CLEAN-UP®
Solid Phase Extraction Columns

Ion Exchange Phase Columns (Anion & Cation)

Ion Exchange Phases Offered:

Anion Exchange
- Aminopropyl
- n-2 Aminoethyl
- Diethylamino
- Quaternary Amine with Chloride Counter Ion
- Quaternary Amine with Acetate Counter Ion
- Quaternary Amine with Hydroxide Counter Ion
- Quaternary Amine with Formate Counter Ion
- Polyimine

Cation Exchange
- Carboxylic Acid
- Propylsulfonic Acid
- Benzenesulfonic Acid
- Benzenesulfonic Acid - High Load
- Triacetic Acid

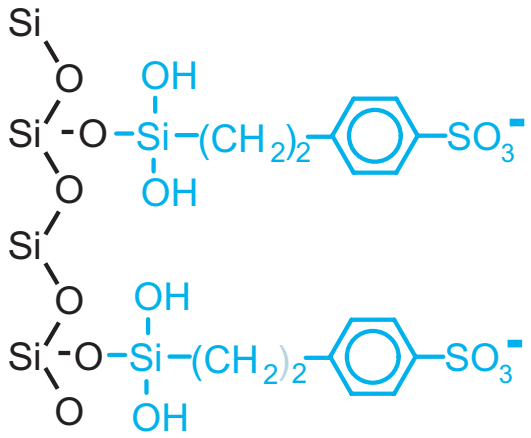
Click Here For:

Applications Manual

CLEAN-UP®
Ion Exchange Extraction Columns

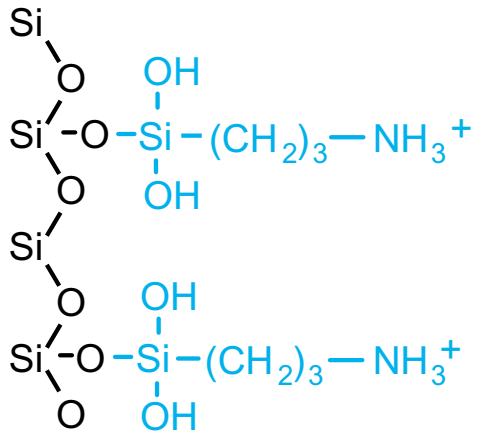
This sorbent is composed of a silica backbone bonded with a carbon chain terminated by a negatively or positively charged functional group.
Ion exchange interactions occur between a sorbent that carries a charge and a compound of opposite charge.

example of a cation exchange phase



■ Silica Backbone
■ Cation exchanger

example of an anion exchange phase



■ Silica Backbone
■ Anion exchanger

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.

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.

Analytes*	Washes	Elutions
Anions Cations	Organic solvent or aqueous buffer at pH that allows the ion to remain charged AND/OR at a low ionic strength AND/OR at a weak concentration	Organic solvent and aqueous buffer at pH that would neutralize the ion AND/OR at a high ionic strength AND/OR at a strong concentration

*typical compounds which can be extracted using ion exchange columns

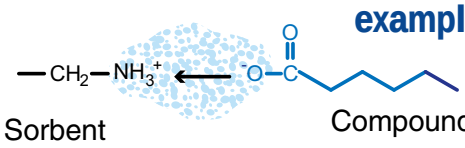
Ion Exchange Sorbents & Structures

Sorbent	Structure	pKa
Anion Exchangers		
Aminopropyl (1°amine)	$-Si-(CH_2)_3NH_3^+$	9.8
n-2 Aminoethyl (2°amine)	$-Si-(CH_2)_3NH_2^+(CH_2)_2NH_3^+$	10.1, 10.9
Diethylamino (3°amine)	$-Si-(CH_2)_3NH^+(CH_2CH_3)_2$	10.6
Quaternary Amine Chloride	$-Si-(CH_2)_3N^+(CH_3)_3$	always charged
Quaternary Amine Hydroxide	$-Si-(CH_2)_3N^+(CH_3)_3$	always charged
Quaternary Amine Acetate	$-Si-(CH_2)_3N^+(CH_3)_3$	alwayscharged
Quaternary Amine Formate	$-Si-(CH_2)_3N^+(CH_3)_3$	always charged
Polyimine	$-Si-(CH_2)_3R-[NHCH_2CH_2]_X$	
Cation Exchangers		
Carboxylic Acid	$-Si-CH_2COOH$	4.8
Propylsulfonic Acid	$-Si-(CH_2)_3SO_3H$	<1
Benzenesulfonic Acid	$-Si-(CH_2)_2-C_6H_4-SO_3H$	always charged
Benzenesulfonic Acid High-Load	$-Si-(CH_2)_2-C_6H_4-SO_3H$	always charged
Triacetic Acid	$-Si-(CH_2)_3N(CH_2COOH)(CH_2)_2N(CH_2COOH)_2$	

