



ChemFiles

Functionalized Silica Gels

Vol. 2, No. 6

Metal
Scavengers

Organic
Scavengers

Supported
Reagents

Linker
Resins

Kits

Functionalized **SILICA GELS** for *Organic Synthesis*

 **ALDRICH**

Introduction/Ordering Information

Sigma-Aldrich and SiliCycle Inc. have partnered to offer you a wide-range of functionalized silica gels for organic synthesis. SiliCycle Inc. manufacture these novel products to combine with the 700+ resins that Sigma-Aldrich now offers to help your synthetic needs.

These novel silica gel products offer numerous advantages over the well-known gel-type resins:

Advantages of the Inert Support

- Solvent independent
 - Rigid porous structure
 - No swelling;
 - Fast kinetics;
 - Can be used in large-scale purification (discovery to process).
 - No low molecular weight residues
 - High purity
- No non-specific binding
 - High Yield
- High density of functional groups
 - Small volume of silica gel required



This ChemFile details the complete range of functionalized silica gels and their applications. All of these products are available in pack sizes of 5 grams to multi-kilos.

Custom packaging (i.e. titerplates, cartridges, vials) is also available via the CombiKits™ service. We are actively adding new supported reagents and catalysts to this product line, for a complete and up-to-date list of our products visit our Web site at www.sigma-aldrich.com/combichem.

To Place Orders

Telephone: (800) 558-9160
(414) 273-3850
Fax: (800) 962-9591
(414) 273-4979
Internet: www.sigma-aldrich.com
Mail: P.O. Box 2060
Milwaukee, WI
53201 USA

Mastercard, Visa & American Express accepted.
NO minimum order OR confirming purchase order required.



Customer & Technical Service

Ordering, pricing, and shipping:
Telephone: (800) 558-9160
Product information:
Telephone: (800) 231-8327
MSDS Requests: (800) 558-9160
E-mail: aldrich@sial.com
Mail: P.O. Box 355
Milwaukee, WI
53201 USA

SAFC - Bulk Chemicals & Custom Synthesis

Telephone: (800) 336-9719

Office Hours

Monday through Friday
7 am – 7 pm

Saturdays, Sundays & Holidays
8 am – 12 noon



SIGMA-ALDRICH
CORPORATION

SILICYCLE



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All of these functionalized silica gels are available in sizes ranging from 5 gram to multi-kilograms.



Quality Control

In order to assure the highest quality products, each batch of UltraPure Silica Gel undergoes a four-point verification procedure:

- Elemental analysis for organic and inorganic compounds
- BET analysis (surface area determination)
- pH
- Particle size determination

Our Four-Point Quality Control Procedure

Elemental Analysis of Organic and Inorganic Compounds

These silica gels have very low organic compound levels. The gels are subjected to Carbon-Nitrogen-Sulfur analysis to determine organic content.

Most silica gel available on today's market likely contains up to 0.5% of different metal oxides. Iron is usually the most abundant oxide, but copper, cadmium, zinc and aluminum, to name a few, may also be present and act as Lewis acids. Such acids can affect or even destroy some products. Peak tailing, occasionally observed in polar compound separation, is another major problem associated with high metal content in silica.

This silica gel is analyzed by ICP-MS for over 40 metals, to ensure that every batch has a very low metal content to prevent the above-mentioned problems .

BET Analysis

The efficiency and reliability of silica gel depends on surface conditions. BET analysis determines the surface area, pore diameter, pore size distribution and volume. All these parameters are closely linked to silica gel performance in separating compounds.

A larger surface area results in greater contact or interactions with the analyte, thereby increasing the separation of different products. Pore diameter, distribution and volume permit semi size-exclusion chromatography, where smaller molecules fit into pores more easily than larger ones (e.g. in peptide separations). This justifies the use of several types of silica gels to achieve better discrimination in chromatographic processes.



