hexyl	**EEC061L1**	**EUC061L1**	100
100 mg/1 mL		**EEC02111**	**EUC02111**		**EECN4111**	**EUCN4111**		**EEC06111**	**EUC06111**	100
200 mg/3 mL		**EEC02123**	**EUC02123**		**EECN4123**	**EUCN4123**		**EEC06123**	**EUC06123**	50
500 mg/3 mL		**EEC02153**	**EUC02153**		**EECN4153**	**EUCN4153**		**EEC06153**	**EUC06153**	50
500 mg/6 mL		**EEC02156**	**EUC02156**		**EECN4156**	**EUCN4156**		**EEC06156**	**EUC06156**	50
1000 mg/6 mL		**EEC021M6**	**EUC021M6**		**EECN41M6**	**EUCN41M6**		**EEC061M6**	**EUC061M6**	30
100 mg/10 mL		**EEC0211Z**	**EUC0211Z**		**EECN411Z**	**EUCN411Z**		**EEC0611Z**	**EUC0611Z**	50
200 mg/10 mL		**EEC0212Z**	**EUC0212Z**		**EECN412Z**	**EUCN412Z**		**EEC0612Z**	**EUC0612Z**	50
500 mg/10 mL		**EEC0215Z**	**EUC0215Z**		**EECN415Z**	**EUCN415Z**		**EEC0615Z**	**EUC0615Z**	50
2000 mg/15 mL		**EEC0212M15**	**EUC0212M15**		**EECN412M15**	**EUCN412M15**		**EEC0612M15**	**EUC0612M15**	20
50 mg/1 mL	C3, Propyl	**EECN31L1**	**EUCN31L1**	C5, Pentyl	**EEC051L1**	**EUC051L1**	C7, Heptyl	**EEC071L1**	**EUC071L1**	100
100 mg/1 mL		**EECN3111**	**EUCN3111**		**EEC0511**	**EUC05111**		**EEC07111**	**EUC07111**	100
200 mg/3 mL		**EECN3123**	**EUCN3123**		**EEC05123**	**EUC05123**		**EEC07123**	**EUC07123**	50
500 mg/3 mL		**EECN3153**	**EUCN3153**		**EEC05153**	**EUC05153**		**EEC07153**	**EUC07153**	50
500 mg/6 mL		**EECN3156**	**EUCN3156**		**EEC05156**	**EUC05156**		**EEC07156**	**EUC07156**	50
1000 mg/6 mL		**EECN31M6**	**EUCN31M6**		**EEC051M6**	**EUC051M6**		**EEC071M6**	**EUC071M6**	30
100 mg/10 mL		**EECN311Z**	**EUCN311Z**		**EEC0511Z**	**EUC0511Z**		**EEC0711Z**	**EUC0711Z**	50
200 mg/10 mL		**EECN312Z**	**EUCN312Z**		**EEC0512Z**	**EUC0512Z**		**EEC0712Z**	**EUC0712Z**	50
500 mg/10 mL		**EECN315Z**	**EUCN315Z**		**EEC0515Z**	**EUC0515Z**		**EEC0715Z**	**EUC0715Z**	50
2000 mg/15 mL		**EECN312M15**	**EUCN312M15**		**EEC0512M15**	**EUC0512M15**		**EEC0712M15**	**EUC0712M15**	20