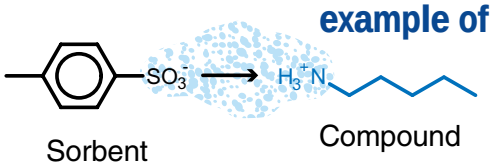
NOTE: In an un-ionized state, these sorbents are hydrophilic (polar) sorbents.

Note: Neutralization can occur on either the sorbent or the analyte of interest. Either will disrupt the bond of the desired compound.

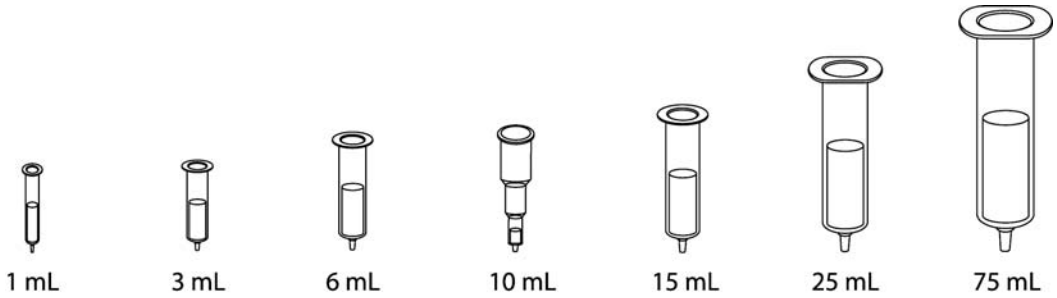
example of anion exchange binding



example of cation exchange binding



CLEAN-UP® Solid Phase Extraction Columns
Anion Exchange Product Guide



Chemistries are offered on these particle sizes.

Small Particle (5-20 µm)
Intermediate Particle (25-40 µm)
Standard Particle (40-60 µm)
Large Particle (125-210 µm)

Aminopropyl

Part Number	Amount sorbent / Tube volume	Units per bag
CUNAX1L1	50mg / 1mL	100
CUNAX111	100mg / 1mL	100
CUNAX113	100mg / 3mL	50
CUNAX123	200mg / 3mL	50
CUNAX153	500mg / 3mL	50
CUNAX156	500mg / 6mL	50
CUNAX11Z	100mg / 10mL	50
CUNAX12Z	200mg / 10mL	50
CUNAX15Z	500mg / 10mL	50
CUNAX1M6	1g / 6mL	30
CUNAX12M15	2g / 15mL	20
CUNAX15M25	5g / 25mL	20
CUNAX110M75	10g / 75mL	10

% Organic Loading: 6.65

Exchange Capacity - (meq/g): 0.310

Application:
Scavenger for acids, cyclic compounds, cholesterols, and other liquid type and compounds.

n-2 Aminoethyl

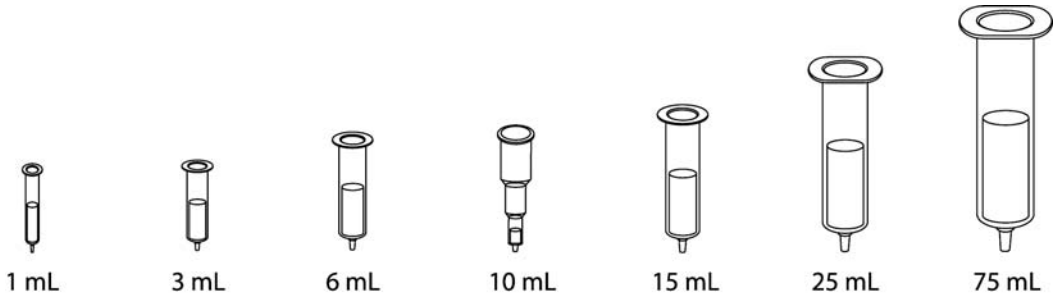
Part Number	Amount sorbent / Tube volume	Units per bag
CUPSA1L1	50mg / 1mL	100
CUPSA111	100mg / 1mL	100
CUPSA113	100mg / 3mL	50
CUPSA123	200mg / 3mL	50
CUPSA153	500mg / 3mL	50
CUPSA156	500mg / 6mL	50
CUPSA11Z	100mg / 10mL	50
CUPSA12Z	200mg / 10mL	50
CUPSA15Z	500mg / 10mL	50
CUPSA1M6	1g / 6mL	30
CUPSA12M15	2g / 15mL	20
CUPSA15M25	5g / 25mL	20
CUPSA110M75	10g / 75mL	10