Quality Control

pH

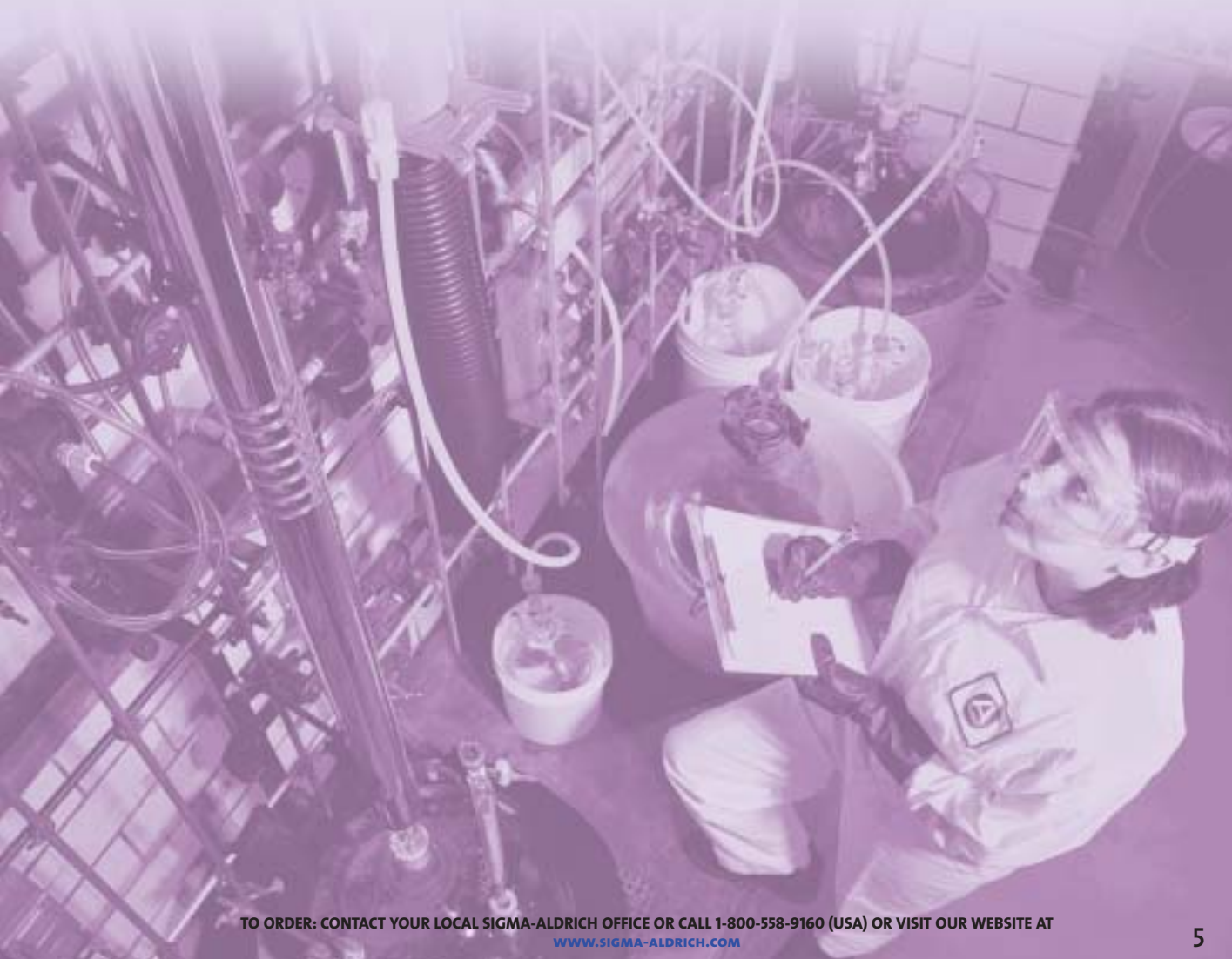
The silica gel pH can affect the retention time of some ionizable compounds. However, some products become hydrolyzed or are rearranged on contact with acidic silica. A neutral pH with a range between 6.5 and 7.0 is the most important factor in determining the reliability and inert behavior of silica gels.

Particle Size

Silica gel with a narrow particle size distribution will ensure easily packed columns. We verify that 90% of the particle size fits in the range provided.

Application

We also test our functionalized silica gels by performing test reactions and by following these reactions by GC-MS and *in situ* FTIR, thus ensuring that our functionalized silica gels perform as well as we claim.



Organic Synthesis

Organic Synthesis

Properties of Silica Gels

- Very high surface area (~ 500 m²/g);
- High silanol density;
- Very high thermal resistance;
- Good mechanical stability;
- No swelling in organic solvents;
- No restriction on solvent choice.

New generation of Silica-based Scavengers

- High yields
- Prepared from high-purity silica gel
- Demonstrate broad solvent compatibility
- **Do not swell**
- Easy to handle
- Time saving

Silica-based scavengers have been developed for use with a variety of solvents, thereby countering the problem posed by **swelling**.

SiliCycle's acid-washed UltraPure Silica Gel assures a pH-controlled medium with very low levels of metal contaminants, thus preventing undesirable reactions. The narrow range of particle sizes of our silica gel

(40-63 μm) is especially important in flow-through systems, as it results in increased uniformity (no channeling and greater reproducibility) and fewer "fine-end" particles (lower back pressure, no clogging of frittered filters and no fine materials to contaminate the product).

As silica-based products **do not swell**, they have a higher scavenging capacity for a given volume. Simply add two to four equivalents of the appropriate scavenger in relation to the reagent or side-product you want to scavenge and in most cases, an hour at room temperature is all it takes!

Silica-based scavengers are easy to handle as they do not develop any **static charge** when, plates, cartridges and columns are filled.

Scavengers normally react covalently with the contaminants they remove from the solution and are usually discarded.

All products are rigorously end-capped to present a solute with no highly adsorptive or reactive surface.