Sample Prep - Solid Phase Extraction

UCT Enviro-Clean® columns

Hydrophobic Extraction Columns

Weight /Vol.	Sorbent	Endcapped	Unendcapped	Sorbent	Endcapped	Unendcapped	Sorbent	Endcapped	Unendcapped	Qty
50 mg/1 mL	C8, Octyl	**EEC081L1**	**EUC081L1**	C12,	**EEC121L1**	**EUC121L1**	Cyclohexyl	**EECYH1L1**	**EUCYH1L1**	100
100 mg/1 mL		**EEC08111**	**EUC08111**	nDodecyl	**EEC12111**	**EUC12111**		**EECYH111**	**EUCYH111**	100
200 mg/3 mL		**EEC08123**	**EUC08123**		**EEC12123**	**EUC12123**		**EECYH123**	**EUCYH123**	50
500 mg/3 mL		**EEC08153**	**EUC08153**		**EEC12153**	**EUC12153**		**EECYH153**	**EUCYH153**	50
500 mg/6 mL		**EEC08156**	**EUC08156**		**EEC12156**	**EUC12156**		**EECYH156**	**EUCYH156**	50
1000 mg/6 mL		**EEC081M6**	**EUC081M6**		**EEC121M6**	**EUC121M6**		**EECYH1M6**	**EUCYH1M6**	30
100 mg/10 mL		**EEC0811Z**	**EUC0811Z**		**EEC1211Z**	**EUC1211Z**		**EECYH11Z**	**EUCYH11Z**	50
200 mg/10 mL		**EEC0812Z**	**EUC0812Z**		**EEC1212Z**	**EUC1212Z**		**EECYH12Z**	**EUCYH12Z**	50
500 mg/10 mL		**EEC0815Z**	**EUC0815Z**		**EEC1215Z**	**EUC1215Z**		**EECYH15Z**	**EUCYH15Z**	50
2000 mg/15 mL		**EEC0812M15**	**EUC0812M15**		**EEC1212M15**	**EUC1212M15**		**EECYH12M15**	**EUCYH12M15**	20
50 mg/1 mL	C10, nDecyl	**EEC101L1**	**EUC101L1**	C18,			Phenyl	**EEPHY1L1**	**EUPHY1L1**	100
100 mg/1 mL		**EEC10111**	**EUC10111**	Octadecyl	**EEC18111**	**EUC18111**		**EEPHY111**	**EUPHY111**	100
200 mg/3 mL		**EEC10123**	**EUC10123**		**EEC18123**	**EUC18123**		**EEPHY123**	**EUPHY123**	50
500 mg/3 mL		**EEC10153**	**EUC10153**		**EEC18153**	**EUC18153**		**EEPHY153**	**EUPHY153**	50
500 mg/6 mL		**EEC10156**	**EUC10156**		**EEC18156**	**EUC18156**		**EEPHY156**	**EUPHY156**	50
1000 mg/6 mL		**EEC101M6**	**EUC101M6**		**EEC181M6**	**EUC181M6**		**EEPHY1M6**	**EUPHY1M6**	30
100 mg/10 mL		**EEC1011Z**	**EUC1011Z**		**EEC1811Z**	**EUC1811Z**		**EEPHY11Z**	**EUPHY11Z**	50
200 mg/10 mL		**EEC1012Z**	**EUC1012Z**		**EEC1812Z**	**EUC1812Z**		**EEPHY12Z**	**EUPHY12Z**	50
500 mg/10 mL		**EEC10115Z**	**EUC1015Z**		**EEC1815Z**	**EUC1815Z**		**EEPHY15Z**	**EUPHY15Z**	50
2000 mg/15 mL		**EEC1012M15**	**EUC1012M15**		**EEC1812M15**	**EUC1812M15**		**EEPHY12M15**	**EUPHY12M15**	20

Hydrophilic Extraction Columns

Polar or hydrophilic phases function by hydrogen bonding, pi-pi and dipole-dipole interaction. Ion exchange interactions occur between the sorbent and the analyte of opposite charge.
Enviro-Clean® sorbents are available in both cation or anion exchangers exhibiting both weak and strong characteristics.
Copolymeric phases offer a new approach to the environmental analyst by providing very clean extracts and high compound recovery. Dual functionalities, hydrophobic plus ion-exchange or polar allow a higher degree of selectivity than was previously possible. Analytes retained by multiple mechanisms can be washed by disrupting only one mechanism. Careful selection of the solvent strength results in a greater removal of chromatographic contamination.

Weight /Vol.	Qty	P/N
50 mg/1 mL	100	**EUCARB1L1**
100 mg/1 mL	100	**EUCARB111**
200 mg/3 mL	50	**EUCARB123**
500 mg/3 mL	50	**EUCARB153**
200 mg/6 mL	50	**EUCARB126**
500 mg/6 mL	50	**EUCARB156**
1000 mg/6 mL	30	**EUCARB1M6**
100 mg/10 mL	50	**EUCARB11Z**
200 mg/10 mL	50	**EUCARB12Z**
500 mg/10 mL	50	**EUCARB15Z**
1000 mg/15 mL	20	**EUCARB1M15**
2000 mg/15 mL	20	**EUCARB12M15**

Carbon-Graphitized

Application : Carbon supports have been used to isolate extremely polar organic compounds. They work by a hydrophobic mechanism with a high surface area and ion exchange. This interaction can happen in a wide range of polar and non-polar solvents.