% Organic Loading: 9.70

Exchange Capacity - (meq/g): 0.320

Application:
Scavenger for acids, cyclic compounds, cholesterols, and other liquid type and compounds.

CLEAN-UP® Solid Phase Extraction Columns
Anion Exchange Product Guide



Chemistries are offered on these particle sizes.

Small Particle (5-20 µm)
Intermediate Particle (25-40 µm)
Standard Particle (40-60 µm)
Large Particle (125-210 µm)

Diethylamino

Part Number	Amount sorbent / Tube volume	Units per bag
CUDAX1L1	50mg / 1mL	100
CUDAX111	100mg / 1mL	100
CUDAX113	100mg / 3mL	50
CUDAX123	200mg / 3mL	50
CUDAX153	500mg / 3mL	50
CUDAX156	500mg / 6mL	50
CUDAX11Z	100mg / 10mL	50
CUDAX12Z	200mg / 10mL	50
CUDAX15Z	500mg / 10mL	50
CUDAX1M6	1g / 6mL	30
CUDAX12M15	2g / 15mL	20
CUDAX15M25	5g / 25mL	20
CUDAX110M75	10g / 75mL	10

% Organic Loading: 8.40

Exchange Capacity - (meq/g): 0.280

Application:
Scavenger for acids, cyclic compounds, cholesterols, and other liqid type and compounds.

Quaternary Amine with chloride counter ion

Part Number	Amount sorbent / Tube volume	Units per bag
CUQAX1L1	50mg / 1mL	100
CUQAX111	100mg / 1mL	100
CUQAX113	100mg / 3mL	50
CUQAX123	200mg / 3mL	50
CUQAX153	500mg / 3mL	50
CUQAX156	500mg / 6mL	50
CUQAX11Z	100mg / 10mL	50
CUQAX12Z	200mg / 10mL	50
CUQAX15Z	500mg / 10mL	50
CUQAX1M6	1g / 6mL	30
CUQAX12M15	2g / 15mL	20
CUQAX15M25	5g / 25mL	20
CUQAX110M75	10g / 75mL	10

% Organic Loading: 8.40

Exchange Capacity - (meq/g): 0.250

Application:
Scavenger for acids and sulfonyl chlorides, isocyanates and weak electrophiles.

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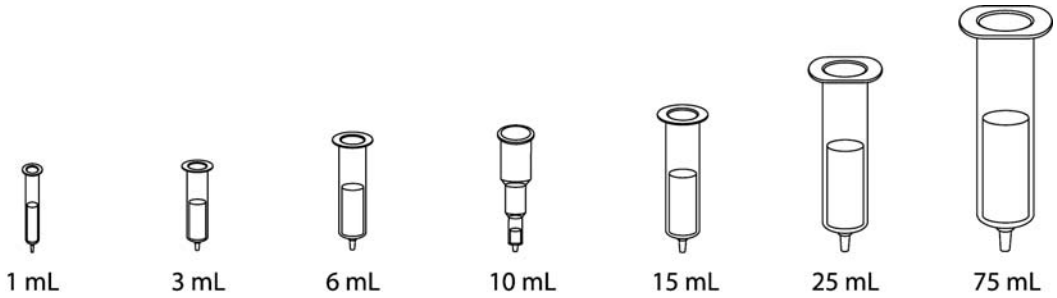
Anion Exchange Product Guide



Chemistries are offered on these particle sizes.

