CLEAN-UP®
PURIFICATION TECHNOLOGIES

SILICA-BASED METAL SCAVENGERS & FUNCTIONALIZED SORBENTS

UNITED CHEMICAL TECHNOLOGIES
WWW.UNITEDCHEM.COM

UCT

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UCT, Inc. | 2731 Bartram Rd | Bristol, PA 19007 | USA
P. 800.541.0559 | 215.781.9255 | F. 215.785.1226
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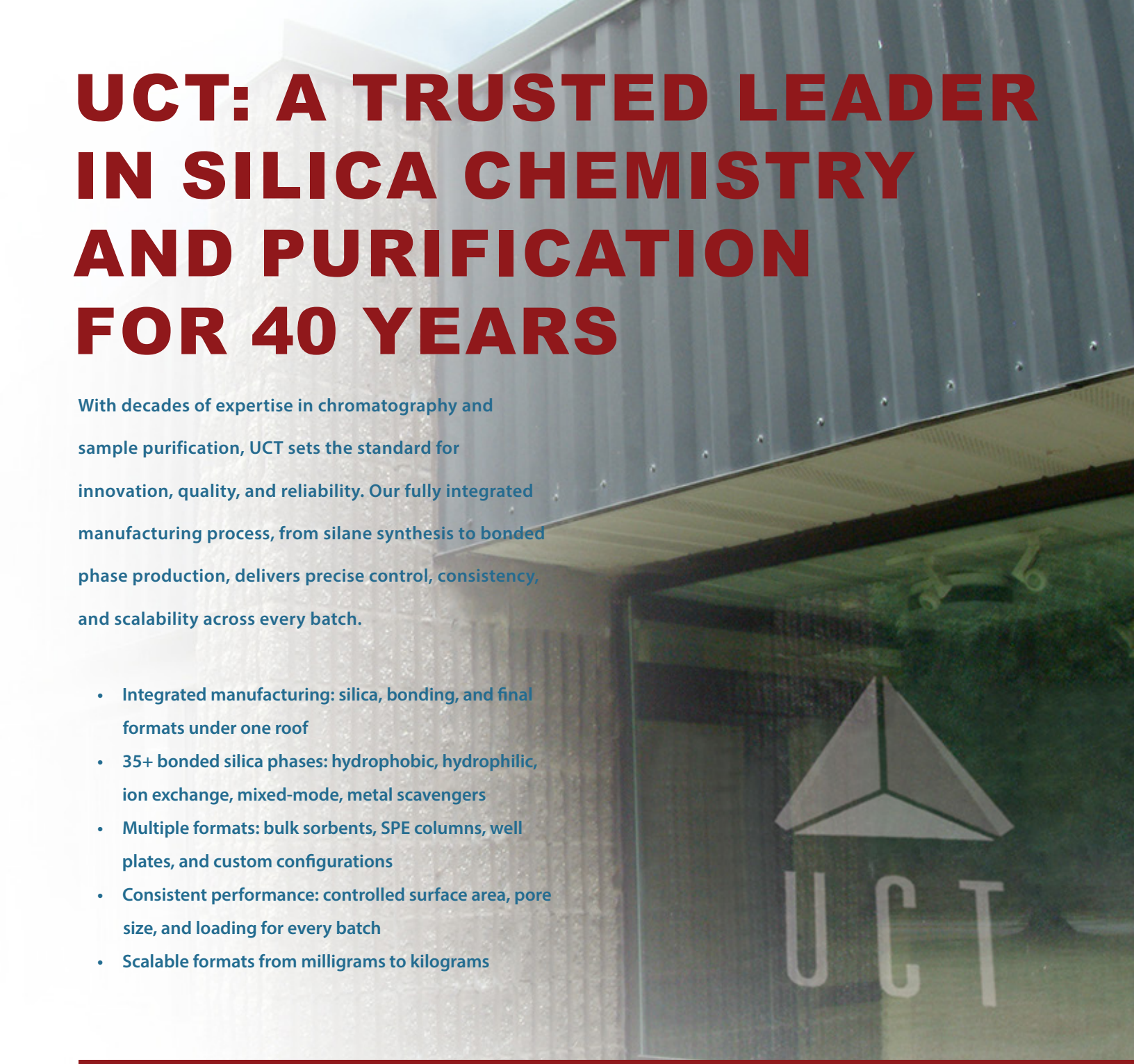
UCT: A TRUSTED LEADER IN SILICA CHEMISTRY AND PURIFICATION FOR 40 YEARS

With decades of expertise in chromatography and sample purification, UCT sets the standard for innovation, quality, and reliability. Our fully integrated manufacturing process, from silane synthesis to bonded phase production, delivers precise control, consistency, and scalability across every batch.

- Integrated manufacturing: silica, bonding, and final formats under one roof
- 35+ bonded silica phases: hydrophobic, hydrophilic, ion exchange, mixed-mode, metal scavengers
- Multiple formats: bulk sorbents, SPE columns, well plates, and custom configurations
- Consistent performance: controlled surface area, pore size, and loading for every batch
- Scalable formats from milligrams to kilograms



"PURITY IS THE FOUNDATION OF EVERYTHING WE CREATE"

UCT

Quality Management ISO 9001:2015 DEKRA Certified

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A COMPLETE PURIFICATION SYSTEM

Modern chemistry demands sophisticated catalytic reactions, complex formulations, and challenging matrices. Such processes call for purification challenges:

- **Residual metals (Pd, Cu, Ni, Ru, Rh, Ag, Fe, etc.)**
- **Ligands, byproducts, and excess reagents**
- **Matrix components such as lipids, salts, proteins, or debris**
- **Analytical interferences in LC/GC/MS workflows**

UCT addresses these challenges through the **Clean-Up®** purification portfolio, comprising:

- **Silica-based metal scavengers - designed to capture and remove trace metals**
- **Silica-based SPE sorbents - designed to remove matrices, organic impurities, and ionic interferences**

Since both technologies are engineered on the same UCT-manufactured silica platform, they work together effortlessly within a single purification workflow. Together, they form a complete silica purification ecosystem that supports discovery chemistry, reaction cleanup, sample prep, and large-scale manufacturing.