Listed below are some examples of scavenging results:

Catalog No.	Scavenger	Compound scavenged	% scavenged
53,778-0	Isocyno	Benzylamine	91
53,794-2	Thiocyno	Benzylamine	98
36,425-8	Amino	Phenylchloroformate	100
53,791-8	Ethylenediamino	Phenylchloroformate	100
53,792-6	Diethylenetriamino	Phenylchloroformate	99
53,804-3	Dimethylamino	HCl	100
53,808-6	Mercapto	Benzaldehyde	81
53,797-7	Sulfonyl chloride	Benzylamine	100
53,798-5	Pyridyl	HCl	95
53,807-8	Propionyl chloride	Benzylamine	100
53,795-0	Imidazol-1-yl	HCl	100

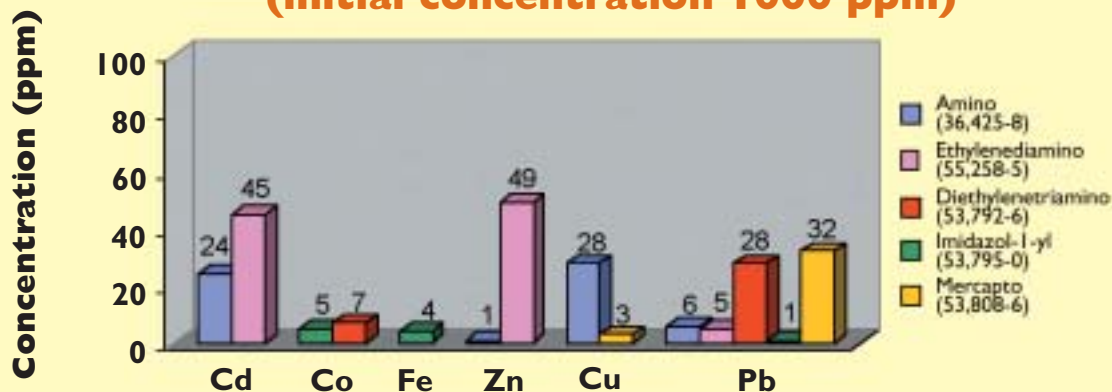
1. 2-4 eq. for 1 hour in methylene chloride or hexanes at RT
2. Amino has been used to scavenge acid chlorides and has proven better than the polymer supported amines. *McComas, W. et al. Tetrahedron Lett. 2000, 41, 3573.*



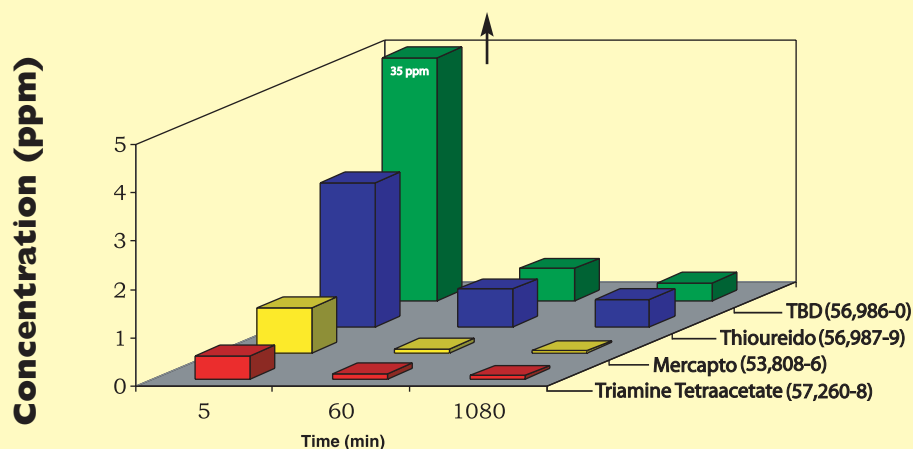
Modified Silica

Scavenging Results (continued)

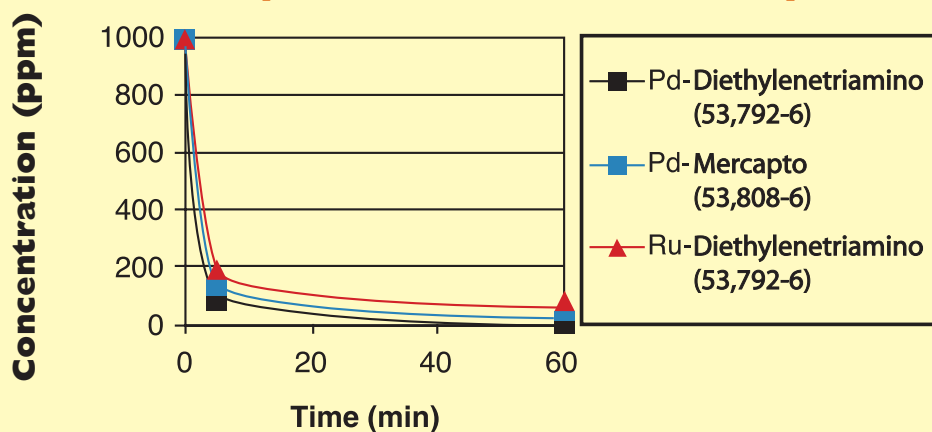
**Selected values on metal scavenging
(initial concentration 1000 ppm)**



**Palladium Removal
(Pd(II) in THF at 25°C)**



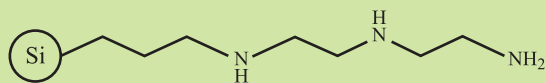
**Pd and Ru removal by
Diethylenetriamino and Mercapto**



Metal Scavengers

53,792-6

3-(DIETHYLENTRIAMINO)PROPYL-FUNCTIONALIZED SILICA GEL



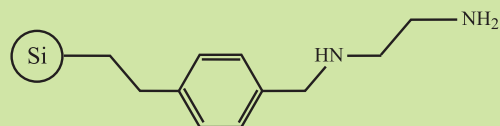
5g 25g 100g

Loading ca. 3.7 mmol N/g

Triamine silica gel is effective for scavenging metals such as lead, cobalt, ruthenium and palladium¹. It has also been used as a ligand exchange². In a specific application (e.g. immobilization of DNA), it is a primary grafted reagent, over which a crosslinker can react³.

