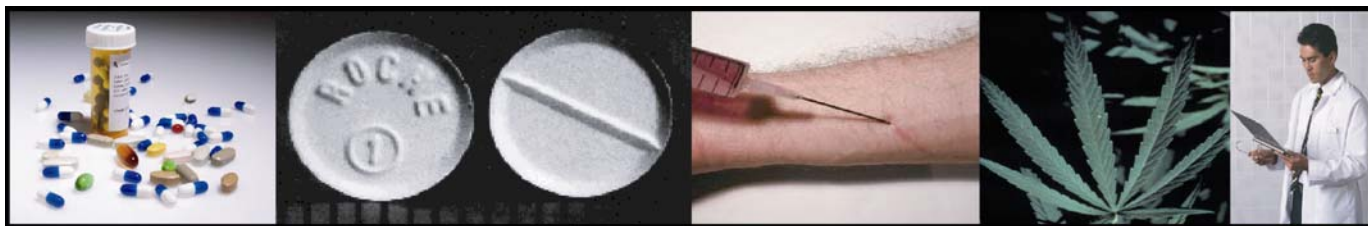
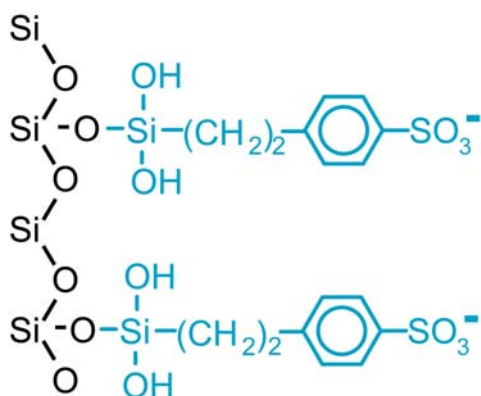




CLEAN-UP[®] Ion Exchange Extraction Columns



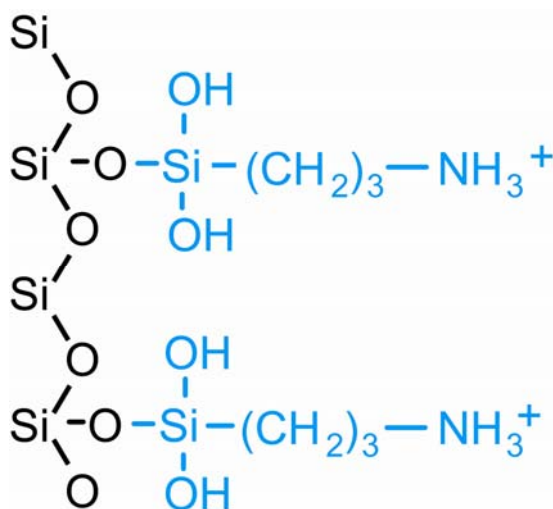
This sorbent is composed of a silica backbone bonded with a carbon chain terminated by a negatively or positively charged functional group. Ion exchange interactions occur between a sorbent that carries a charge and a compound of opposite charge.



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.

Analytes

Anions
Cations

Washes



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.

Elutions

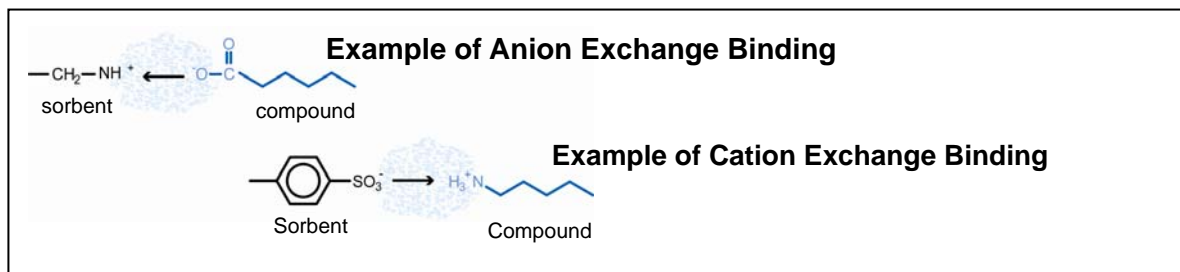
Organic solvent or aqueous buffer at pH that would neutralize the ion AND/OR at a high ionic strength AND/OR at a strong concentration.