Small Particle (5-20 µm)
Intermediate Particle (25-40 µm)
Standard Particle (40-60 µm)
Large Particle (125-210 µm)

Quaternary amine with acetate counter ion

Part Number Unendcapped	Amount sorbent / Tube volume	Units per bag
CAQAX111	100mg / 1mL	100
CAQAX123	200mg / 1mL	50
CAQAX153	500mg / 3mL	50
CAQAX156	500mg / 6mL	50
CAQAX11Z	100mg / 10mL	50
CAQAX12Z	200mg / 10mL	50
CAQAX15Z	500mg / 10mL	50
CAQAX1M6	1g / 6mL	30
CAQAX12M6	2g / 6mL	20
CAQAX12M15	2g / 15mL	20
CAQAX15M25	5g / 25mL	20
CAQAX110M75	10g / 75mL	10

% Organic Loading: 8.40

Exchange Capacity - (meq/g): 0.250

Application:
Scavenger for acids and sulfonyl chlorides, isocyanates and weak electrophiles. Useful when charge on ion being removed is weaker than the acetate counter ion.

Quaternary amine with hydroxide counter ion

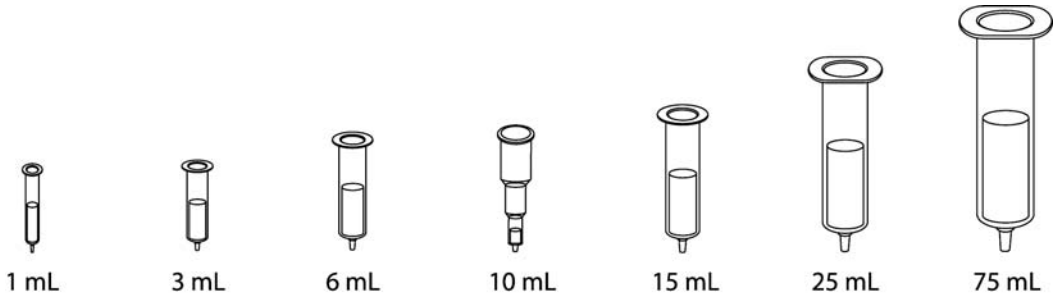
Part Number	Amount sorbent / Tube volume	Units per bag
CHQAX111	100mg / 1mL	100
CHQAX123	200mg / 1mL	50
CHQAX153	500mg / 3mL	50
CHQAX156	500mg / 6mL	50
CHQAX11Z	100mg / 10mL	50
CHQAX12Z	200mg / 10mL	50
CHQAX15Z	500mg / 10mL	50
CHQAX1M6	1g / 6mL	30
CHQAX12M6	2g / 6mL	20
CHQAX12M15	2g / 15mL	20
CHQAX15M25	5g / 25mL	20
CHQAX110M75	10g / 75mL	10

% Organic Loading: 8.40

Exchange Capacity - (meq/g): 0.250

Application:
Scavenger for acids and sulfonyl chlorides, isocyanates and weak electrophiles. Useful when charge on ion being removed is weaker than the hydroxide counter ion.

CLEAN-UP® Solid Phase Extraction Columns
Anion Exchange Product Guide



Chemistries are offered on these particle sizes.

Small Particle (5-20 µm)
Intermediate Particle (25-40 µm)
Standard Particle (40-60 µm)
Large Particle (125-210 µm)

Quaternary amine with formate counter ion

Part Number	Amount sorbent / Tube volume	Units per bag
CFQAX1L1	50mg / 1mL	100
CFQAX111	100mg / 1mL	100
CFQAX113	100mg / 3mL	50
CFQAX123	200mg / 3mL	50
CFQAX153	500mg / 3mL	50
CFQAX156	500mg / 6mL	50
CFQAX11Z	100mg / 10mL	50
CFQAX12Z	200mg / 10mL	50
CFQAX15Z	500mg / 10mL	50
CFQAX1M6	1g / 6mL	30
CFQAX12M15	2g / 15mL	20
CFQAX15M25	5g / 25mL	20
CFQAX110M75	10g / 75mL	10

% Organic Loading: 8.40

Exchange Capacity - (meq/g): 0.250

Application:
Scavenger for acids and sulfonyl chlorides, isocyanates and weak electrophiles. Useful when charge on ion being removed is weaker than the formate counter ion.