55,258-5

2-(4-(ETHYLENEDIAMINO)BENZENE)ETHYL-FUNCTIONALIZED SILICA GEL



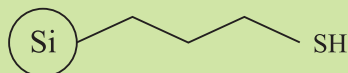
5g 25g 100g

Loading ca. 2.5 mmol N/g

This functionalized silica gel is a good metal scavenger and is also used as a coupling support for polyimides.

53,808-6

3-(MERCAPTO)PROPYL-FUNCTIONALIZED SILICA GEL



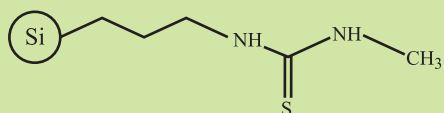
5g 25g 100g

Loading ca. 1.2 mmol/g

Used for adsorption of heavy metals, such as Hg^{4,5}, Ag⁶, Cu⁷ and Pd⁸, and as a linker for immobilizing C3-symmetric cage-like receptors yielding chiral stationary phase through nucleophilic addition on a double bond⁹. Also used for primary amine sequestration¹⁰.

56,987-9

3-(1-THIOUREIDO)PROPYL-FUNCTIONALIZED SILICA GEL



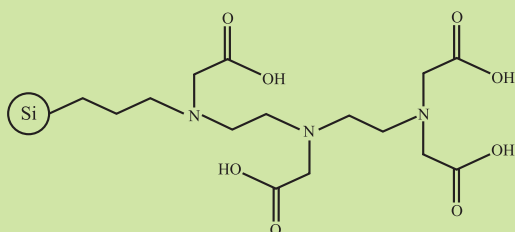
5g 25g 100g

Loading ca. 2.6 mmol N/g

This functionalized silica gel has been used to concentrate Pd, Au, Ag¹¹ and Pt¹², to scavenge Pd¹³ and to anchor it for catalytic applications¹⁴.

57,260-8

TRIAMINE TETRAACETATE-FUNCTIONALIZED SILICA GEL



5g 25g 100g

This functionalized silica gel is specifically designed to scavenge metals in solution.

NEW!

NEW!



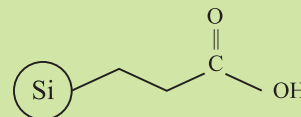
Electrophilic Scavengers

56,983-6

4-CARBOXYBUTYL-FUNCTIONALIZED SILICA GEL

Loading *ca.* 1.2 mmol/g

Used for immobilizing cobalt acetate during alkene catalytic epoxidation¹⁵. May also be used for scavenging amines.



25g 100g

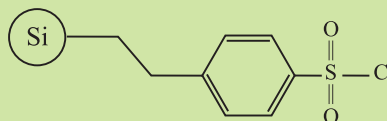
NEW!

53,797-7

4-ETHYL BENZENESULFONYL CHLORIDE-FUNCTIONALIZED SILICA GEL

Loading *ca.* 1.0 mmol/g

This gel can be used to immobilize alcohols and scavenge nucleophiles, as well as for “catch and release” applications.



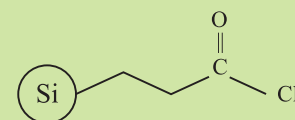
5g 25g 100g

53,807-8

PROPIONYL CHLORIDE-FUNCTIONALIZED SILICA GEL

Loading *ca.* 1.0 mmol/g

Can be used to scavenge amines and alcohols.



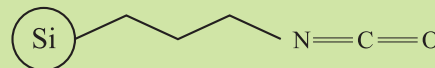
5g 25g 100g

53,778-0

3-(ISOCYANO)PROPYL-FUNCTIONALIZED SILICA GEL

Loading *ca.* 1.2 mmol/g

Used to scavenge azide functionality in a “cap-tag” methodology for oligosaccharide preparation by automated solid-phase synthesis¹⁶. It has been repeatedly demonstrated that grafted isocyanate moieties can efficiently scavenge amines (primary and secondary), anilines, and hydrazines without releasing small molecules, thereby greatly simplifying isolation procedures.



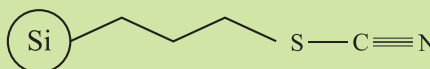
5g 25g 100g

53,794-2

3-(THIOCYANO)PROPYL-FUNCTIONALIZED SILICA GEL

Loading *ca.* 0.8 mmol/g

Thiocyanate supported on silica can be used for epoxide conversion (oxirane) in episulfide (thiirane) with the possibility of regeneration. It can also be used to immobilize metal ions (silver and gold) with good complex stability and dispersion¹⁷, and acts as a good scavenger for amines (primary and secondary).



