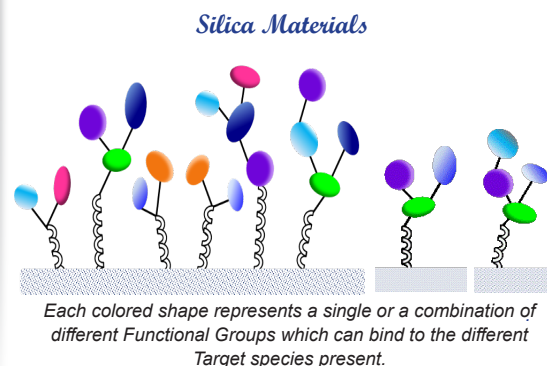


Enhanced cost effective performance through a new Scavenger design with:

- Multiple mono and polydentate Functional Groups each with very high Affinity for the Target;
- Functional Groups present in numerous different spatial arrangements and in specific combination with other Functional Groups results in numerous different binding modes to the Target;
- Strong binding modes designed for each of the different Target species present.

## Benefits

- Meets Purification, Selectivity and Recovery Targets (> 99%) through Novel Scavenger Design
- No loss of Customer Product or Added Impurities
- Scavengers achieving > 99% Removal & Recovery of Precious Metals including Rh & Pd(0/II)
- Scavengers for metals and organic impurities achieving >99% removal
- Significant Process Improvement Costs using Scavengers with High Affinity, Selectivity and Capacity
- Simple, low cost processes that are easy/quick to implement requiring low maintenance
- Scavenger Design facilitates the use of an expensive catalyst/reagent late in a multi-step process



Item #	Structure	Market Applications and Benefits/Advantages
16-0825		<p><b>Thiourea Sulfide Mercapto Silica, metals and organic impurity scavenger</b></p> <p>Metal and Organic Compounds Removal for Product Purification, Precious Metal Recovery, Bio-Tech, Environmental</p> <ul style="list-style-type: none"> <li>• Leading Pd(0/II) Scavenger for Palladium cross-coupling reactions</li> <li>• Very effective Rh Scavenger from Hydroformylation reactions</li> </ul> <p>Pd(0/II), Rh(I), Pt, Ru, and Ir, Ag, Au, Hg removal</p> <p>Combined Functional Group Loading: 1.15 - 1.5 mmol/g</p>
16-0815		<p><b>Poly Mercaptoalkyl Silica, metals and organic impurity scavenger</b></p> <p>Metal and Organic Compounds Removal for Product Purification, Precious Metal Recovery, Bio-Tech, Environmental</p> <p>General Palladium Scavenger with effectively double the Functional Group Loading of existing products with benefits of lower levels of residual Precious &amp; other Metals and higher capacity</p> <ul style="list-style-type: none"> <li>• Pd, Pt, Rh, Ru, Cu and Ir, Cd, Hg, Pb removal</li> <li>• Removal of alkyl halides, <math>\alpha</math>-halo ketones, esters, amides, acyl and sulfonyl halides</li> </ul> <p>Combined Functional Group Loading: 1.7 - 2.5 mmol/g</p>
07-9255		<p><b>Poly Quaternary Ammonium Alkyl Silica, metals and organic impurity scavenger</b></p> <p>Metal Removal and Anion Exchange for Product Purification, Precious Metal Recovery, Bio-Tech, Environmental</p> <p>At the minimum, double the Functional Group Loading of existing products and providing enhanced performance</p> <ul style="list-style-type: none"> <li>• Precious Metals and Transition Metals removal</li> <li>• Anion Exchange</li> </ul> <p>Combined Functional Group Loading: 1.7 - 2.8 mmol/g</p>

