MagSi-DNA mf

Art.No.: MD020001

Product Description

I. Intended use

MagSi-DNA mf is intended for purification or isolation of nucleic acids from various sources and is especially designed for use in microfluidic systems. The magnetic nanoparticles can be used as a solid support for nucleic acid isolation and extraction methods with buffer systems based on chaotropic binding principles. The product is intended for developing your own application, 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, or phage DNA from bacterial cultures and bacteria from clinical samples (blood, stool, swabs, etc.)
- Clean-up of DNA from enzymatic reactions (restriction digestions, ligations) or chromatin immunoprecipitation (ChIP) procedures to remove excess primers, nucleotides, enzymes, salts, buffers and other substances that are unwanted in downstream applications

MagSi-DNA mf consists of magnetic silica beads with a highly dense core of magnetite. Due to their ferrimagnetic properties, the beads typically collect within 10 seconds in a magnetic field, but quickly loose magnetic remanence and are easily resuspended. The beads have minimal adhesion effects to plastics, making them perfectly suitable for use in microfluidic systems. The small particle size offers a very large active surface area for binding of nucleic acids, and the storage buffer has been optimized for maximum suspension time and ease of resuspension.

II. Principle

MagSi-DNA mf reversibly binds DNA and other nucleic acids under sample- and buffer-specific conditions. A solution containing DNA (e.g. lysate) is combined with the beads and an application-specific binding buffer. After incubation, nucleic acids are bound to the silica surface. By applying a magnetic field the bead pellet is separated from the sample mixture. Unwanted components are further removed by 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 pH~8).

Silica surfaces, but also nucleic acids, are negatively charged at neutral or basic pH, while both are also hydrated. For a chaotropic binding mechanism of DNA to particles, dehydration is needed. This can be achieved by for instance alcohol, and by 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.

In further steps, beads are washed to remove sample contaminants, chaotropic salts and other unwanted binding components, while keeping the DNA in dehydrated form and bound to the beads. To reduce premature elution of DNA, salts can be added to the washing solution. Traces of ethanol are removed by drying on air or by washing with an aqueous wash buffer. Elution takes place in a low-salt conditions, preferably 10 mM Tris pH 7.5-8 for optimal DNA yield and stability.

III. Material supplied

- 2, 10, or 100 mL **MagSi-DNA mf** (supplied in storage buffer containing 0.05% sodium azide)

Additional materials needed

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

- Sample processing disposables: microtubes, microplates and nuclease-free pipette tips or microfluidic chips composed of glass or polymers, e.g. PDMS and COP.
- A specific set of lysis, binding, washing and elution buffers for the intended application
- Optionally, a suspension buffer for preparation of the beads
- Vortexer or pipetting for homogenization of the beads and mixing samples.
- Thermoshaker or waterbath for incubations at elevated temperature
- Magnetic Separator for collection of beads (see Order Information on the next page)

IV. Product Use

This product is stable for up to 2 years, but no longer than the expiry date on the label. Store beads at room temperature in well closed vial and in upright position. Do not freeze the product! Vortex bead suspension well before use.

MagSi-DNA mf beads are suspended in a storage buffer that is optimized for optimal suspension time and contains 0.05% sodium azide as preservative. The beads can be further pre-washed to avoid any impact in downstream applications and the suspension media can be replaced with your own buffer/storage media.

The beads are compatible with typical buffers such as PBS or Tris, detergents such as Tween20®, SDS or Triton X-100, and organic solvents like ethanol or isopropanol, but particles may sediment faster. Chemicals with strong redox-potential should be avoided. The beads are stable in a pH range from 3 to 11 and at temperatures up to 95 degrees.

Be aware that MagSi-DNA mf starts sedimenting quickly and may need homogenization during incubation steps. In some cases **MagSi-DNA 600, allround or 3.0** may be more suitable due to their superparamagnetic behaviour and longer sedimentation time.

For use in microfluidic systems, drying of beads may be desired. In some cases, additives can be added to allow more easy reconstitution. MagSi-DNA mf has been proven to be compatible with trihalose and other additives such as polyvinylpyrolidone (PVP) and PEG400. For more information, contact MagnaMedics customer support.

IV. Protocols

The steps below are intended as a guideline to develop a customized protocol and application. Based on the sample and analytical requirements optimization may be needed.

A. Sample Preparation

Lyse your cell, tissue, or bacterial sample via:

- Using a surfactant like Tween 20/SDS/Triton X-100 and other denaturing agents.

Lysis efficiency may be improved by heating the sample mixture.

- mechanical disruption (bead-beating)
- Enzymatic (lysozyme) methods

B. Binding

- Completely homogenize MagSi-DNA mf by vortexing for 20 seconds
- Add beads and the binding buffer of choice to the lysate and mix well to get a homogeneous suspension. 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.

- Incubate 2–10 minutes to allow the DNA to bind to the bead surface. Depending on the required recovery, mixing may be needed.

C. Washing

- Following incubation, collect the beads by applying a magnetic field.
- Discard the supernatant and add 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 low-salt, nuclease-free buffer (10 Tris pH 8) to rehydrate the DNA so it will elute from the beads.

- Add elution buffer and mix the sample. Incubate 2–10 minutes at room temperature.
- Following incubation, collect the beads by applying a magnetic field.
- Transfer the supernatant containing purified DNA into a new tube. If the solution contains beads, repeat magnetic collection.
- 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 mf

Product Name	MagSi-DNA mf
Size	~300 nm
Magnetic content	95%
Binding capacity	>300 ng DNA per µL beads
Material	Magnetite with a dense silica shell
Storage	Room temperature

VII. Additional Information

Disclaimer

For Research Use Only (RUO). Not for drug, household or other uses.

Order Information

Product	Volume	Art. No.
MagSi-DNA mf	2 mL	MD0200010002
MagSi-DNA mf	10 mL	MD0200010010
MagSi-DNA mf	100 mL	MD0200010100

Related Products

Product	Art. No.
MM-Separator M12 + 12	MD90001
MM-Separator M96	MD90002
MM-Separator 96 PCR	MDMG0005
MM-Separator 384 PCR	MDMG0006
MM-Separator 96 DeepWell	MDMG0013

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