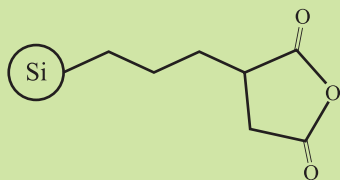
5g 25g 100g



Electrophilic Scavengers *continued*

55,269-0

3-(2-SUCCINIC ANHYDRIDE)PROPYL-FUNCTIONALIZED SILICA GEL



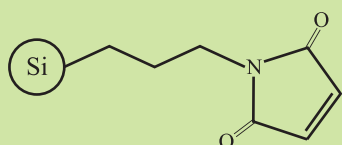
5g 25g 100g

Loading *ca.* 1.4 mmol/g

This silica-grafted functional group demonstrates high reactivity to amines and water. Therefore, it can be easily transformed into acids, esters or amides using simple organic transformations.

56,990-9

3-(MALEIMIDO)PROPYL-FUNCTIONALIZED SILICA GEL



5g 25g

Loading *ca.* 1.5 mmol/g

A functionalized silica gel designed to scavenge thiols.

Combichem just got easier with
CombiKits™

The emerging importance of combinatorial and high-throughput methods in chemistry has resulted in a need for specialized kits of chemicals. We are able to provide a variety of these kits by combining Aldrich's vast chemical inventory and our customized weighing process. Some of our more popular kits have included carboxylic acids, arylboronic acids, amines, and alcohols; we are now pleased to add isocyanates to this list. Please contact us - we can create a kit tailored to your specific requirements. Each kit includes the sfile.



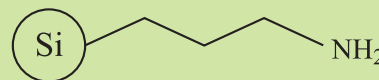
Nucleophilic Scavengers

36,425-8

3-AMINO-FUNCTIONALIZED SILICA GEL

Loading ca. 1.0 mmol N/g

This functionalized silica gel has been used for the separation and solid-phase extraction (SPE) of sugars¹⁸, as well as for the separation of steroids¹⁹, cholesterol, and triglycerides²⁰. It has also been used in size-exclusion chromatography of cationic polymers²¹, as a scavenger to remove excess acid chlorides²² and as a catalyst in Knoevenagel reactions^{23,24}.



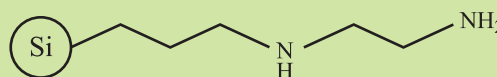
10g 50g 250g

53,791-8

3-(ETHYLENEDIAMINO)-FUNCTIONALIZED SILICA GEL

Loading ca. 2.7 mmol N/g

Scavenge acids, acid chlorides, anhydrides, aldehydes, isocyanates and chloroformates.



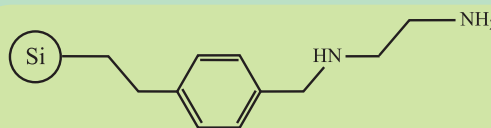
5g 25g 100g

55,258-5

2-(4-(ETHYLENEDIAMINO)BENZENE)ETHYL-FUNCTIONALIZED SILICA GEL

Loading ca. 2.5 mmol N/g

This functionalized silica gel is a good metal scavenger and is also used as a coupling support for polyimides.



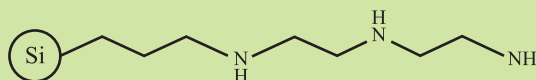
5g 25g 100g

53,792-6

3-(DIETHYLENTRIAMINO)PROPYL-FUNCTIONALIZED SILICA GEL

Loading ca. 3.7 mmol N/g

Triamine silica gel is effective for scavenging metals such as lead, cobalt, ruthenium and palladium¹. It has also been used as a ligand exchange². In a specific application (e.g. immobilization of DNA), it is a primary grafted reagent, over which a crosslinker can react³.



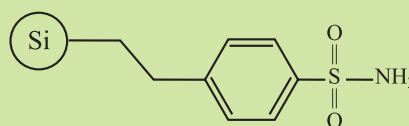
5g 25g 100g

53,793-4

4-ETHYL-BENZENESULFONAMIDE-FUNCTIONALIZED SILICA GEL

Loading ca. 0.9 mmol/g

Sulfonamide functionalized silica gel is an efficient sorbent of active bromine and chlorine species²⁵. Solid supported sulfonamide is a useful component as a linker for solid phase synthesis (e.g. after activation (acylation) in enolate alkylations and in Suzuki reactions).

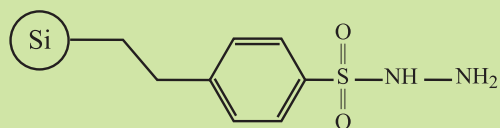


5g 25g 100g



Nucleophilic Scavengers *continued*

55,259-3 2-(4-TOLUENESULFONYL HYDRAZINO)ETHYL-FUNCTIONALIZED SILICA GEL



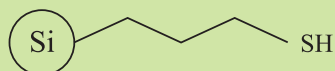
5g 25g 100g

Loading ca. 2.0 mmol N/g

Scavenging of aldehydes and ketones and used in application needing solid-phase tosyl hydrazine reagent.

53,808-6

3-(MERCAPTO)PROPYL-FUNCTIONALIZED SILICA GEL



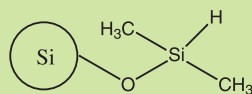
5g 25g 100g

Loading ca. 1.2 mmol/g

Used for adsorption of heavy metals, such as Hg^{4,5}, Ag⁶, Cu⁷ and Pd⁸, and as a linker for immobilizing C3-symmetric cage-like receptors yielding chiral stationary phase through nucleophilic addition on a double bond⁹. Also used for primary amine sequestration¹⁰.