UCT QUALITY & MANUFACTURING CONTROL

UCT controls the entire process from silane synthesis and silica activation to bonding and final packaging. This allows a superior degree of control over:

- **Surface area and pore structure**
- **Functional loading level**
- **Particle size distribution**
- **Batch-to-batch reproducibility**

Each lot is released only after it meets predefined specifications. Every batch of Clean-Up® sorbent is accompanied by a Certificate of Analysis (CoA) that typically includes:

- **Surface area (BET multipoint)**
- **Pore diameter (nitrogen absorption)**
- **Pore volume (nitrogen absorption)**
- **Particle size distribution (laser diffraction / multisizer)**
- **Functional loading (elemental analysis)**
- **Appearance and identity**
- **Shelf-life under controlled storage**

This depth of characterization supports regulatory compliance, requalification and process robustness.

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WHY ARE METAL SCAVENGERS ESSENTIAL?

Catalytic reactions such as Suzuki Coupling, Buchwald–Hartwig Amination, Heck, Sonogashira, Olefin Metathesis, and Knoevenagel Condensation may contaminate the product with trace metals.

Residual metals can:

- **Compromise API quality**
- **Interfere with downstream purification**
- **Delay regulatory approval (ICH Q3D, FDA, EMA)**
- **Lower yield and throughput**
- **Damage analytical instrumentation**

Clean-Up® metal scavengers provide a fast, selective, and scalable solution to meet the regulatory standards in both research and manufacturing environments.

APPLICATIONS ACROSS INDUSTRIES

Pharmaceutical Manufacturing & API Synthesis:

Removes toxic metal contaminants, supports regulatory compliance, and helps produce high-quality APIs.

Fine & Specialty Chemicals Production:

Enhances purity, minimizes contamination, and improves product efficiency.

Analytical & Medicinal Chemistry (HPLC/Prep-HPLC):

Protects valuable columns and instrumentation and delivers reliable results by removing metal impurities during clinical studies or final purification.

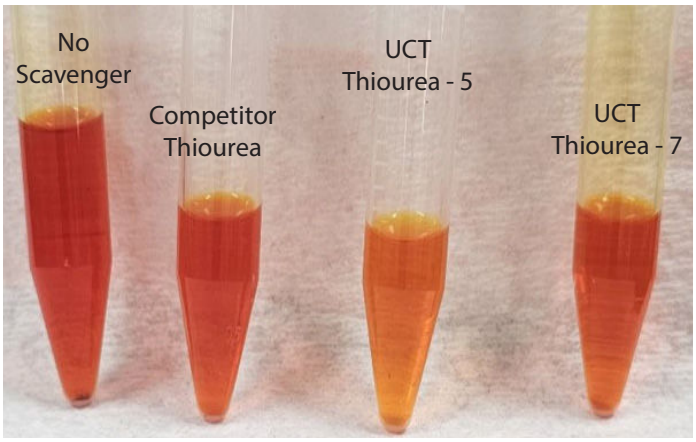
EXAMPLES OF TYPICAL REACTION CLASSES AND SUGGESTED SCAVENGERS

Reaction	Residual Metal	Recommended Scavenger
Suzuki Coupling	Pd	Silica Thiol
Buchwald–Hartwig, Ullman	Pd, Cu	Thiol / Thiourea
Heck Reaction	Pd	Silica Thiol
Sonogashira	Pd, Cu	Thiol / Thiourea
Olefin Metathesis	Ru	Silica Thiol
Negishi, Knoevenagel	Zn, Fe	Silica Thiol

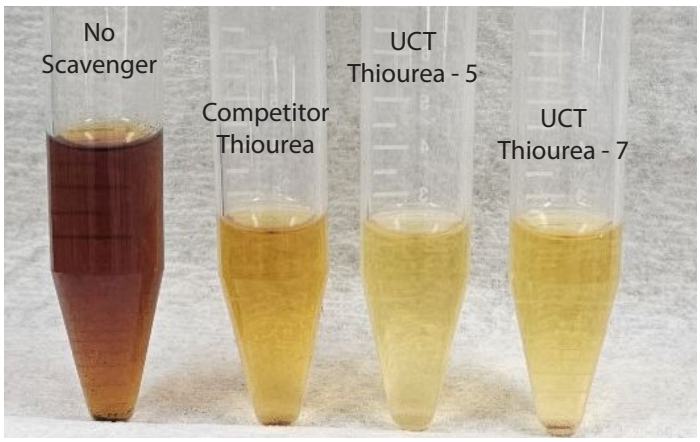
Performance Advantages of UCT's Silica-Based Metal Scavengers	
Feature	**Benefit**
No Leaching	Functional groups are covalently bonded to the silica surface minimizing contamination risk in APIs or filtrates.
Stringent Purity Control	Every batch is rigorously tested to ensure clean, defect-free, and consistent performance.
Targeted Selectivity	Functionalized groups capture metals precisely while preserving complete API recovery.
Broad Metal Affinity	Efficiently removes diverse metals and oxidation states from catalytic residues.
Rapid Kinetics	Fast metal binding at ambient temperature minimizes process time and boosts productivity.
Process Efficiency	Reduces solvent use and cycle time, offering lower cost per gram of metal removed.
Universal Solvent Compatibility	Performs seamlessly in both aqueous (pH 2–10) and organic systems.
Flow & Microwave Ready	Fully compatible with modern synthesis and purification platforms.
Exceptional Stability	Maintains structure under high heat and mechanical agitation without swelling or deformation.
Simple & Scalable Workflow	Add, stir, filter. Easily scalable from R&D to manufacturing scale.
Consistent Loading	Precisely controlled loading levels allow predictable stoichiometry and performance.
Reliable Supply	Large-scale production ensures immediate availability and secure supply chain.

A visual comparison of Rh and Ru catalyst scavenging, where CUTHU-5 and CUTHU-7 represent two different loadings.

Ruthenium Catalyst Scavenging



Rhodium Catalyst Scavenging



Solutions of Rh and Ru catalysts were prepared in organic solvents and treated with 2.5 mmol equivalents of CLEAN-UP® Thiourea (THU) per mmol metal. After 24 hours of mixing on a nutating mixer, samples were analyzed by ICP-OES to determine metal removal efficiency. Both UCT sorbents demonstrated better metal scavenging performance compared to the competitor product.

