



### I. Intended use

MagSi-Tools are surface activated magnetic particles, intended for covalent immobilization of proteins (e.g. antibodies, enzymes), peptides, nucleic acids or other molecules of interest. Different surface modifications and bead sizes allow for choosing the optimal product for the right molecule to be coupled, and for the intended application.

After coupling the molecule of interest (ligand) is coupled to the magnetic particles, the resulting beads can be used in downstream applications such as:

- Isolating specific target proteins, antibodies, nucleic acids, cells, viruses, etc. (preparative applications)
- Detecting specific target proteins, nucleic acids, cells, viruses, etc. (diagnostic applications)
- Immobilizing enzymes, thereby enhancing stability and minimizing auto-catalysis. Magnetic collection of the particle/enzyme complex allows to remove the enzyme from the reaction, and to reuse it in a new reaction.

### II. Principle

Magnetic beads are an ideal tool for immobilizing molecules (proteins, enzymes, antibodies, peptides, nucleic acids, etc.) on a solid phase, to be used for e.g. detecting, enriching, or cleaving specific target molecules. The easy and efficient collection of beads in magnetic fields allows for easy rinsing and removal of excess reagents and ligand after coupling the ligand molecule, as well as easy use in downstream applications. The use of magnetic beads does not require columns or centrifugation steps, and are therefore ideal in high-throughput and automated applications.

### Selection of your MagSi-Tool particle:

#### Bead surfaces

MagSi-Tools are magnetic silica beads with different surface activations to best suit your needs. Surfaces available are:

Table 1: Active surfaces and example applications of MagSi-tools

Surface activated	Formula	Example Applications
Silica	SiOH	-End-users' own application (e.g. functionalization of the MagSi beads)
Carboxyl	COOH	-Protein and peptide immobilization -Antibody immobilization
Aldehyde	CHO*	-Protein immobilization
Amine	NH <sub>2</sub>	-Protein immobilization
Sulfydryl	SH*	-Immobilization via target cysteine groups, coupling to gold surfaces

\* CHO- and SH-beads have a limited stability, and must be used for coupling ligand within 2-3 weeks after production.

Please take into consideration which groups are available on the ligand for coupling, and try to prevent inactivation or hiding the active or exposed site of the ligand.

#### Bead size

MagSi-Tools magnetic beads come in two sizes, 600 nm and 1 µm. 600 nm beads have the advantage of having a larger surface area than 1,0 µm beads. The sedimentation time of 600nm MagSi beads is approximately 4 times slower than that of 1.0µm beads. This allows longer incubation times without shaking/mixing, and may be important in automated and other high-throughput applications in which shaking/mixing options are often lacking. MagSi beads with a diameter of 1µm have stronger magnetic properties and will separate approximately 2x faster than 600nm beads under same conditions; approximate separation time is ≤1 minute using a suitable magnet.

### III. Material Supplied

- 2, 10, or 100 ml MagSi-Tools 600 or 1.0 (supplied at 10 mg/ml in PBS, 0.05% sodium azide - unmodified MagSi-S and MagSi-NH<sub>2</sub> beads are supplied in water, 0.05% sodium azide)

#### Additional materials needed

- Buffers and Materials (depending on the application, contact for support)
- Magnetic separator for bead separation/collecting (see order information)
- Mixer/vortex to homogenize samples and resuspend beads (depending on the application, contact for support)

### IV. Product usage

The products are stable at least 1 year after purchasing date when stored at 2-8°C (except CHO- and SH-beads: limited stability, must be used for coupling ligand within 2-3 weeks after production), unless mentioned otherwise on the label. Store beads in well closed vial and in upright position to prevent drying of the beads since this makes them more difficult to re-suspend. Do not freeze the product! Vortex bead suspension well before use. If you expect iron interference in downstream applications, we strongly advise you to rinse the beads before usage.

The MagSi-Tools are suspended in PBS buffer or water with 0.05% sodium azide added as a preservative. Before using the beads it is important to rinse with water or PBS to remove the NaN<sub>3</sub> that could interfere with your test and for safety reasons since NaN<sub>3</sub> is toxic! MSDS of our products can be found at our site ([www.magnamedics.com](http://www.magnamedics.com)).