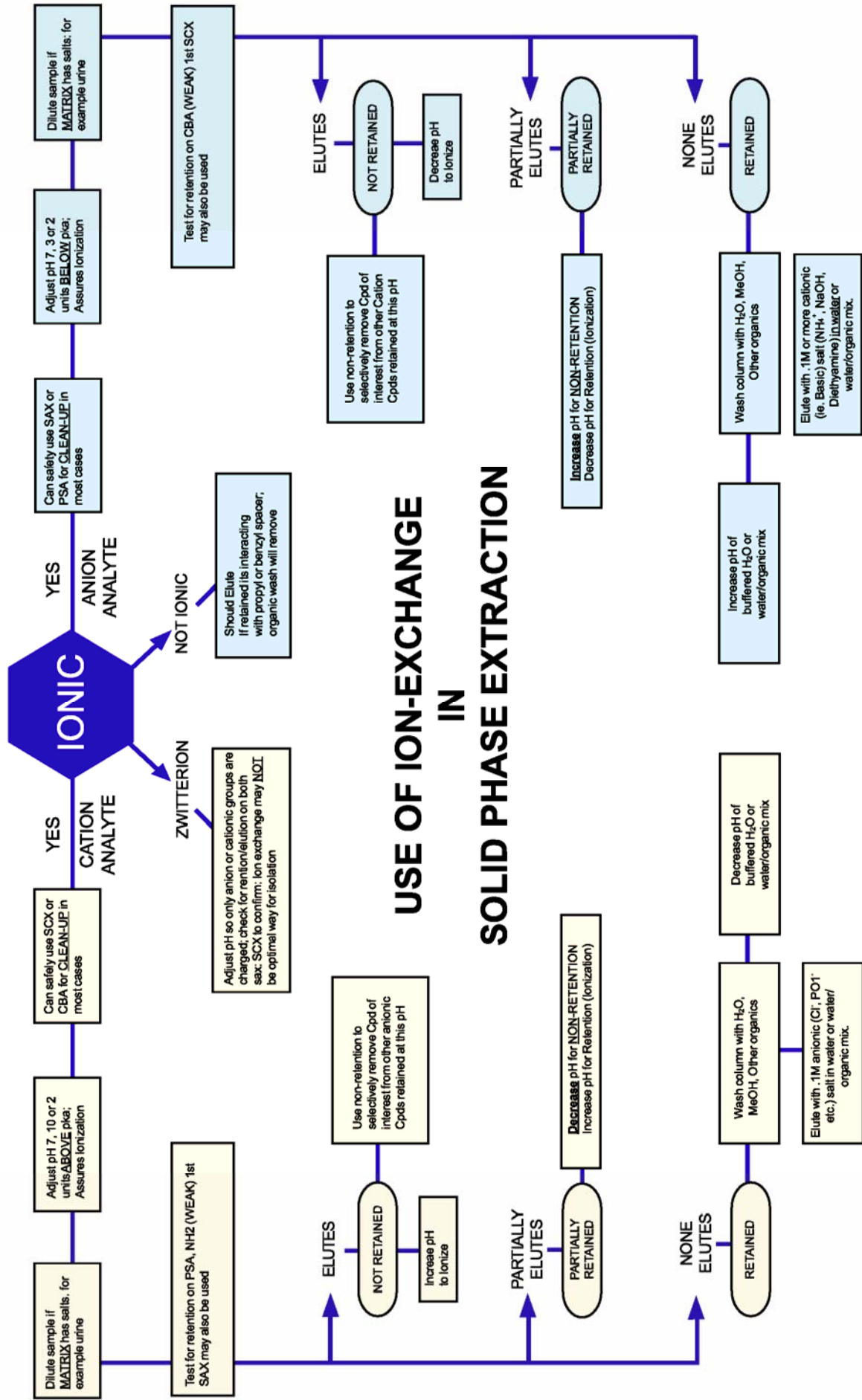
Mechanism of Ion Exchange Bonding

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 molecule's 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.