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METAL SCAVENGER CHEMISTRY OVERVIEW

UCT's Clean-Up® metal scavengers are built on a high-purity silica platform with controlled surface area, pore structure, and functional loading. Each chemistry is designed to target specific classes of metals and impurities through well-defined interaction mechanisms, enabling predictable and scalable purification across a wide range of applications.

Sulfur-Based Metal Scavengers

Chemistries: Thiopropyl (Thiol), Thiourea, DMT

Sulfur-containing ligands act as soft electron donors and exhibit strong affinity toward soft and late-transition metals. These phases are highly effective for removing catalytic residues commonly encountered in cross-coupling and organometallic reactions.

- **Strong interaction with Pd, Ru, Rh, Ag, Hg**
- **Effective for both neutral and ligand-bound metal species**
- **Suitable for general-purpose and high-selectivity metal removal**

Amine-Based Metal Scavengers

Chemistries: Aminopropyl, Triethylamine (aka Diethylamino), PSA (Primary/Secondary Amine), Triamine

Nitrogen-based ligands provide versatile coordination through lone-pair donation, enabling interaction with a broad range of metals. These phases also offer dual functionality by interacting with acidic and polar impurities.

- **Broad metal affinity across multiple oxidation states**
- **Dual-function cleanup (metal + acidic impurities)**
- **Suitable for complex reaction matrices and early-stage screening**

Acid-Based Metal Scavengers

Chemistries: Benzenesulfonic Acid, Carboxylic Acid, Triacetic Acid

Oxygen-based ligands and ion-exchange functionalities enable strong interaction with hard metal ions and charged species. These phases are particularly useful for removing inorganic residues and metal salts.

- **Strong interaction with Ni, Co, Zn, and other base metals**
- **Effective for ionic and inorganic contaminants**
- **Complementary to sulfur- and amine-based scavengers**

METAL SCAVENGER CHEMISTRY OVERVIEW

Organic / Functional Scavengers

Chemistries: Quaternary Amine (Cl, Acetate, Hydroxide), Piperazine, Piperidine

These phases are designed for targeted removal of acidic impurities and reactive functional groups through ionic interactions or nucleophilic scavenging.

- **Strong anion exchange for acidic compounds**
- **Removal of reactive species (acid chlorides, aldehydes, etc.)**
- **Useful in reaction cleanup and post-synthesis polishing**

Specialty / Fluorinated Phases

Chemistries: Pentafluorophenyl, Perfluoroalkyl

Specialized phases designed to interact with fluorinated compounds and highly specific molecular systems where conventional chemistries may lack selectivity.

- **Enhanced selectivity for fluorinated molecules**
- **Useful for niche and emerging applications**

Metal Scavengers Mechanisms

Soft–Soft Coordination

Sulfur-Based Ligands — Thiol · Thiourea · DMT

Strong interaction with soft transition metals such as Pd, Pt, and Ru. Ideal for catalytic metal removal in cross-coupling reactions.

Chelation & Coordination

Amine-Based Ligands — PSA · Triamine · Amines

Multi-dentate coordination increases binding strength and capacity. Effective for complex mixtures and higher metal loading.

Ion-Exchange Interactions

Acid / Base Functionalities

Removes charged metal species and inorganic residues through ionic interactions. Best suited for base metals and salt-rich systems.

Selecting the Right Chemistry

Unknown metals	→	**Thiol**
Pd-dominant	→	**Thiourea**
High metal load	→	**Triamine**
Mixed impurities	→	**PSA**
Base metals	→	**Triacetic Acid**
Trace cleanup	→	**DMT**

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UCT'S SCAVENGER SELECTION GUIDE

Bulk Phase Specifications & Applications

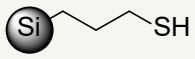
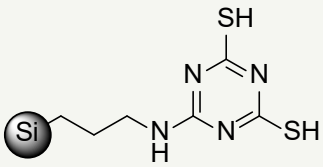
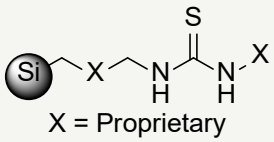
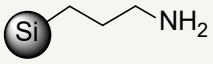
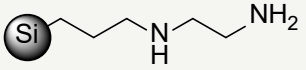
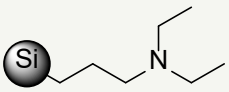
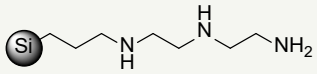
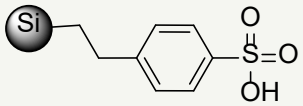
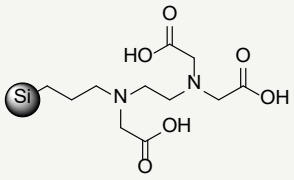
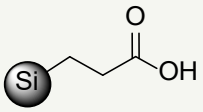
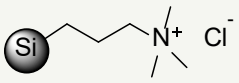
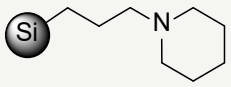
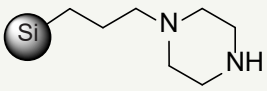
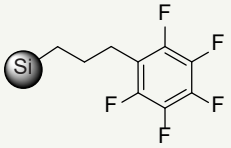
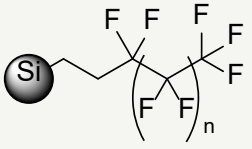
All phases are built on UCT's high-purity silica platform with controlled loading and reproducible performance.

