Mag Beads Polymer COOH (300 nm)

Introduction

TargetMol's Mag Beads Polymer COOH (300 nm) are high-quality Fe_3O_4 microspheres coated with carboxyl (-COOH) groups. These beads allow for rapid, efficient, sensitive, and specific covalent coupling of biomolecules—such as peptides, proteins, and oligonucleotides—to the microsphere surface under the action of specific chemical reagents like EDC. The resulting conjugates can be used in applications such as immunoprecipitation (IP), cell sorting, and DNA–protein interaction studies, making them valuable carrier tools in medical and molecular biology research.

The shell of TargetMol Mag Beads COOH (300 nm) is functionalized with carboxyl groups to reduce bead aggregation and sedimentation. Carboxyl magnetic beads exhibit acidity and are typically activated with EDC in acidic buffer systems. This product line is a water-based suspension of carboxyl-coated, superparamagnetic Fe_3O_4 microspheres. Manufactured using advanced technology, these beads combine magnetic cores with polymeric materials to form a novel class of functionalized magnetic microspheres.

Product Features

- High density of binding sites enables strong and specific ligand coupling.
- Superparamagnetic properties and high magnetic responsiveness reduce handling time.
- Excellent dispersibility and resuspendability improve ease of operation.
- Superior physicochemical stability ensures reproducible results.

Product Components

Product Name	C0069	C0070	C0071	C0072	C0073	C0074	C0075	C0076
Average Particle Size	300 nm	300 nm	1 μm	2 μm	2.8 μm	2.8 μm	3 μm	5 μm
Surface Carboxyl Group Density*	≥70 μmol/g	~100 μmol/g	≥230 μmol/g	≥180 μmol/g	≥160 μmol/g	≥160 μmol/g	≥80 μmol/g	≥80 μmol/g
Magnetic Core	Fe_3O_4							
Shell Material	Polymer							
Magnetic Type	Superparamagnetic							
Storage Buffer	20% (V/V) ethanol	Purified water, 0.05% (V/V) proclin300	20% (V/V) ethanol	20% (V/V) ethanol	Purified water, 0.05% (V/V) proclin300	Purified water, 0.05% (V/V) proclin300	20% (V/V) ethanol	20% (V/V) ethanol

*Determined by potentiometric titration

Product Applications

- Protein purification: The carboxyl functional groups on the surface of the magnetic beads enable covalent coupling with various ligands, allowing for efficient purification of target proteins.
- Immunoassays: Magnetic beads can be conjugated with antibodies to capture and detect specific antigens in immunological assays.
- Cell sorting: By binding to specific cell surface antigens, magnetic beads can be used to isolate target cells via magnetic separation.
- Specific nucleic acid separation: Magnetic beads can be functionalized with nucleic acid probes to selectively isolate target nucleic acids from complex samples.

• Biosensors: Magnetic beads serve as core components in biosensor systems, enabling the detection and analysis of specific biomolecules through their magnetic properties and surface functionalization.
• Drug screening and delivery: Magnetic beads can be applied in high-throughput drug screening to identify potential drug candidates. They can also act as drug delivery carriers, allowing precise delivery of therapeutics to target sites under magnetic field control, thereby enhancing treatment efficacy and reducing side effects.

Instruction

Coupling of Mag Beads with Biomolecules (Example: Protein A)

1. Magnetic Bead Pretreatment

1) Vortex the Mag Beads COOH thoroughly to ensure full dispersion. Pipette 100 µL of bead suspension into a 1 mL EP tube.
2) Place the tube on a magnetic separator for 1 minute, then perfome magnetic separation. Remove the supernatant and take the tube off the magnet.
3) Add 200 µL of MEST solution (100 mM MES, pH 5.0, 0.05% Tween 20) and wash the beads 2 times, removing the supernatant after each magnetic separation.

2. Activation of Carboxyl Groups on Bead Surface

1) Quickly add 100 µL of freshly prepared EDC solution (10 mg/mL, prepared using the above MES-Tween buffer as the dispersant) and 100 µL of NHS solution (10 mg/mL, also prepared using the above MES-Tween buffer as the dispersant) to the EP tube. Vortex thoroughly to fully resuspend the magnetic beads.
2) Incubate at 25 °C for 30 minutes. Keep the beads in suspension during the reaction using a vertical rotator or equivalent mixing device.

Note: After this treatment, the carboxyl groups on the surface of the magnetic beads are successfully activated and ready for covalent coupling with biomolecules containing primary amine groups. Since the activated state is unstable, it is recommended to proceed with the coupling reaction immediately to ensure high efficiency and successful conjugation.

3. Covalent Coupling of Beads with Biomolecular Ligands

1) Perform magnetic separation and discard the supernatant. Add 50–200 µg of the biomolecular ligand to the EP tube. The amount, concentration, and buffer system should be optimized based on experimental requirements.

Note: Recommended ligand buffers include: 100 mM MES buffer, pH 4.8; 200 mM sodium bicarbonate buffer, pH 8.3; 50 mM borate buffer, pH 8.5; 100 mM phosphate buffer; 100 mM sodium chloride solution, pH 7.4. 0.05% Tween 20 may be added to the buffer to improve bead dispersion. Avoid the presence of reagents containing primary amine groups in the buffer, except for the intended biomolecular ligand.

2) Gently mix the reaction. Incubate at 25 °C for 2 hours, or incubate at 25 °C for 1 hour followed by overnight incubation at 4 °C. Keep the beads suspended during coupling, using a vertical rotator or similar mixing device.

4. Blocking After Coupling

1) Perform magnetic separation and discard the supernatant. Add 200 µL of PBST solution (pH 7.2, containing 1% BSA) to resuspend the beads. Sonication may be used if necessary.
2) Incubate at 25 °C for 1 hour to block nonspecific binding sites on the bead surface. Keep the beads suspended during incubation using a vertical rotator or similar mixing device.

5. Storage

1) Perform magnetic separation and discard the supernatant. Wash the beads 3 times with 200 µL of PBS buffer (pH 7.2) or a designated storage buffer.
2) Resuspend the beads in storage buffer at the desired concentration. Store at 4 °C. If long-term storage is needed, 0.02% (w/v) sodium azide (NaN_3) can be added to inhibit microbial growth.

Storage

Store at 4℃ for 2 years

Precautions

1. Avoid freezing, drying, or high-speed centrifugation of the magnetic beads.
2. To minimize bead loss, magnetic separation time should be no less than 1 minute each time.
3. Before removing beads from the tube, ensure they are evenly suspended by gentle shaking. Handle gently to prevent the bubbles.
4. It is recommended to use high-quality pipette tips and reaction tubes to reduce bead and solution loss due to surface adhesion.
5. If the solution is too viscous to allow proper resuspension of the magnetic beads by inverting the centrifuge tube, pipetting up and down or briefly vortexing can be used to fully resuspend the beads.
6. If needed, magnetic beads can be washed 2–3 times with purified water or buffer using magnetic separation to remove ethanol from the storage solution.
7. These beads are not pre-activated and must be activated according to the recommended procedure before performing coupling reactions.
8. The product is for R&D use only, not for diagnostic procedures, food, drug, household or other uses.
9. Please wear a lab coat and disposable gloves.

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