53,802-7

DIMETHYLSILOXY-FUNCTIONALIZED SILICA GEL



5g 25g 100g

Loading ca. 1.5 mmol/g

Silyl derivatives are widely used in synthetic organic chemistry as protecting groups for alcohols, phenols, carboxylic acids, amines, acetylenes and aromatic compounds. Therefore, dimethylsilyl grafted on silica is an efficient scavenger for these organic compounds. It can also be used as a hydride source in Friedel-Crafts alkylation or as a reducing agent (e.g. aldehydes and ketones). Si-H bond can be used as a reactive intermediate to immobilize other molecules, as shown for saccharide modified silica²⁶.



Bases and Acid Scavengers

36,425-8

3-AMINO-FUNCTIONALIZED SILICA GEL

Loading ca. 1.0 mmol N/g

This functionalized silica gel has been used for the separation and solid-phase extraction (SPE) of sugars¹⁸, as well as for the separation of steroids¹⁹, cholesterol, and triglycerides²⁰. It has also been used in size-exclusion chromatography of cationic polymers²¹, as a scavenger to remove excess acid chlorides²² and as a catalyst in Knoevenagel reactions^{23,24}.



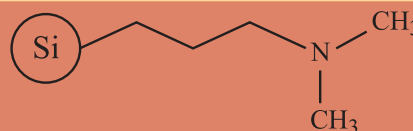
10g 50g 250g

53,804-3

3-(DIMETHYLAMINO)PROPYL-FUNCTIONALIZED SILICA GEL

Loading ca. 1.6 mmol N/g

This dimethylamine immobilized on silica gel can be used as a base catalyst in Michael²⁷ or Knoevenagel reactions²⁸. It can also be used as a catalyst for alkane oxidation²⁹. It is a strong supported tertiary amine that can be used to scavenge acids.



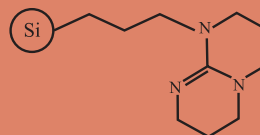
5g 25g 100g

56,986-0

3-(1,3,4,6,7,8,-HEXAHYDRO-2H-PYRIMIDO-[1,2-a]PYRIMIDINO)PROPYL-FUNCTIONALIZED SILICA GEL

Loading ca. 2.4 mmol N/g

This grafted hindered strong base has been used as a basic catalyst in Michael reactions, Knoevenagel condensations, Robinson annulations and nucleophilic epoxidations^{30,31}.



5g 25g 100g

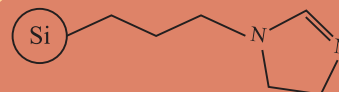
NEW!

53,795-0

3-(1-IMIDAZOL-1-YL)PROPYL-FUNCTIONALIZED SILICA GEL

Loading ca. 2.2 mmol N/g

This gel has been used for anchoring ruthenium complexes used in catalytic cyclization reactions^{32,33} and as a chromatographic packing for the separation of metal chelates³⁴.



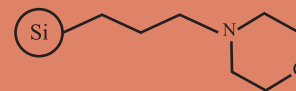
5g 25g 100g

56,979-8

3-(1-MORPHOLINO)PROPYL-FUNCTIONALIZED SILICA GEL

Loading ca. 1.1 mmol N/g

This grafted morpholine silica gel is commonly used as an acid sponge. It is used in the same manner as morpholine functionalized polymers^{35,36}.



5g 25g 100g

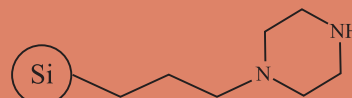
NEW!

55,260-7

3-(1-PIPERAZINO)PROPYL-FUNCTIONALIZED SILICA GEL

Loading ca. 1.9 mmol N/g

This silica-bound piperazine is a useful deblocking and scavenging agent for Fmoc³⁷ and for the Bsmoc³⁸ amino protecting group. According to the results of one study, silica-bound piperazine is superior to polystyrene-based reagents. It has also been used to immobilize metal carbonyl complexes³⁹, for the synthesis of 2-aminobutadienes, as a traceless linker in cross-coupling strategy starting with diazonium ions and as a solid phase Knoevenagel catalyst.



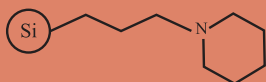
5g 25g 100g



Bases and Acid Scavengers

NEW!

56,984-4



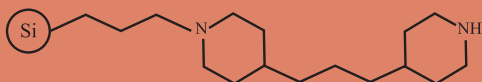
5g 25g 100g

3-(1-PIPERIDINO)PROPYL-FUNCTIONALIZED SILICA GEL

Loading ca. 1.1 mmol N/g

Used as an immobilized catalyst for Knoevenagel condensation^{40,41}, and for selective monoglyceride synthesis^{42,43,44}. May also be used as a tertiary-bound amine for scavenging acids, thereby avoiding salt elimination problems.

56,985-2 3-(4,4'-TRIMETHYLENEDIPIPERIDINO)PROPYL-FUNCTIONALIZED SILICA GEL

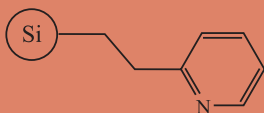


25g 100g

Loading ca. 2.0 mmol N/g

Used as a deblocking-scavenging agent for Fmoc amino-protecting⁴². It is a better deblocking agent than the piperazino gel, but less efficient for scavenging dibenzofulvene. Can be used in conjunction with the piperazino gel for enhanced performance. May also be used as an electrophile scavenger or a silica-bound base.

