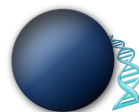


MagSi-DNA

Product Description



I. Intended use

MagSi-DNA beads are ideal for purification or isolation of nucleic acids from various sources. The magnetic nanoparticles are intended as a solid phase extraction tool for custom buffer systems based on chaotropic as well non-chaotropic binding principles, and can be used for developing your own nucleic acid isolation and extraction methods, such as:

- Isolation of genomic, mitochondrial, or viral DNA from whole blood, cell lysates, human, animal, or plant tissue; isolation of RNA
- Isolation of genomic, plasmid, cosmid, or phage DNA from bacterial cultures and bacteria from clinical samples (blood, stool, swabs, etc.)
- Cleanup of DNA from enzymatic reactions (restriction digestions, ligations) or chromatin immunoprecipitation (ChIP) procedures to get rid of excess primers, nucleotides, enzymes, salts, buffers and other substances that are unwanted in downstream applications

MagSi-DNA beads are magnetic silica beads with a highly dense magnetic core of iron oxide which causes ultra-fast magnetic collection (± 10 seconds) and high recovery of the beads. Their small particle size offers a very large active surface area and high binding capacity for nucleic acids. These particles are applicable in both manual and automated processes, *but continuous shaking* is needed because of their fast sedimentation.

II. Principle

MagSi-DNA beads reversibly bind DNA and other nucleic acids under sample- and buffer-specific conditions. They can be used to isolate and purify nucleic acids from various (complex) mixtures, such as cell lysates, or enzymatic reactions. It works as following;

A solution containing DNA (e.g. lysate) is combined with MagSi-DNA beads and a application-specific binding buffer. After a short incubation under mild shaking, nucleic acids are bound to the silica surface. By applying a suitable magnet to the container (tube/deep-well microplate) the bead pellet is separated from the sample mixture. Unwanted components are further removed by 3-4 washing steps in a

selection of buffers (alcohol/water solutions). Finally, nucleic acids are released in Dnase/RNase-free water or buffer solution (e.g. Tris, Tris-EDTA, pH~8).

Silica and carboxyl (COOH) surfaces, but also nucleic acids, are negatively charged at neutral or basic pH, while both are also hydrated. For the binding mechanism of DNA to particles, dehydration is needed. This can be achieved by for instance alcohol, or by chaotropic agents such as guanidinium salts. Negative charges on the bead surface and the nucleic acid backbones are bridged by divalent cations. This can be reversed by a water solution.

For washing, mostly alcohol/water mixtures are used, which will keep the DNA in dehydrated form and bound to the beads. To reduce premature elution of DNA, salts can be added to the washing solution. Elution takes place in a low-salt non-alcohol condition.

Carboxylated & Non-Carboxylated MagSi-DNA beads

Optimal binding conditions differ for beads with silica or with carboxyl surfaces. In Table 1 below, some of the practical differences between the 2 types of beads are shown. (To develop a new application it is recommended to try both types in parallel! Contact MagnaMedics for a test sample)

Table 1: Differences between plain silica (**MagSi-DNA**) and carboxylated (**MagSi-DNA COOH**) beads

Type of beads/ Parameter	Plain silica MagSi-DNA	Carboxylated MagSi-DNA COOH
Compatability with chaotropic / high salt binding buffers	Fully compatible	Partially compatible
Binding mechanism	Dehydration of nucleic acids / hydrogen bonding	Binding supported by alcohols; polymers like PEG and divalent salts (e.g. Mg ²⁺)
Elution mechanism (conditions)	Low salt conditions → rehydration of DNA	pH shift from acidic binding towards basic elution conditions Or low salt conditions → charge repulsion

III. Material supplied

- 2, 10, or 100 ml **MagSi-DNA** or **MagSi-DNA COOH** (supplied at 300 mg/ml, in filtered demineralized water)

Additional materials needed

Depending on the application, reagents, equipment and consumables are needed:

- A specific set of binding, washing and elution buffers for the intended application
- Magnetic Separator for collection of the beads (see Order Information on the next page)
- Mixer/vortexer for homogenization of the beads and sample mixture.
- Optionally, a suspension buffer for preparation of the beads
- Container tubes or deep-well microplates and pipette tips

IV. Product Usage

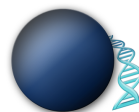
This product is stable for at least 1 year after production date when stored at 2-8°C. Store beads in well closed vial and in upright position to prevent drying of the beads since this makes them more difficult to re suspend. Do not freeze the product! Vortex bead suspension well before use.