## Protocols for ligand immobilization

Table 2: Coupling chemistries and conditions for different MagSi-Tools

Bead Surface	Chemicals needed	Protein binding	Treatment	Comments
Carboxyl <sup>1</sup> (COOH)	EDC/NHS	Amine groups (from lysine and/or as unblocked N-termini)	No treatment needed	Can be used to couple most proteins
Aldehyde (CHO)	Aldehyde/Amine reaction	Amine groups	No treatment needed	Add reducing agent to stabilize amide bond
Thiol (SH)	Redox reaction <sup>3</sup>	Free cysteine	Reduce disulphides under non-denaturing conditions to generate free cysteine.	Useful for proteins containing cysteines. Risk of multiple coupling
Amine <sup>2</sup> (NH <sub>2</sub> )	Gluteraldehyde	Amine/aldehyde	No treatment needed	Add reducing agent to stabilize amide bond

<sup>1</sup> The first step is to activate the functional groups with *N*-hydroxysuccinimide in order of creating a highly reactive succinimide ester which reacts with amine groups contained in protein.

<sup>2</sup> Gluteraldehyde gives more stable protein binding than the carbodiimide reagents used with carboxylate beads.

Abbreviations: EDC, *N*-ethyl-*N'*-(dimethylaminopropyl) carbodiimide; NHS, *N*-hydroxysuccinimide.

<sup>3</sup> Reduction of disulfides with 0.1 M DTE (dithioerythrol); coupling of protein at pH below iso-electric point; deactivate excess thiol with 20 mM PDEA (2-(2-pyridinyldithio) ethane-amine)/ 1M NaCl, pH 4,3

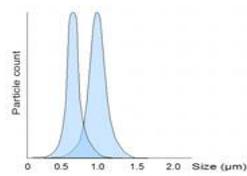
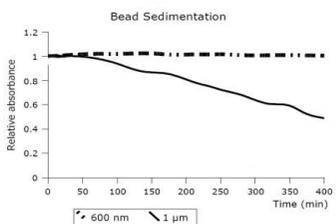
Most customers are interested in coupling proteins, but coupling of other organic molecules, such as nucleic acids or carbohydrates, is also possible.

### Disclaimer

For R&D use only. Not for drug, household or other uses. Products contain 0.05% sodium azide which is toxic. Avoid contact with the suspension buffer. When disposing the suspension buffer, flush with large amounts of water. Material Data Sheet (MSDS) is available on our website at [www.magnamedics.com](http://www.magnamedics.com).

## VI. Technical Data

Table 3: Specifications of MagSi-Tools

Product Name	MagSi-Tools	
	600	1.0
Size	600 nm	1.0 µm
Concentration	10 mg/ml	
	beads/ml	
	8 - 20 · 10 <sup>9</sup>	6 - 12 · 10 <sup>9</sup>
Supplied product volume	2 ml, 10 ml, 100 ml	
Material	Magnetic silica beads with activated surface	
Size Distribution	D5-D95	
	500 - 900 nm	0.7 - 1.4 µm
		
Sedimentation		
Solution additives	MagSi-Tools, surface activated: PBS (pH 7.4), 0.05% sodium azide (NaN <sub>3</sub> , Toxic!), except: MagSi-S, unmodified silica beads and MagSi-NH <sub>2</sub> , amine-modified silica beads: water, 0.05% sodium azide	
Storage	Store at 2-8°C	

## VII. Additional Information

### Order Information

Product	Volume	Art. No.
MagSi-S 600	2ml	MD16003
	10ml	MD18003
	100ml	MD19003
MagSi-S 1.0	2ml	MD01003
	10ml	MD03003
	100ml	MD04003
MagSi-S COOH 600	2ml	MD16004
	10ml	MD18004
	100ml	MD19004
MagSi-S COOH 1.0	2ml	MD01004
	10ml	MD03004
	100ml	MD04004
MagSi-S NH <sub>2</sub> 600	2ml	MD16005
	10ml	MD18005
	100ml	MD19005
MagSi-S NH <sub>2</sub> 1.0	2ml	MD01005
	10ml	MD03005
	100ml	MD04005
MagSi-S SH 600	2ml	MD16006
	10ml	MD18006
	100ml	MD19006
MagSi-S SH 1.0	2ml	MD01006
	10ml	MD03006
	100ml	MD04006
MagSi-S CHO 600	10ml	MD18007
	100ml	MD19007
MagSi-S CHO 1.0	10ml	MD03007
	100ml	MD04007

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