UCT Enviro-Clean® columns

Weight /Vol.	Sorbent	P/N	Sorbent	P/N	Sorbent	P/N	Sorbent	P/N	Qty
50 mg/1 mL	Unbonded	**EUSIL1L1**	Florisil®	**EUFLS1L1**	Alumina,	**EUALA1L1**	Alumina,	**EUALB1L1**	100
100 mg/1 mL	Silica	**EUSIL111**		**EUFLS111**	Acidic	**EUALA111**	Basic	**EUALB111**	100
200 mg/3 mL		**EUSIL123**		**EUFLS123**		**EUALA123**		**EUALB123**	50
500 mg/3 mL		**EUSIL153**		**EUFLS153**		**EUALA153**		**EUALB153**	50
500 mg/6 mL		**EUSIL156**		**EUFLS156**		**EUALA156**		**EUALB156**	50
1000 mg/6 mL		**EUSIL1M6**		**EUFLS1M6**		**EUALA1M6**		**EUALB1M6**	30
100 mg/10 mL		**EUSIL11Z**		**EUFLS11Z**		**EUALA11Z**		**EUALB11Z**	50
200 mg/10 mL		**EUSIL12Z**		**EUFLS12Z**		**EUALA12Z**		**EUALB12Z**	50
500 mg/10 mL		**EUSIL15Z**		**EUFLS15Z**		**EUALA15Z**		**EUALB15Z**	50
2000 mg/15 mL		**EUSIL12M15**		**EUFLS12M15**		**EUALA12M15**		**EUALB12M15**	20
50 mg/1 mL	Alumina,	**EUALN1L1**	CN,	**EECNP1L1**	CN,	**EUCNP1L1**	Diol	**EUDOL1L1**	100
100 mg/1 mL	neutral	**EUALN111**	Cyanopropyl	**EECNP111**	Cyanopropyl	**EUCNP111**		**EUDOL111**	100
200 mg/3 mL		**EUALN123**	Endcapped	**EECNP123**	Unendcapped	**EUCNP123**		**EUDOL123**	50
500 mg/3 mL		**EUALN153**		**EECNP153**		**EUCNP153**		**EUDOL153**	50
500 mg/6 mL		**EUALN156**		**EECNP156**		**EUCNP156**		**EUDOL156**	50
1000 mg/6 mL		**EUALN1M6**		**EECNP1M6**		**EUCNP1M6**		**EUDOL1M6**	30
100 mg/10 mL		**EUALN11Z**		**EECNP11Z**		**EUCNP11Z**		**EUDOL11Z**	50
200 mg/10 mL		**EUALN12Z**		**EECNP12Z**		**EUCNP12Z**		**EUDOL12Z**	50
500 mg/10 mL		**EUALN15Z**		**EECNP15Z**		**EUCNP15Z**		**EUDOL15Z**	50
2000 mg/15 mL		**EUALN12M15**		**EECNP12M15**		**EUCNP12M15**		**EUDOL12M15**	20

Ion exchange and mixed mode Extraction Columns

Weight /Vol.	Sorbent	P/N	Sorbent	P/N	Sorbent	P/N	Sorbent	P/N	Qty
50 mg/1 mL	Diethylamino	**EUDAX1L1**	Aminopropyl	**EUNAX1L1**	Quaternary	**EUQAX1L1**	Carboxylic	**EUCCX1L1**	100
100 mg/1 mL		**EUDAX111**		**EUNAX111**	Amine	**EUQAX111**	Acid	**EUCCX111**	100
200 mg/3 mL		**EUDAX123**		**EUNAX123**	with Chloride	**EUQAX123**		**EUCCX123**	50
500 mg/3 mL		**EUDAX153**		**EUNAX153**	Counter Ion	**EUQAX153**		**EUCCX153**	50
500 mg/6 mL		**EUDAX156**		**EUNAX156**		**EUQAX156**		**EUCCX156**	50
1000 mg/6 mL		**EUDAX1M6**		**EUNAX1M6**		**EUQAX1M6**		**EUCCX1M6**	30
100 mg/10 mL		**EUDAX11Z**		**EUNAX11Z**		**EUQAX11Z**		**EUCCX11Z**	50
200 mg/10 mL		**EUDAX12Z**		**EUNAX12Z**		**EUQAX12Z**		**EUCCX12Z**	50
500 mg/10 mL		**EUDAX15Z**		**EUNAX15Z**		**EUQAX15Z**		**EUCCX15Z**	50
2000 mg/15 mL		**EUDAX12M15**		**EUNAX12M15**		**EUQAX12M15**		**EUCCX12M15**	20
50 mg/1 mL	Benzene-	**EUBCX1L1**	Hydrophobic	**EUCCX2L1**	Hydrophobic	**EUBCX2L1**	Hydrophobic	**EUQAX2L1**	100
100 mg/1 mL	-sulfonic	**EUBCX111**	plus	**EUCCX211**	plus	**EUBCX211**	plus	**EUQAX211**	100
200 mg/3 mL	Acid	**EUBCX123**	Carboxylic	**EUCCX223**	Benzene-	**EUBCX223**	Quaternary	**EUQAX223**	50
500 mg/3 mL		**EUBCX153**	Acid	**EUCCX253**	-sulfonic	**EUBCX253**	Amine	**EUQAX253**	50
500 mg/6 mL		**EUBCX156**		**EUCCX256**	Acid	**EUBCX256**		**EUQAX256**	50
1000 mg/6 mL		**EUBCX1M6**		**EUCCX2M6**		**EUBCX2M6**		**EUQAX2M6**	30
100 mg/10 mL		**EUBCX11Z**		**EUCCX21Z**		**EUBCX21Z**		**EUQAX21Z**	50
200 mg/10 mL		**EUBCX12Z**		**EUCCX22Z**		**EUBCX22Z**		**EUQAX22Z**	50
500 mg/10 mL		**EUBCX15Z**		**EUCCX25Z**		**EUBCX25Z**		**EUQAX25Z**	50
2000 mg/15 mL		**EUBCX12M15**		**EUCCX22M15**		**EUBCX22M15**		**EUQAX22M15**	