Silica Substrate Irregular, 40–63 µm	Surface Area 500 m^2/g	Average Pore Size 60 Å	Pore Volume 0.77 cm^3/g

Phase Chemistry	End-capping	Mol. Loading (mmol/g)	Characteristics	Applications
Sulfur-Based Metal Scavengers				
Thiopropyl	Yes No	1.4 1.0	Sulfur-based scavenger with strong soft-metal affinity; ideal for removal of precious metal catalysts	High: Ag, Hg, Pd, Ru Moderate: Cu, Pb, Rh, Sn
Thiourea	Yes	0.5	Bidentate sulfur ligand for capturing soft transition metals	High: Pd, Ru Moderate: Ag, Cu, Fe, Rh
DMT	No	0.7	Multidentate sulfur ligand providing strong chelation of noble metals (in development)	High: Pd, Pt, Au, Ag Moderate: Cu, Fe, Zn
Amine-Based Metal Scavengers				
Aminopropyl	No No	1.1 1.7 (HL*)	Weak anion exchange phase for binding negatively charged species	High: Cd, Cr, Pd, Rh Moderate: Ag, Cu, Ni
Triethylamine (Diethylamino)	No	0.6	Weak anion exchanger for selective removal of acidic components using a tertiary amine	High: Cr, Pd, Pt Moderate: Ag, Cu, Ni
Primary / Secondary Amine	No	0.9	Weak anion exchanger for removing organic acids and polar interferences	High: Cd, Cr, Pd, Pt, Rh, Ru Moderate: Cu, Fe, Zn
Triamine	No	0.8	Multi-functional amine phase for enhanced interaction and selectivity	High: Cr, Pd, Pt Moderate: Ag, Cu, Ni
Acid-Based Metal Scavengers				
Benzenesulfonic Acid	No No	0.5 0.8 (HL*)	Strong cation exchange phase for retaining basic compounds	High: Rh, Sn Moderate: Pd, Pt, Zn
Carboxylic Acid	No	0.8	Weak-cation exchange with pH-dependent retention	Primary & secondary amines; basic nitrogen-containing compounds
Triacetic Acid	No	0.3	Multidentate ligand with mixed-mode retention	High: Pd, Rh, Ni Moderate: Cu, Fe, Zn
Organic Scavengers				
Quaternary Amine (Cl^-, OAc^-, OH^-)	No	0.4	Strong anion exchanger for retention of acidic analytes across pH	Acids, acidic phenols
Piperazine	No	0.8	Bifunctional nucleophilic scavenger and base (in development)	Acyl chlorides, aldehydes, anhydrides, isocyanates
Piperidine	No	0.8	General-purpose tertiary amine base (in development)	Acid scavenger
Pentafluorophenyl	Yes	0.8	Selective interaction with fluorinated aromatics (in development)	Fluorinated compounds
Perfluoroalkyl	No	~0.6	Strong fluorophilic interaction for fluorinated species (in development)	Fluorinated compounds

(*HL = High Load)

METAL SCAVENGER STRUCTURES

Phase Chemistry	Structure	Phase Chemistry	Structure
Sulfur-Based Metal Scavengers			
Thiopropyl		DMT	
Thiourea	 X = Proprietary		
Amine-Based Metal Scavengers			
Aminopropyl		Primary / Secondary Amine	
Triethylamine (Diethylamino)		Triamine	
Acid-Based Metal Scavengers			
Benzenesulfonic Acid		Triacetic Acid	
Carboxylic Acid			
Organic Scavengers			
Quaternary Amine Chloride		Piperidine	
Piperazine		Pentafluorophenyl	
Perfluoroalkyl			

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ORDERING INFORMATION

Part numbers shown are for phases with available bulk ordering. Phases marked "In Dev." are under development. Contact UCT for availability.

Phase Chemistry	UCT Product Code	5 g	10 g	25 g	50 g	100 g	500 g	1 kg
Sulfur-Based Metal Scavengers								
Thiopropyl (endcapped)	CETHXHL	CETHXHL00V	CETHXHL00X	CETHXHL0XXV	CETHXHL00L	CETHXHL00C	CETHXHL00D	CETHXHL00K
Thiourea	CUTHU	CUTHU00V	CUTHU00X	CUTHU0XXV	CUTHU00L	CUTHU00C	CUTHU00D	CUTHU00K
DMT	In Dev.	–	–	–	–	–	–	–
Amine-Based Metal Scavengers								
Aminopropyl	CUNAX	CUNAX00V	CUNAX00X	CUNAX0XXV	CUNAX00L	CUNAX00C	CUNAX00D	CUNAX00K
Aminopropyl (High Load)	CUNAXHL	CUNAXHL00V	CUNAXHL00X	CUNAXHL0XXV	CUNAXHL00L	CUNAXHL00C	CUNAXHL00D	CUNAXHL00K
Triethylamine (Diethylamino)	CUDAX	CUDAX00V	CUDAX00X	CUDAX0XXV	CUDAX00L	CUDAX00C	CUDAX00D	CUDAX00K
Primary / Secondary Amine	CUPSA	CUPSA00V	CUPSA00X	CUPSA0XXV	CUPSA00L	CUPSA00C	CUPSA00D	CUPSA00K
Triamine	CUTRI	CUTRI00V	CUTRI00X	CUTRI0XXV	CUTRI00L	CUTRI00C	CUTRI00D	CUTRI00K
Acid-Based Metal Scavengers								
Benzenesulfonic Acid	CUBCX	CUBCX00V	CUBCX00X	CUBCX0XXV	CUBCX00L	CUBCX00C	CUBCX00D	CUBCX00K
Benzenesulfonic Acid (High Load)	CUBCX-HL	CUBCXHL00V	CUBCXHL00X	CUBCXHL0XXV	CUBCXHL00L	CUBCXHL00C	CUBCXHL00D	CUBCXHL00K
Carboxylic Acid	CUCCX	CUCCX00V	CUCCX00X	CUCCX0XXV	CUCCX00L	CUCCX00C	CUCCX00D	CUCCX00K
Triacetic Acid	CUTAX	CUTAX00V	CUTAX00X	CUTAX0XXV	CUTAX00L	CUTAX00C	CUTAX00D	CUTAX00K
Organic Scavengers								
Quaternary Amine Chloride	CUQAX	CUQAX00V	CUQAX00X	CUQAX0XXV	CUQAX00L	CUQAX00C	_	CUQAX00K
Quaternary Amine Acetate	CAQAX	CAQAX00V	CAQAX00X	CAQAX0XXV	CAQAX00L	CAQAX00C	_	CAQAX00K
Quaternary Amine Hydroxide	CHQAX	CHQAX00V	CHQAX00X	CHQAX0XXV	CHQAX00L	CHQAX00C	_	CHQAX00K
Piperazine	In Dev.	–	–	–	–	–	–	–
Piperidine	In Dev.	–	–	–	–	–	–	–
Pentafluorophenyl (endcapped)	In Dev.	–	–	–	–	–	–	–
Perfluoroalkyl	In Dev.	–	–	–	–	–	–	–