Polyimine

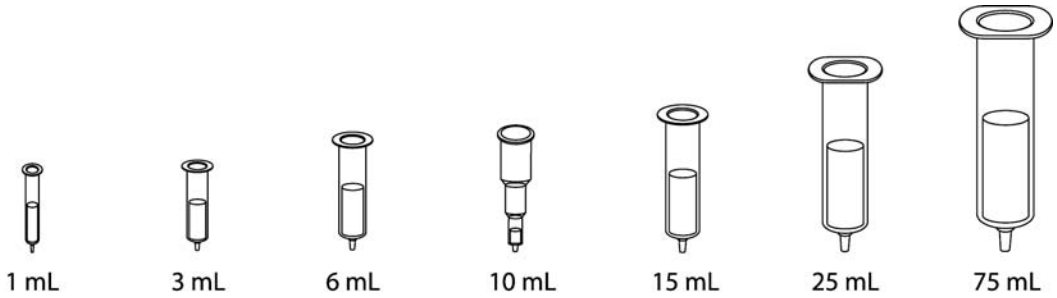
Part Number	Amount sorbent / Tube volume	Units per bag
CUPAX11	50mg / 1mL	100
CUPAX111	100mg / 1mL	100
CUPAX113	100mg / 3mL	50
CUPAX123	200mg / 3mL	50
CUPAX153	500mg / 3mL	50
CUPAX156	500mg / 6mL	50
CUPAX11Z	100mg / 10mL	50
CUPAX12Z	200mg / 10mL	50
CUPAX15Z	500mg / 10mL	50
CUPAX1M6	1g / 6mL	30
CUPAX12M15	2g / 15mL	20
CUPAX15M25	5g / 25mL	20
CUPAX110M75	10g / 75mL	10

% Organic Loading: 13.5

Exchange Capacity - (meq/g): 0.250

Application:
Scavenger for acids and sulfonyl chlorides, isocyanates and other electrophiles.

CLEAN-UP® Solid Phase Extraction Columns
Cation Exchange Product Guide



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Small Particle (5-20 µm)
Intermediate Particle (25-40 µm)
Standard Particle (40-60 µm)
Large Particle (125-210 µm)

Carboxylic Acid

Part Number	Amount sorbent / Tube volume	Units per bag
CUCCX1L1	50mg / 1mL	100
CUCCX111	100mg / 1mL	100
CUCCX113	100mg / 3mL	50
CUCCX123	200mg / 3mL	50
CUCCX153	500mg / 3mL	50
CUCCX156	500mg / 6mL	50
CUCCX11Z	100mg / 10mL	50
CUCCX12Z	200mg / 10mL	50
CUCCX15Z	500mg / 10mL	50
CUCCX1M6	1g / 6mL	30
CUCCX12M15	2g / 15mL	20
CUCCX15M25	5g / 25mL	20
CUCCX110M75	10g / 75mL	10

% Organic Loading: 9.10

Exchange Capacity - (meq/g): 0.170

Application:
Scavenger for strong amines with quats.

Propylsulfonic Acid

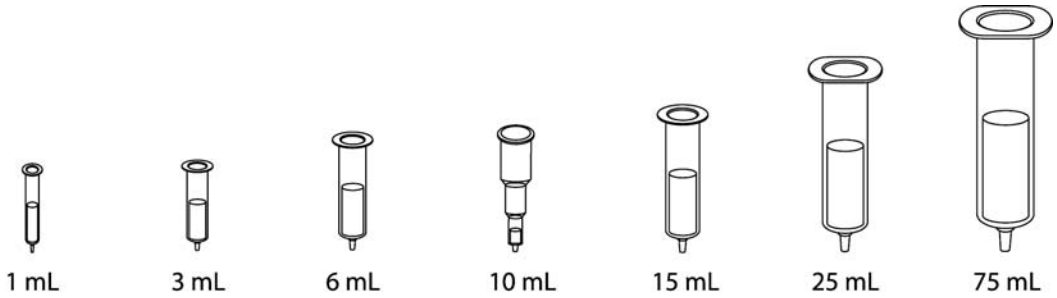
Part Number	Amount sorbent / Tube volume	Units per bag
CUPCX1L1	50mg / 1mL	100
CUPCX111	100mg / 1mL	100
CUPCX113	100mg / 3mL	50
CUPCX123	200mg / 3mL	50
CUPCX153	500mg / 3mL	50
CUPCX156	500mg / 6mL	50
CUPCX11Z	100mg / 10mL	50
CUPCX12Z	200mg / 10mL	50
CUPCX15Z	500mg / 10mL	50
CUPCX1M6	1g / 6mL	30
CUPCX12M15	2g / 15mL	20
CUPCX15M25	5g / 25mL	20
CUPCX110M75	10g / 75mL	10

% Organic Loading: 7.10

Exchange Capacity - (meq/g): 0.180

Application:
Scavenger for amines, alcohols and other nucleophiles.