Ion Exchange Sorbents & Structure		
Sorbent	Structure	pKa
Anion Exchangers		
Aminopropyl (1° amine)	-Si-(CH ₂) ₃ NH ₂	9.8
N-2 Aminoethyl (1° & 2° amine)	-Si-(CH ₂) ₃ NH(CH ₂) ₂ NH ₂	10.1, 10.9
Diethylamino (3° amine)	-Si-(CH ₂) ₃ N(CH ₂ CH ₃) ₂	10.6
Quaternary Amine Chloride	-Si-(CH ₂) ₃ N ⁺ (CH ₃) ₃ Cl ⁻	always charged
Quaternary Amine Hydroxide	-Si-(CH ₂) ₃ N ⁺ (CH ₃) ₃ OH ⁻	always charged
Quaternary Amine Acetate	-Si-(CH ₂) ₃ N ⁺ (CH ₃) ₃ CH ₃ CO ₂ ⁻	always charged
Quaternary Amine Formate	-Si-(CH ₂) ₃ N ⁺ (CH ₃) ₃ CHO ₂ ⁻	always charged
Polyimine	-Si-(CH ₂) ₃ -R-[NHCH ₃ CH ₃] _x	
Cation Exchangers		
Carboxylic Acid	-Si-CH ₂ COOH	
Propylsulfonic Acid	-Si-(CH ₂) ₃ SO ₃ H	<1
Benzenesulfonic Acid	-Si-(CH ₂) ₂ -  -SO ₃ H	always charged
Benzenesulfonic Acid High-Load	-Si-(CH ₂) ₂ -  -SO ₃ H	always charged
Triacetic Acid	-Si-(CH ₂) ₃ NH-(CH ₂) ₂ N(CH ₂ COOH) ₂ <div style="margin-left: 100px;"> CH₂COOH</div>	
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.





CLEAN-UP®

CLEAN-UP[®] Anion Extraction Columns

Part Number	Sorbent Amount/ Tube Volume	Unit per Pack	Description
Aminopropyl			
CUNAX1L1	50mg/1mL	100	% Organic Loading: 6.65 Exchange Capacity (meq/g): 0.310 Application: Scavenger for acids, cyclic compounds, cholesterols, and other lipid-type and compounds.
CUNAX111	100mg/1mL	100	
CUNAX123	200mg/3mL	50	
CUNAX153	500mg/3mL	50	
CUNAX156	500mg/6mL	50	
CUNAX1M6	1g/6mL	30	
CUNAX11Z	100mg/10mL	50	
CUNAX12Z	200mg/10mL	50	
CUNAX15Z	500mg/10mL	50	
CUNAX12M15	2g/15mL	20	
CUNAX15M25	5g/25mL	20	
CUNAX110M75	10g/75mL	10	
PSA (N-2 Aminoethyl)			
CUPSA1L1	50mg/1mL	100	% Organic Loading: 9.70 Exchange Capacity (meq/g): 0.320 Application: Scavenger for acids, cyclic compounds, cholesterols, and other lipid-type and compounds.
CUPSA111	100mg/1mL	100	
CUPSA123	200mg/3mL	50	
CUPSA153	500mg/3mL	50	
CUPSA156	500mg/6mL	50	
CUPSA1M6	1g/6mL	30	
CUPSA11Z	100mg/10mL	50	
CUPSA12Z	200mg/10mL	50	
CUPSA15Z	500mg/10mL	50	
CUPSA12M15	2g/15mL	20	
CUPSA15M25	5g/25mL	20	
CUPSA110M75	10g/75mL	10	
Diethylamino			
CUDAX1L1	50mg/1mL	100	% Organic Loading: 8.40 Exchange Capacity (meq/g): 0.280 Application: Scavenger for acids, cyclic compounds, cholesterols, and other lipid-type and compounds.
CUDAX111	100mg/1mL	100	
CUDAX123	200mg/3mL	50	
CUDAX153	500mg/3mL	50	
CUDAX156	500mg/6mL	50	
CUDAX1M6	1g/6mL	30	
CUDAX11Z	100mg/10mL	50	
CUDAX12Z	200mg/10mL	50	
CUDAX15Z	500mg/10mL	50	
CUDAX12M15	2g/15mL	20	
CUDAX15M25	5g/25mL	20	
CUDAX110M75	10g/75mL	10	