UCT'S CHROMATOGRAPHIC SELECTION GUIDE

Bulk Phase Specifications & Applications

Silica Substrate	Surface Area	Average Pore Size	Pore Volume
Irregular, 40–63 µm	500 m^2/g	60 Å	0.77 cm^3/g

Phase Chemistry	End-capping	Typical Loading (%)	Characteristics	Applications
Reverse Phase				
C18, Octadecyl	Yes No	20.5–22.7 21.0–22.2	General-purpose reversed phase; strong hydrophobic retention	Non-polar to moderately polar compounds; pesticides, PAHs, pharmaceuticals
C8, Octyl	Yes No	10.0–12.0 10.5–11.7	Moderate hydrophobicity; improved selectivity vs C18	Pharmaceuticals, pesticides, semi-volatiles
C4, n-Butyl	Yes No	7.85–9.15 7.85–9.15	Mild hydrophobic interaction for selective cleanup	Drug metabolites, moderately hydrophobic analytes
C2, Ethyl	Yes No	5.4–7.0 5.4–7.0	Low-retention hydrophobic phase; minimal cleanup	Lipids, hydrocarbons, non-polar compounds
C30, Triacontyl	Yes No	16.0–20.0 20.0–25.0	Long-chain phase with enhanced shape selectivity	Lipids, steroids, fat-soluble vitamins, THC
Phenyl	Yes No	10.0–11.5 10.0–11.5	π–π interactions for aromatic selectivity	Phenols, PAHs, aromatic compounds
Biphenyl	Yes	17.0	Enhanced π–π selectivity (higher than phenyl)	Conjugated and aromatic compounds
Cyclohexyl	Yes No	9.5–11.2 9.0–11.0	Hydrophobic + shape selectivity	Aromatic contaminants, phenols
Reverse / Fluoro Phase				
Pentafluorophenyl	Yes	20.0	Fluorinated phase with strong aromatic selectivity	Fluorinated compounds, Taxol®, aromatic analytes
Perfluoroalkyl	No	28.8	Strong fluorophilic interaction	PFAS, highly fluorinated compounds
Polymeric Reverse Phase				
Polymeric Polydivinylbenzene	N/A	–	Broad retention of neutral and aromatic compounds	Herbicides, environmental screening (EPA methods)
Polymeric HyperLinked DVB	N/A	–	High surface area; retains polar + nonpolar analytes	Drugs of abuse, pesticides, mycotoxins
Polymeric Lipophilic Balance	N/A	–	Balanced hydrophilic-lipophilic retention	Pharmaceuticals, cannabinoids, steroids
Normal Phase				
Cyanopropyl	Yes No	8.0–10.0 8.0–10.0	Dual-mode: weak RP* + polar interactions	Moderately polar compounds, aldehydes, ketones
Diol	No	7.8–9.8	Polar phase; hydrogen bonding interactions	Sugars, lipids, steroids

(*RP = Reverse Phase, **HL = High Load)

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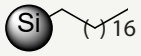
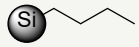
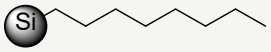
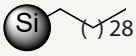
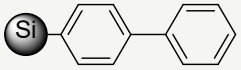
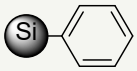
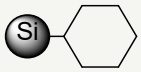
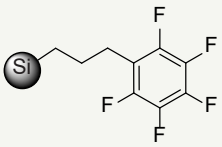
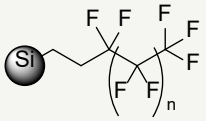
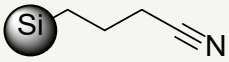
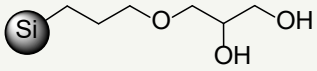
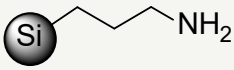
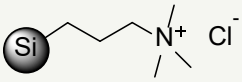
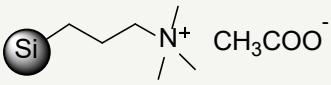
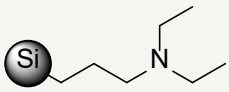
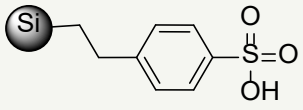
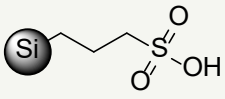
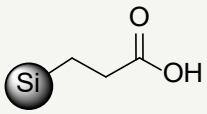
Ion Exchange — Anion Exchange				
Aminopropyl	No No	6.15–7.15 11.0 (HL**)	Weak anion exchange; broad pH stability	Sugars, organic acids, negatively charged analytes
Quaternary Amine Chloride	No	7.09–9.71	Strong anion exchanger; consistent across pH	Organic acids, phenols, PFAS-like compounds
Quaternary Amine Acetate	No	7.7–9.7	Strong anion exchanger; consistent across pH	Organic acids, phenols, PFAS-like compounds
Quaternary Amine Hydroxide	No	8.4	Strong anion exchanger; consistent across pH	Organic acids, phenols, PFAS-like compounds
Triethylamine (Diethylamino)	No	9.0–10.5	Weak anion exchanger; selective cleanup when a teriary amine is needed	Acidic interferences; "catch & release" workflows
Ion Exchange — Cation Exchange				
Benzenesulfonic Acid	No No	9.28–12.10 16.5 (HL**)	Strong cation exchange	Basic drugs, alkaloids
Propylsulfonic Acid	No	6.0–7.5	High-capacity cation exchange	Amines, basic interferences
Carboxylic Acid	No	8.0–9.5	Weak cation exchange; pH-dependent retention	Basic pharmaceuticals, alkaloids
Polymeric Ion Exchange				
Polymeric Quaternary Amine	N/A	N/A	Strong-anion exchange for weak acids	Extraction of acidic compounds
Polymeric Amine (Weak Anion)	N/A	N/A	Weak anion exchange for strong acids	Selective retention of strong acids
Polymeric Benzenesulfonic Acid	N/A	N/A	Strong cation exchange	Weak bases, drug cleanup
Mixed Mode				
Polyimine (HILIC)	No	13.1–15.0	Strong anion exchange with HILIC retention	Polar acidic compounds
Zwitterion (HILIC)	No	10.5	Mixed charge phase (in development)	Polar compound cleanup
C8 + Carboxylic Acid	No	11.0–12.0	RP* + weak cation exchange	Catecholamines, polar/basic analytes
C8 + Benzenesulfonic Acid	No	12.0–12.8	RP* + strong cation exchange	Basic drugs, melamine, dyes
C8 + Propylsulfonic Acid	No	15.0	RP* + cation exchange (high capacity)	Alkaloids, amine-containing drugs
C8 + Quaternary Amine	No	12.5–14.5	RP* + strong anion exchange	Acidic compounds, herbicides
C8 + Aminopropyl	No	17.0	RP* + anion exchange	Organic acids, pigments, acidic / polar analytes
C8 + Cyanopropyl	No	15.0	RP* + polar selectivity	Pharmaceuticals, pesticides
C8 + Cyclohexyl	No	12.0–16.0	RP* + shape selectivity	Aromatic compounds, environmental analytes
C18 + Quaternary Amine (SAX)	No	16.0–18.0	RP* + Strong anion exchange	PFAS-like acids, organic acids
C18 + PSA	No	19.0	RP* + Weak anion exchange	Organic acids, phenols
C18 + Benzenesulfonic Acid (SCX)	No	14.5–16.5	RP* + Strong cation exchange	Amphetamines, opiates, cocaine
Polymeric DBX	N/A	14.5–16.5	Dual retention for weak bases + hydrophobic compounds	Drugs of abuse, pharmaceuticals