CLEAN-UP® Solid Phase Extraction Columns
Cation Exchange Product Guide



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Small Particle (5-20 µm)
Intermediate Particle (25-40 µm)
Standard Particle (40-60 µm)
Large Particle (125-210 µm)

Benzenesulfonic Acid

Part Number	Amount sorbent / Tube volume	Units per bag
CUBCX1L1	50mg / 1mL	100
CUBCX111	100mg / 1mL	100
CUBCX113	100mg / 3mL	50
CUBCX123	200mg / 3mL	50
CUBCX153	500mg / 3mL	50
CUBCX156	500mg / 6mL	50
CUBCX11Z	100mg / 10mL	50
CUBCX12Z	200mg / 10mL	50
CUBCX15Z	500mg / 10mL	50
CUBCX1M6	1g / 6mL	30
CUBCX12M15	2g / 15mL	20
CUBCX15M25	5g / 25mL	20
CUBCX110M75	10g / 75mL	10

% Organic Loading: 11.00

Exchange Capacity - (meq/g): 0.320

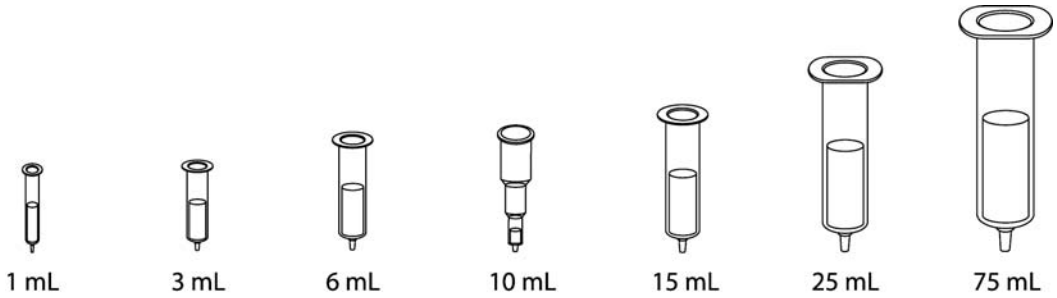
Application:
Scavenger for amines, alcohols and other nucleophiles.

Benzenesulfonic Acid - HIGH LOAD

Part Number	Amount sorbent / Tube volume	Units per bag
CUBCX1HL11	100mg / 1mL	100
CUBCX1HL23	200mg / 3mL	50
CUBCX1HL53	100mg / 3mL	50
CUBCX1HL56	500mg / 6mL	50
CUBCX1HL1Z	100mg / 10mL	50
CUBCX1HL2Z	200mg / 10mL	50
CUBCX1HL5Z	500mg / 10mL	50
CUBCX1HLM6	1000g / 6mL	30
CUBCX1HL2M15	2000mg / 15mL	20
CUBCX1HL2M6	1g / 6mL	20
CUBCX1HL5M25	5000g / 25mL	20
CUBCX1HL10M25	10000g / 25mL	20
CUBCX1HL5M75	5000g / 75mL	20
CUBCX1HL10M75	10000g / 75mL	10

% Organic Loading: 15.00

Exchange Capacity - (meq/g): 0.650
Application:
Scavenger for amines, alcohols and other nucleophiles.



Chemistries are offered on these particle sizes.

Small Particle (5-20 µm)
Intermediate Particle (25-40 µm)
Standard Particle (40-60 µm)
Large Particle (125-210 µm)

Triacetic Acid

Part Number	Amount sorbent / Tube volume	Units per bag
CUTAX1L1	50mg / 1mL	100
CUTAX111	100mg / 1mL	100
CUTAX113	100mg / 3mL	50
CUTAX123	200mg / 3mL	50
CUTAX153	500mg / 3mL	50
CUTAX156	500mg / 6mL	50
CUTAX11Z	100mg / 10mL	50
CUTAX12Z	200mg / 10mL	50
CUTAX15Z	500mg / 10mL	50
CUTAX1M6	1g / 6mL	30
CUTAX12M15	2g / 15mL	20
CUTAX15M25	5g / 25mL	20
CUTAX110M75	10g / 75mL	10

% Organic Loading: 7.61

Application:
Chelator for metal ions.
i.e. tin
palladium
cooper
ruthinium
chromium
nickel