53,798-5



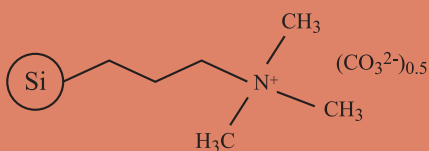
5g 25g 100g

2-(2-PYRIDYL)ETHYL-FUNCTIONALIZED SILICA GEL

Loading ca. 1.3 mmol/g

This gel can be used as a tertiary amine for acid removal. It can also be used to anchor Cu_2^+ ions, which can then be used as a catalyst for hydroquinone oxidation⁴⁵.

55,288-7 3-(TRIMETHYLAMMONIUM)PROPYL-FUNCTIONALIZED SILICA GEL-CARBONATE



5g 25g 100g

Loading ca. 0.7 mmol/g

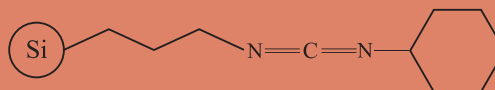
Can be used as a general base to scavenge acids.



Coupling Reagents

56,988-7 3-(1-CYCLOHEXYLCARBODIIMIDO)PROPYL-FUNCTIONALIZED SILICA GEL

Loading ca. 2.0 mmol N/g
Coupling reagent for peptide synthesis.



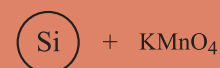
5g 25g

NEW!

Oxidizing Reagents

56,989-5 POTASSIUM PERMANGANATE, 15-20 WT. % ON SILICA GEL (PHOSPHATE BUFFERED)

This solid-supported oxidant is used for converting aldehydes to carboxylic acids⁴⁶ and alcohols to aldehydes⁴⁷.

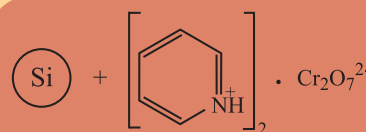


25g 100g

NEW!

56,980-1 PYRIDINIUM CHLOROCHROMATE, CA. 20 WT. % ON SILICA GEL

Used for the general oxidation of alcohols to carbonyl compounds, selective oxidation of allylic and benzylic alcohols, organometallic oxidation, oxidative transpositions, oxidative cleavages, allylic and benzylic oxidation, and oxidative cyclizations^{48,49,50,51}. Using PCC immobilized on silica gel provides anhydrous conditions that may otherwise promote side reactions and reduce yields. It greatly facilitates removal of polymeric reduced chromium by-products, and is compatible with acid-sensitive protecting groups^{52,53}. When used in conjunction with ultrasound, kinetics are increased and the amount of oxidant required to complete the reaction is decreased^{42,54,55}.

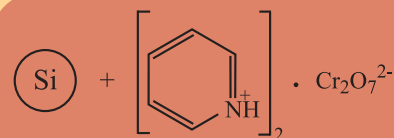


25g 100g

NEW!

56,982-8 PYRIDINIUM DICHROMATE, CA. 20 WT. % ON SILICA GEL

Used as an alternative to PCC in nucleoside and carbohydrate oxidation, particularly for fragile molecules⁵⁶. Can also be used in conjunction with tert-butyl hydroperoxide for a variety of oxidative transformations⁵⁷. PDC-on-silica is a very convenient and effective reagent for oxidizing allylic and benzylic alcohols, as well as saturated primary and secondary alcohols and it is compatible with acid-sensitive groups, such as cyclopropane ring, or a ketal function⁵⁸.

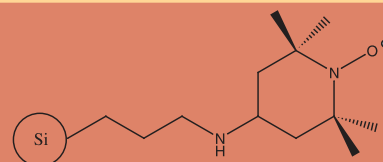


25g 100g

NEW!

57,634-4 TEMPO ON SILICA GEL

Recyclable catalyst in the Anelli oxidation of alcohols.



5g 25g 100g

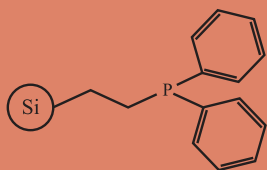
COMING SOON!



Phosphines

53,801-9

2-(DIPHENYLPHOSPHINO)ETHYL-FUNCTIONALIZED SILICA GEL



5g 25g 100g

Loading ca. 0.7 mmol/g

Used for NiCl_2 and CoCl_2 complexation⁵⁹, chromatographic phase preparation, hydro-formylation of 1-heptene with silica-anchored rhodium thiolate complexes⁶⁰, cross-coupling reactions of organic halides with organotin and organomagnesium reagents with silica-supported palladium⁶¹, and for carbonickel complex immobilization⁶². Can also be used with a supported rhodium(I) catalyst for olefin catalytic reduction, with dinuclear rhodium(I) complexes for hydro-formylation reactions, with palladium(0) for cross-coupling organoboron compounds, and with organic halides or organic triflates.