(*RP = Reverse Phase, **HL = High Load)

CHROMATOGRAPHIC STRUCTURES

Phase Chemistry	Structure	Phase Chemistry	Structure
Reverse Phase			
C18, Octadecyl		C4, n-Butyl	
C8, Octyl		C2, Ethyl	
C30, Triacontyl		Biphenyl	
Phenyl		Cyclohexyl	
Reverse / Fluoro Phase			
Pentafluorophenyl		Perfluoroalkyl	
Polymeric Reverse Phase			
Polymeric Polydivinylbenzene		Polymeric HyperLinked DVB	
Polymeric Lipophilic Balance			
Normal Phase			
Cyanopropyl		Diol	
Ion Exchange			
Aminopropyl		Quaternary Amine Chloride	
Quaternary Amine Acetate		Triethylamine (or diethylamino)	
Benzenesulfonic acid		Propylsulfonic acid	
Carboxylic acid			

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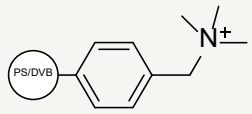
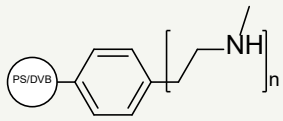
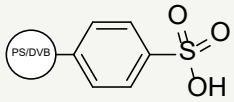
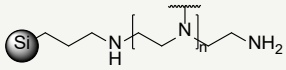
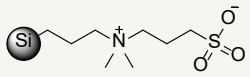
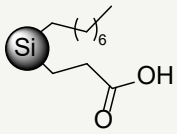
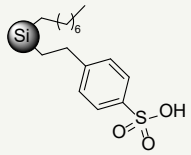
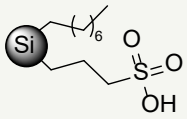
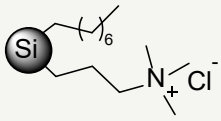
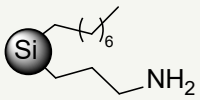
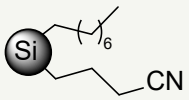
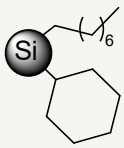
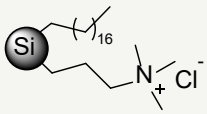
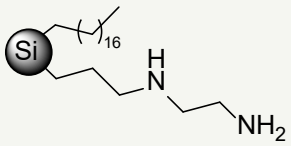
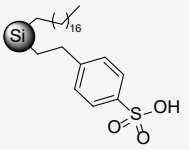
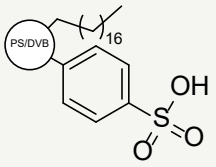
Polymeric Ion Exchange			
Polymeric - Quaternary Amine		**Polymeric - Amine**	
Polymeric - Benzenesulfonic acid			
Mixed Mode			
Polyimine		**Zwitterion**	
Mixed - C8 + Carboxylic Acid		**Mixed - C8 + Benzenesulfonic Acid**	
Mixed - C8 + Propylsulfonic acid		**Mixed - C8 + Quaternary amine**	
Mixed - C8 + Aminopropyl		**Mixed - C8 + Cyanopropyl**	
Mixed - C8 + Cyclohexyl		**Mixed - C18 + Quaternary Amine**	
Mixed - C18 + Primary/ secondary amine		**Mixed - C18 + Benzenesulfonic acid**	
Mixed - Polymeric C18 + BCX			

ORDERING INFORMATION

Part numbers shown are for phases with available bulk ordering. Contact UCT for details.