CLEAN-UP[®] Anion Extraction Columns

Part Number	Sorbent Amount/ Tube Volume	Unit per Pack	Description
Quaternary Amine with Chloride Counter Ion			
CUQAX1L1	50mg/1mL	100	<p>% Organic Loading: 8.40</p> <p>Exchange Capacity (meq/g): 0.250</p> <p>Application: Scavenger for acids and sulfonyl chlorides, isocyanates and weak electrophiles.</p>
CUQAX111	100mg/1mL	100	
CUQAX123	200mg/3mL	50	
CUQAX153	500mg/3mL	50	
CUQAX156	500mg/6mL	50	
CUQAX1M6	1g/6mL	30	
CUQAX11Z	100mg/10mL	50	
CUQAX12Z	200mg/10mL	50	
CUQAX15Z	500mg/10mL	50	
CUQAX12M15	2g/15mL	20	
CUQAX15M25	5g/25mL	20	
CUQAX110M75	10g/75mL	10	
Quaternary Amine with Acetate Counter Ion			
CAQAX1L1	50mg/1mL	100	<p>% Organic Loading: 8.40</p> <p>Exchange Capacity (meq/g): 0.250</p> <p>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.</p>
CAQAX111	100mg/1mL	100	
CAQAX123	200mg/3mL	50	
CAQAX153	500mg/3mL	50	
CAQAX156	500mg/6mL	50	
CAQAX1M6	1g/6mL	30	
CAQAX11Z	100mg/10mL	50	
CAQAX12Z	200mg/10mL	50	
CAQAX15Z	500mg/10mL	50	
CAQAX12M15	2g/15mL	20	
CAQAX15M25	5g/25mL	20	
CAQAX110M75	10g/75mL	10	
Quaternary Amine with Hydroxide Counter Ion			
CHQAX1L1	50mg/1mL	100	<p>% Organic Loading: 8.40</p> <p>Exchange Capacity (meq/g): 0.250</p> <p>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.</p>
CHQAX111	100mg/1mL	100	
CHQAX123	200mg/3mL	50	
CHQAX153	500mg/3mL	50	
CHQAX156	500mg/6mL	50	
CHQAX1M6	1g/6mL	30	
CHQAX11Z	100mg/10mL	50	
CHQAX12Z	200mg/10mL	50	
CHQAX15Z	500mg/10mL	50	
CHQAX12M15	2g/15mL	20	
CHQAX15M25	5g/25mL	20	
CHQAX110M75	10g/75mL	10	

CLEAN-UP[®] Anion Extraction Columns

Part Number	Sorbent Amount/ Tube Volume	Unit per Pack	Description	
Quaternary Amine with Formate Counter Ion				
CFQAX1L1	50mg/1mL	100	<p>% Organic Loading: 8.40</p> <p>Exchange Capacity (meq/g): 0.250</p> <p>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.</p>	
CFQAX111	100mg/1mL	100		
CFQAX123	200mg/3mL	50		
CFQAX153	500mg/3mL	50		
CFQAX156	500mg/6mL	50		
CFQAX1M6	1g/6mL	30		
CFQAX11Z	100mg/10mL	50		
CFQAX12Z	200mg/10mL	50		
CFQAX15Z	500mg/10mL	50		
CFQAX12M15	2g/15mL	20		
CFQAX15M25	5g/25mL	20		
CFQAX110M75	10g/75mL	10		
Polyimine				
CUPAX1L1	50mg/1mL	100		<p>% Organic Loading: 13.5</p> <p>Exchange Capacity (meq/g): 0.25</p> <p>Application: Scavenger for acids and sulfonyl chlorides, isocyanates and other electrophiles.</p>
CUPAX111	100mg/1mL	100		
CUPAX123	200mg/3mL	50		
CUPAX153	500mg/3mL	50		
CUPAX156	500mg/6mL	50		
CUPAX1M6	1g/6mL	30		
CUPAX11Z	100mg/10mL	50		
CUPAX12Z	200mg/10mL	50		
CUPAX15Z	500mg/10mL	50		
CUPAX12M15	2g/15mL	20		
CUPAX15M25	5g/25mL	20		
CUPAX110M75	10g/75mL	10		