MagSi-DNA (COOH) beads are suspended in filtered water. The beads should be pre-washed in sterile filtered water to avoid any impact in downstream applications. The suspension media can be replaced with your own buffer/storage media. The beads are compatible with typical organic solvents like ethanol or isopropanol. However, chemicals with strong redox-potential should be avoided.

The beads are stable in a pH range from 3 to 13 and at temperatures up to 95 degrees. After extensive incubations in these conditions, no degradation is measurable using spectrophotometric assays. Nevertheless, if you expect any interference in downstream applications, we strongly advise you to rinse the beads before use.

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Be aware that MagSi-DNA beads sediment within seconds and need homogenization during incubation. In some cases **MagSi-DNA allround** may be more suitable due to its sedimentation time (>5 min, depending on media) when separation speed is not crucial.

IV. Protocols

The protocols below are intended as a guideline to develop a customized protocol and application.

A. Sample Preparation

Lyse your cell, tissue, or bacterial sample via:

- mechanical disruption (sonication/French press)
- Enzymatic (lysozyme) methods
- Using a surfactant like Tween 20/SDS/Triton X-100.

Lysing may be improved by heating the sample mixture.

B. Binding

- Add the binding buffer of choice to the lysate and mix well to get a homogeneous suspension.
- Add beads. Mix beads by vortexing before adding them to the sample. Depending on the expected amount of DNA the volume of beads can be varied. A good starting point is 20 µl when having 400-800 µl of cell lysate.
- Mix sample and incubate 2-10 minutes to allow the DNA to bind to the bead surface.

C. Washing

- Following incubation, place the sample tube in a magnetic separator.
- In order to collect the beads to the side of the tube. Wait 30 seconds until all the beads have been attracted to the magnet. Discard the supernatant using a pipette, then remove the tube from the separator.
- Add 400 µl wash buffer, vortex 10 seconds and place the sample tube in a magnetic separator in order to collect the beads and discard the supernatant.
- Wash the beads at least twice.

D. Elution

The Elution buffer consists of a nuclease-free, non-alcohol solution (TE-buffer) to rehydrate the DNA so it will elute from the bead. Concentrated TE-buffer can be added to the pure sample to improve storage properties.

- Elute DNA by adding 50-200 µl elution buffer, pre-heated to 56°C. Incubate 2-10 minutes at room temperature and mix several times.
- Collect beads with a magnetic separator and transfer the supernatant, containing the DNA, into a new tube.
- If eluate appears brown, repeat collection of the beads.
- Elution can be improved by repeating these steps or by incubating at 60°C during elution.

VI. Technical Data

Table 2: Technical data for **MagSi-DNA** and **MagSi-DNA COOH**

Product Name	MagSi-DNA
Size	200 – 400 nm
Concentration	300 mg/ml
Supplied product volume	2 ml, 10 ml, 100 ml
Material	Dense iron oxide core coated with porous silica. Optimized for nucleic acid isolation.
Magnetic Particle Content (per gram dry solid)	60-70%
Solution additives	Filtered demineralized water
Storage	Store at 2-8°C

VII. Additional Information

Disclaimer

For R&D use only. Not for drug, household or other uses. Material Safety Data Sheet (MSDS) is available on our website at www.magnamedics.com.

Order information

Product	Volume	Art. No.
MagSi-DNA	2 ml	MD01017
MagSi-DNA	10 ml	MD02017
MagSi-DNA	100 ml	MD03017

Product	Volume	Art. No.
MagSi-DNA COOH	2 ml	MD01019
MagSi-DNA COOH	10 ml	MD02019
MagSi-DNA COOH	100 ml	MD03019

Related products

Product	Art. No.
MM-Separator M12 + 12	MD90001
MM-Separator M96	MD90002
MM-Separator 96 SBS	MD90005
MM-Separator 384 SBS	MD90006

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