Phase Chemistry	UCT Product Code	10 g	100 g	1 kg
Reverse Phase				
C18, Octadecyl (endcapped)	CEC18	CEC1800X	CEC1800C	CEC1800K
C18, Octadecyl (unendcapped)	CUC18	CUC1800X	CUC1800C	CUC1800K
C8, Octyl (endcapped)	CEC08	CEC0800X	CEC0800C	CEC0800K
C8, Octyl (unendcapped)	CUC08	CUC0800X	CUC0800C	CUC0800K
C4, n-Butyl (endcapped)	CECN4	CEC0400X	CEC0400C	CEC0400K
C2, Ethyl (endcapped)	CEC02	CEC0200X	CEC0200C	CEC0200K
C2, Ethyl (unendcapped)	CUC02	CUC0200X	CUC0200C	CUC0200K
C30, Triacontyl (endcapped)	CEC30	CEC3000X	CEC3000C	CEC3000K
Phenyl (endcapped)	CEPHY	CEPHY00X	CEPHY00C	CEPHY00K
Cyclohexyl (endcapped)	CECYH	CECYH00X	CECYH00C	CECYH00K
Normal Phase				
Cyanopropyl (endcapped)	CECNP	CECNP00X	CECNP00C	CECNP00K
Cyanopropyl (unendcapped)	CUCNP	CUCNP00X	CUCNP00C	CUCNP00K
Diol (unendcapped)	CUDOL	CUDOL00X	CUDOL00C	CUDOL00K
Ion Exchange — Anion Exchange				
Aminopropyl	CUNAX	CUNAX00X	CUNAX00C	CUNAX00K
Primary/Secondary Amine	CUPSA	CUPSA00X	CUPSA00C	CUPSA00K
Quaternary Amine Chloride	CUQAX	CUQAX00X	CUQAX00C	CUQAX00K
Quaternary Amine Acetate	CAQAX	CAQAX00X	CAQAX00C	CAQAX00K
Quaternary Amine Hydroxide	CHQAX	CHQAX00X	CHQAX00C	CHQAX00K
Triethylamine (Diethylamino)	CUDAX	CUDAX00X	CUDAX00C	CUDAX00K

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Phase Chemistry	UCT Product Code	10 g	100 g	1 kg
Ion Exchange — Cation Exchange				
Benzenesulfonic Acid	CUBCX	CUBCX00X	CUBCX00C	CUBCX00K
Benzenesulfonic Acid (High Load)	CUBCX-HL	CUBCXHL00X	CUBCXHL00C	CUBCXHL00K
Propylsulfonic Acid	CUPCX	CUPCX00X	CUPCX00C	CUPCX00K
Carboxylic Acid	CUCCX	CUCCX00X	CUCCX00C	CUCCX00K
Mixed Mode				
Polyimine (HILIC)	CUPAX	CUPAX00X	CUPAX00C	CUPAX00K
Zwitterion (HILIC)	Zwitterion	—	—	—
C8 + Carboxylic Acid	CUCCX2	CUCCX20X	CUCCX20C	CUCCX20K
C8 + Benzenesulfonic Acid	CUBCX2	CUBCX20X	CUBCX20C	CUBCX20K
C8 + Propylsulfonic Acid	CUPCX2	CUPCX20X	CUPCX20C	CUPCX20K
C8 + Quaternary Amine	CUQAX2	CUQAX20X	CUQAX20C	CUQAX20K
C8 + Aminopropyl	CUNAX2	CUNAX20X	CUNAX20C	CUNAX20K
C8 + Cyanopropyl	CUCNP2	CUCNP20X	CUCNP20C	CUCNP20K
C8 + Cyclohexyl	CUCYH2	CUCYH20X	CUCYH20C	CUCYH20K
C18 + Quaternary Amine	CUQAX3	CUQAX30X	CUQAX30C	—
C18 + PSA	CUPSA3	CUPSA30X	CUPSA30C	—
C18 + Benzenesulfonic Acid	CUBCX3	CUBCX30X	CUBCX30C	—
Polymeric C18 + Benzenesulfonic Acid	SSDBX	SSDBX00X	SSDBX00C	—

**If the desired phase is not listed in the table above, please contact UCT to confirm availability.*

INTEGRATED WORKFLOWS COMBINING METAL SCAVENGERS AND SPE

UCT's Clean-Up® metal scavengers and SPE sorbents are designed to function seamlessly within the same purification sequence. Whether you are working in synthetic chemistry, analytical laboratories, or manufacturing environments, these tools can be combined to deliver efficient, scalable, and reproducible purification.

Synthetic Chemistry Workflow

1. Metal Scavenging
Treat the crude mixture with the selected Clean-Up® metal scavenger (Silica Thiol, Thiourea, Triamine, PSA, etc.) to capture catalytic metals.

2. Filtration and Rinse
Remove the scavenger by filtration and rinse the solid bed to maximize product recovery.

3. SPE Polishing
Apply a reversed-phase or mixed-mode SPE cartridge/column to remove:

- Organic byproducts
- Ligands and excess reagents
- Residual salts or matrix impurities

4. Concentration and Isolation
Concentrate the purified solution and isolate the final material by crystallization, precipitation, or evaporation.

Analytical and Bioanalytical Workflow

1. SPE Cleanup First
Use an appropriate SPE phase to remove proteins, salts, lipids, and other matrix interferences.

2. Optional Metal Scavenging Step
If catalyst residues or metal ions may affect instrument performance, apply a metal scavenger to the cleaned extract.

3. Instrumental Analysis
Proceed with LC, GC, or MS analysis using a cleaner, more stable sample.

Process and Scale-Up Integration

Begin with small-scale screening of scavenger and SPE chemistries using cartridges or batch treatments.

Transition to bulk packed columns or large-volume batch operations for pilot or production-scale purification.

Maintain the same core chemistries across scales to ensure consistent performance and simplify process validation.

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CLEAN-UP® FORMATS AND CONFIGURATIONS