CLEAN-UP® Cation Extraction Columns

Part Number	Sorbent Amount/ Tube Volume	Unit per Pack	Description
Carboxylic Acid			
CUCCX1L1	50mg/1mL	100	% Organic Loading: 9.10 Exchange Capacity (meq/g): 0.170 Application: Scavenger for strong anions (Quaternary amines or metals).
CUCCX111	100mg/1mL	100	
CUCCX123	200mg/3mL	50	
CUCCX153	500mg/3mL	50	
CUCCX156	500mg/6mL	50	
CUCCX1M6	1g/6mL	30	
CUCCX11Z	100mg/10mL	50	
CUCCX12Z	200mg/10mL	50	
CUCCX15Z	500mg/10mL	50	
CUCCX12M15	2g/15mL	20	
CUCCX15M25	5g/25mL	20	
CUCCX110M75	10g/75mL	10	
Propylsulfonic Acid			
CUPCX1L1	50mg/1mL	100	% Organic Loading: 7.10 Exchange Capacity (meq/g): 0.180 Application: Scavenger for amines, alcohols and other nucleophiles.
CUPCX111	100mg/1mL	100	
CUPCX123	200mg/3mL	50	
CUPCX153	500mg/3mL	50	
CUPCX156	500mg/6mL	50	
CUPCX1M6	1g/6mL	30	
CUPCX11Z	100mg/10mL	50	
CUPCX12Z	200mg/10mL	50	
CUPCX15Z	500mg/10mL	50	
CUPCX12M15	2g/15mL	20	
CUPCX15M25	5g/25mL	20	
CUPCX110M75	10g/75mL	10	
Triacetic Acid			
CUTAX1L1	50mg/1mL	100	% Organic Loading: 7.61 Exchange Capacity: Anion: 0.17 Cation: 0.06 Application: Chelator for metal ions. i.e. tin palladium chromium copper nickel ruthinium
CUTAX111	100mg/1mL	100	
CUTAX123	200mg/3mL	50	
CUTAX153	500mg/3mL	50	
CUTAX156	500mg/6mL	50	
CUTAX1M6	1g/6mL	30	
CUTAX11Z	100mg/10mL	50	
CUTAX12Z	200mg/10mL	50	
CUTAX15Z	500mg/10mL	50	
CUTAX12M15	2g/15mL	20	
CUTAX15M25	5g/25mL	20	
CUTAX110M75	10g/75mL	10	

CLEAN-UP[®] Cation Extraction Columns

Part Number	Sorbent Amount/ Tube Volume	Unit per Pack	Description
Benzenesulfonic Acid			
CUBCX1L1	50mg/1mL	100	% Organic Loading: 11.00 Exchange Capacity (meq/g): 0.320 Application: Scavenger for amines, alcohols and other nucleophiles.
CUBCX111	100mg/1mL	100	
CUBCX123	200mg/3mL	50	
CUBCX153	500mg/3mL	50	
CUBCX156	500mg/6mL	50	
CUBCX1M6	1g/6mL	30	
CUBCX11Z	100mg/10mL	50	
CUBCX12Z	200mg/10mL	50	
CUBCX15Z	500mg/10mL	50	
CUBCX12M15	2g/15mL	20	
CUBCX15M25	5g/25mL	20	
CUBCX110M75	10g/75mL	10	
Benzenesulfonic Acid - HIGH LOAD			
CUBCX1HLL1	50mg/1mL	100	% Organic Loading: 11.00 Exchange Capacity (meq/g): 0.650 Application: Scavenger for amines, alcohols and other nucleophiles.
CUBCX1HL11	100mg/1mL	100	
CUBCX1HL23	200mg/3mL	50	
CUBCX1HL53	500mg/3mL	50	
CUBCX1HL56	500mg/6mL	50	
CUBCX1HLM6	1g/6mL	30	
CUBCX1HL1Z	100mg/10mL	50	
CUBCX1HL2Z	200mg/10mL	50	
CUBCX1HL5Z	500mg/10mL	50	
CUBCX1HL2M15	2g/15mL	20	
CUBCX1HL5M25	5g/25mL	20	
CUBCX1HL10M75	10g/75mL	10	