Diols and Epoxides

55,274-7

2-(3,4-CYCLOHEXYLDIOL)PROPYL-FUNCTIONALIZED SILICA GEL



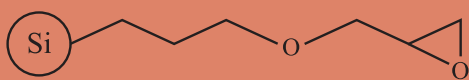
5g 25g 100g

Loading ca. 0.8 mmol/g

Scavenging or protection of ketones and aldehydes used in chromatography and as a solid support.

53,796-9

3-(GLYCIDOXY)PROPYL-FUNCTIONALIZED SILICA GEL



5g 25g 100g

Loading ca. 1.0 mmol/g

Used for immobilizing organic molecules when extracting heavy metals bearing hydroxy⁶³, amine⁶⁴, thiol⁶⁵, and thiocarboxylic acid⁶⁶ functionalities. Also used to develop chemically bonded stationary phases for chiral ligand exchange⁶⁷ and reversed phase liquid chromatography⁶⁸.

55,273-9

2-(3,4-EPOXYCYCLOHEXYL)PROPYL-FUNCTIONALIZED SILICA GEL



5g 25g 100g

Loading ca. 0.8 mmol/g

Serves the same purpose as the glycidoxy gel, but the epoxide ring is more reactive.



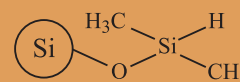
Linker Resins for Solid-Phase Synthesis

55,270-4

1-(ALLYL)METHYL-FUNCTIONALIZED SILICA GEL

Loading ca. 1.1 mmol/g

Very reactive double bond for anchoring other molecules, catalysts, etc.



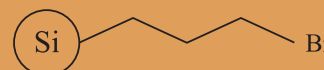
5g 25g 100g

55,265-8

4-BROMOPROPYL-FUNCTIONALIZED SILICA GEL

Loading ca. 1.5 mmol/g

Serves the same purpose as 3-chloropropyl gel, but with increased reactivity.



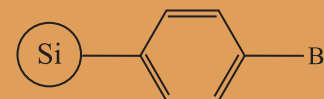
5g 25g 100g

55,266-6

4-BROMOPHENYL-FUNCTIONALIZED SILICA GEL

Loading ca. 1.0 mmol/g

This bromine functionalized silica gel is more reactive than its chloride equivalent and is easily modified to anchor a variety of functionalities.



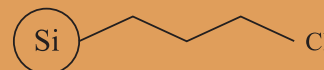
5g 25g 100g

36,426-6

3-CHLOROPROPYL-FUNCTIONALIZED SILICA GEL

Loading ca. 1.0 mmol/g

This polyvalent functionalized silica gel can be used to anchor different functionalities, catalysts, etc.

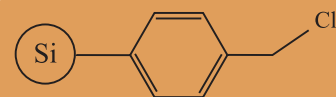


10g 50g 250g

55,263-1

4-BENZYL CHLORIDE-FUNCTIONALIZED SILICA GEL

Loading ca. 1.2 mmol/g

Used to synthesize a homogeneous ruthenium catalyst for asymmetric transfer hydrogenation reaction⁶⁹. Enables cationic graft polymerization of different alkenes when initiated by silver perchlorate⁷⁰. Can also be used in solid-phase synthesis.

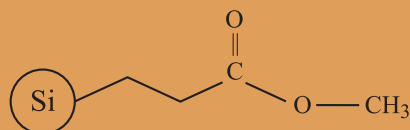
5g 25g 100g



Linker Resins for Solid-Phase Synthesis

55,268-2

2-(CARBOMETHOXY)PROPYL-FUNCTIONALIZED SILICA GEL



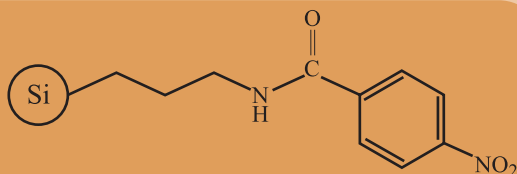
5g 25g 100g

Loading ca. 1.6 mmol/g

Can be used as a solid support for further derivitization.

55,262-3

3-(4-NITROBENZAMIDO)PROPYL-FUNCTIONALIZED SILICA GEL



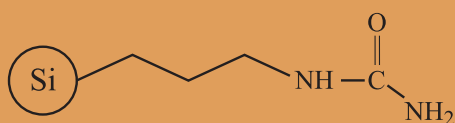
5g 25g 100g

Loading ca. 2.4 mmol N/g

Can be used as an enzyme immobilization support.

55,261-5

3-(UREIDO)PROPYL-FUNCTIONALIZED SILICA GEL



5g 25g 100g

Loading ca. 2.5 mmol N/g

Used for adsorbing cationic surfactants⁷¹ and as an immobilized reagent in solid-phase synthesis.

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Triamine tetraacetate, functionalized silica gel	(57,260-8)
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3-(Mercapto)propyl-functionalized silica gel	(53,808-6)
2-(4-Toluenesulfonyl hydrazino)ethyl-functionalized silica gel	(55,259-3)
4-Ethyl benzenesulfonyl chloride-functionalized silica gel	(53,797-7)
3-(Trimethylammonium)propyl-functionalized silica gel, carbonate	(55,288-7)

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Pyridinium dichromate, ca. 20 wt. % on silica gel	(56,982-8)

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3-(1-Morpholino)propyl- functionalized silica gel	(56,979-8)
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