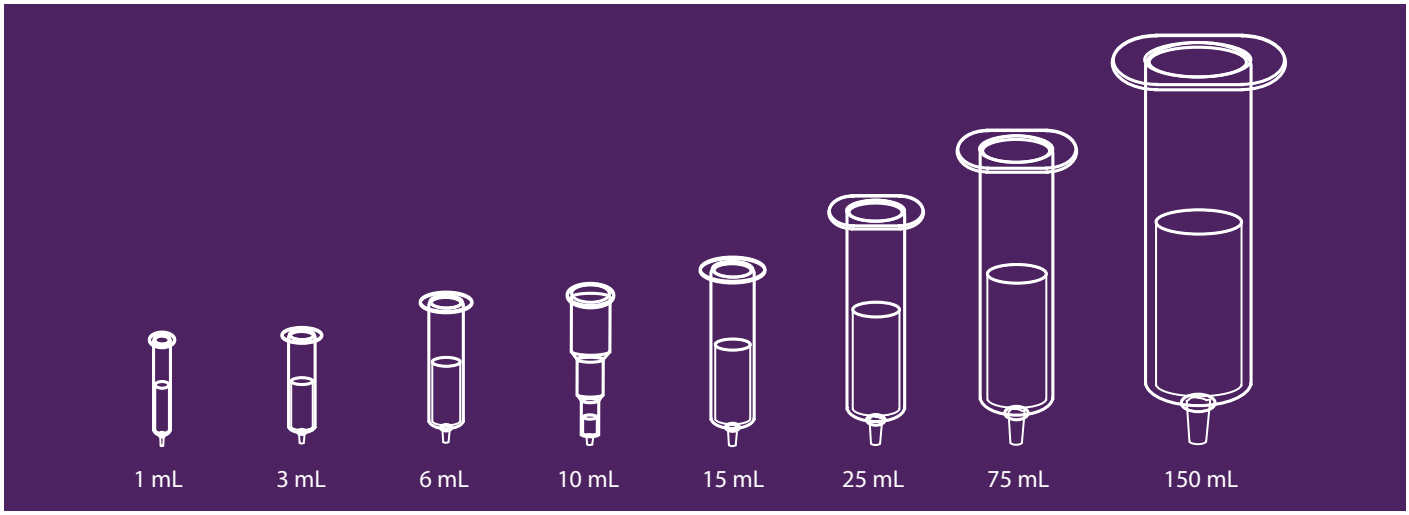
Metal Scavengers

- Bulk powder formats from small jars to multi-kilogram containers
- Standard particle size ranges suitable for gravity flow or mild pressure
- SPE cartridge formats (optional)
- Custom loading or particle size available upon request

SPE Sorbents

- SPE cartridges from 1 mL up to 150 mL with a wide range of bed masses
- Bed masses from 10 mg to 70 g
- Multi-well plates and bulk powder options for high-throughput screening or custom devices
- All products are manufactured with consistent frit quality, bed density, and packing integrity

RESERVOIRS FOR BONDED PHASE EXTRACTIONS



CHEMISTRIES ARE OFFERED ON THESE SILICA SIZES...

SMALL PARTICLE (5-20 µm)

INTERMEDIATE PARTICLE (25-40 µm)

STANDARD PARTICLE (40-60 µm)

LARGE PARTICLE (125-210 µm)

SPE Column

Well-plate

Bulk

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Our technical specialists can provide:

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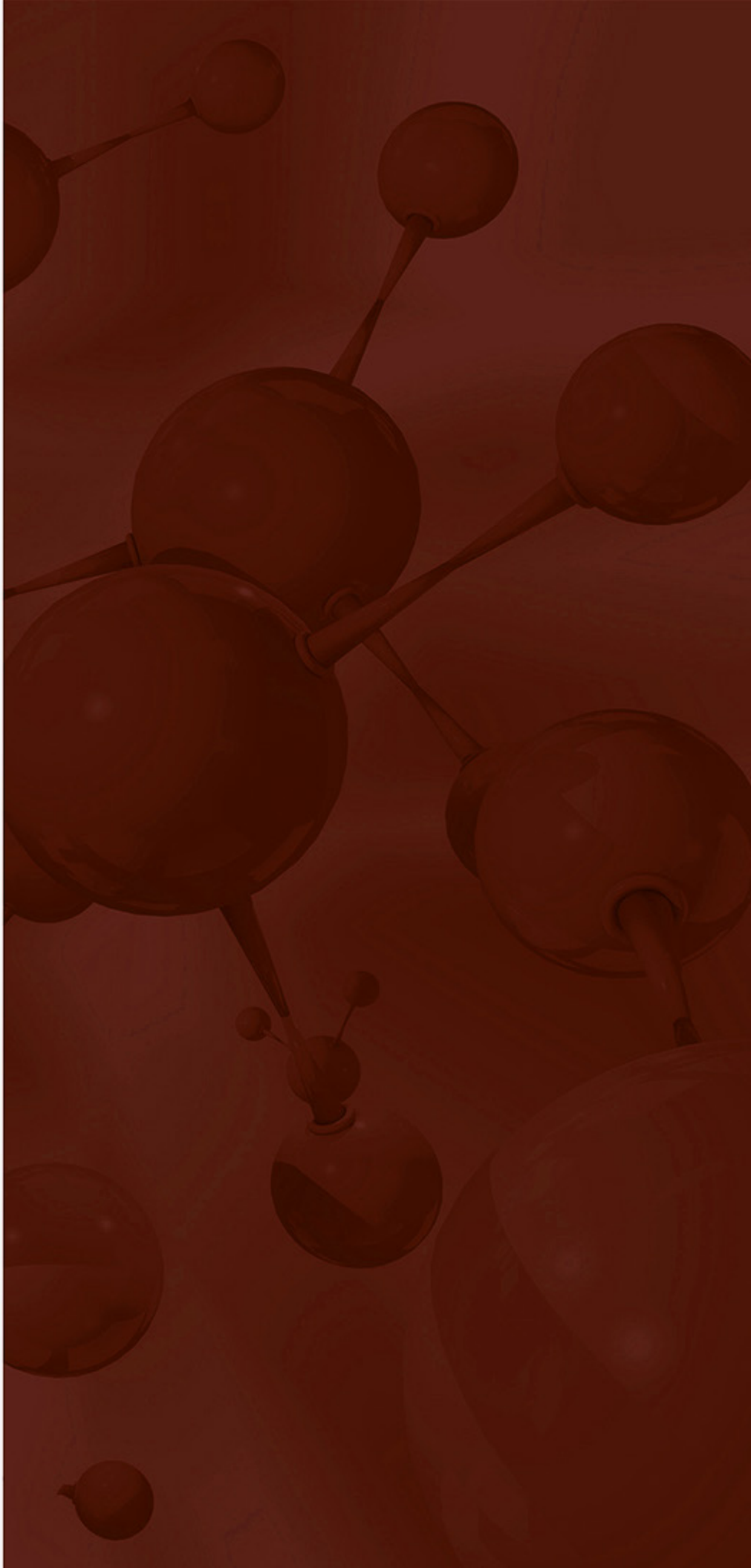
Workflow optimization

Custom packing and custom chemistry solutions

COAs, SDS, and regulatory documentation



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