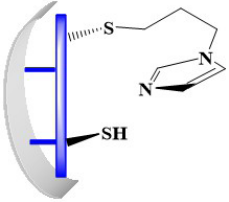
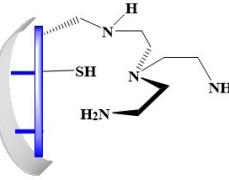
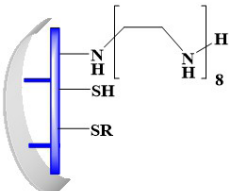
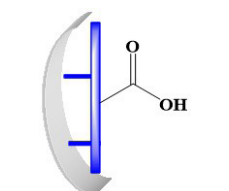
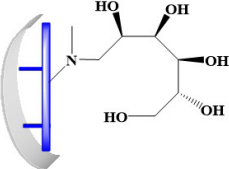
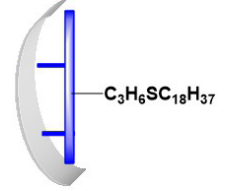
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Item#	Structure	Market Applications and Benefits/Advantages
16-0800		<p><b>Imidazole Sulfide Mercapto Alkyl Silica, metals and organic impurity scavenger</b></p> <p>Metal and Organic Compounds Removal for Product Purification, Precious Metal Recovery, Bio-Tech, Environmental</p> <p>Additional functionality provides enhanced performance</p> <ul style="list-style-type: none"> <li>Precious Metals and Ag, Cu, Cd, Ni, Co, Cr, Mn, Zn removal</li> <li>Acid removal</li> <li>Removal of alkyl halides, <math>\alpha</math>-halo ketones, esters, amides, acyl and sulfonyl halides, chloroformates, isocyanates and isothiocyanates</li> </ul> <p>Combined Functional Group Loading: 1.15 - 1.5 mmol/g</p>
16-0820		<p><b>Tetraamine Sulfide Alkyl Silica, metals and organic impurity scavenger</b></p> <p>Metal Removal, in particular Rh, Ir and Ru for Product Purification, Precious Metal Recovery, Bio-Tech, Environmental</p> <ul style="list-style-type: none"> <li>Pt, Pd, Rh, Ir, Ru and Cu, Ag, Au, Ni, Cd, Pb, Hg removal</li> <li>Acid removal</li> </ul> <p>Combined Functional Group Loading: 1.0 - 1.4 mmol/g</p>
16-0810		<p><b>Polyamine Sulfide Alkyl Silica, metals and organic impurity scavenger</b></p> <p>Metal and Organic Compounds Removal for Product Purification, Precious Metal Recovery, Bio-Tech, Environmental</p> <ul style="list-style-type: none"> <li>Acid removal</li> <li>Removal of alkyl halides, <math>\alpha</math>-halo ketones, esters, amides, acyl and sulfonyl halides, chloroformates, isocyanates and isothiocyanates</li> <li>Pt, Pd, Rh, Ir, Ru and Ni, Cu, Ag, Au, Gd removal</li> </ul> <p>Combined Functional Group Loading: 0.9 - 1.4 mmol/g</p>
08-4230		<p><b>Poly Carboxylic Acid Alkyl Silica, metals and organic impurity scavenger</b></p> <p>Metal and Organic Compounds Removal for Product Purification, Precious Metal Recovery, Bio-Tech, Environmental</p> <p>High Functional Group Loading</p> <ul style="list-style-type: none"> <li>Strong base removal</li> <li>Cation removal - Cu, Fe, Ni, Co, Mn, Cr, Ca</li> <li>Easy elution of quaternary amine functionalised analytes</li> </ul> <p>Functional Group Loading: 1.8 - 2.4 mmol/g</p>
08-4225		<p><b>Glucamine Alkyl Silica, metals and organic impurity scavenger</b></p> <p>Borate Removal for Product Purification, Bio-Tech</p> <ul style="list-style-type: none"> <li>Organic and inorganic borate removal</li> <li>Borate residues left after Palladium catalysed carbon-carbon coupling reactions removal</li> <li>Antibiotics, prostaglandins</li> </ul> <p>Functional Group Loading: 0.8 - 1.2 mmol/g</p>
16-0805		<p><b>Octadecyl Sulfide Propyl Silica, metals and organic impurity scavenger</b></p> <p>Non-polar compounds for Product Purification, Bio-Tech</p> <p>Most hydrophobic Functionalised Material available</p> <ul style="list-style-type: none"> <li>Retains non-polar compounds and de-salts aqueous mixtures</li> <li>Purification of aflatoxins, amphetamines; antibiotics, antiepileptics; barbiturates, caffeine; drugs, preservatives; fatty acids, nicotine, PAH, pesticides, PCB; heavy metals, vitamins</li> </ul> <p>Functional Group Loading: 0.8 - 1.2 mmol/g</p>

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