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Rev.2

Bioneer
Healthier Future for Humanity with Genomic Technology

AccuNanoBead™
Ni-NTA Silica Magnetic Beads
AccuPrep™ His-tagged Protein Purification Kit

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BIONEER
Innovation • Value • Discovery

AccuNanoBead™ Ni-NTA Silica Magnetic Beads

The Best Solution for Biomolecule Purification

1. Introduction

As Biopharmaceuticals and Biosimilars have been attracting attention in the pharmaceutical industry, their market is also expanding. A separation and purification process is a vital, inevitable step in the bio drug development, which drives companies to seek better purification tools such as magnetic beads. In purification using magnetic beads, a specific functional group coated on the surface of magnetic beads captures a target biomolecule such as proteins, antibodies and peptides in a sample solution during mixing, and the biomolecule-bound beads are collected and separated from the sample using external magnetic force.

2. Features of Magnetic Beads

- Spherical and Magnetic, Nano-sized Silica Beads
- Sufficient Surface Area-to-Volume Ratio for Effective Purification
- Suitable for Separating Target Biomolecules
- Superior Purification Method in terms of Speed, Accuracy and Cost
- High Quality and High Efficiency Separation

3. Specifications of Ni-NTA Silica Magnetic Beads

- **Matrix :** silica-coated Fe_3O_4
- **Binding capacity :** up to 50~60mg his-tagged proteins/g of Ni-NTA magnetic beads
- **Average particle size :** 400nm
- **Working temperature :** 0 ~ 100℃
- **Storage solution :** 20% EtOH
- **Storage temperature :** Room Temperature
- **Ligand :** Ni^{2+}-charged Nitrilotriacetic acid (NTA)
- **Linker size :** 6 atom space linker
- **pH stability :** pH 2 to 10

4. Applications of Magnetic Beads

- Cell separation
- Protein isolation and purification
- In vitro diagnostics, etc.

5. FE-SEM and TEM Image of Magnetic Beads

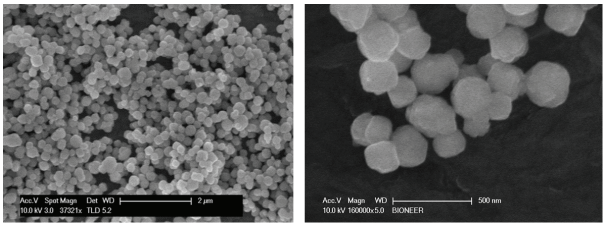


Figure 1. FE-SEM photograph shows Bioneer Magnetic Beads are uniform spheres.

6. Protein Purification Using Magnetic Beads

Proteins of interest are purified using Magnetic Beads as follows:
1. Mix protein sample solution with Magnetic Beads to bind target proteins to Magnetic Beads.
2. Wash away unbound impurities several times while protein-bound Beads are immobilized under external magnetic field.
3. Elute proteins of interest from Magnetic Beads.

The purification procedure using Magnetic Beads is simpler, faster and more effective than other conventional methods. *AccuNanoBead*™ is especially optimized for small- or large-scale applications in laboratories and production facilities due to its sufficient surface area-to-volume ratio. Bioneer also provides purification protocols that allow customers to purify their proteins of interest with ease and convenience.

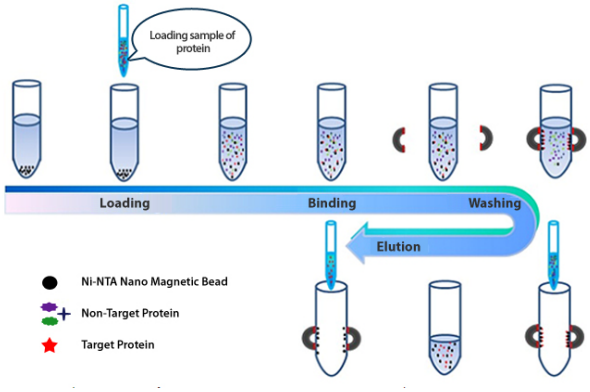


Figure 2. Schematic Purification Process using Magnetic Beads.

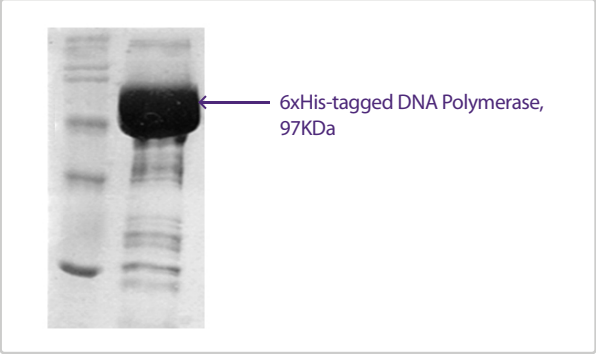


Figure 3. SDS-PAGE of recombinant 6x His-tagged DNA Polymerase, separated from cell lysate using *AccuNanoBead*™ Ni-NTA Silica Magnetic Beads. The purification yield was about 15% with more than 90% purity.

7. Comparison with Other Magnetic Beads

7.1. Comparison of Bead Appearance

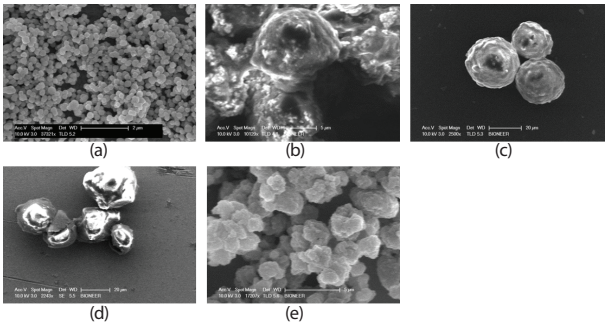


Figure 4. SEM photographs of Magnetic Beads from: (a) Bioneer; (b) company A; (c) company B; (d) company C; (e) company D. The photographs above show Bioneer's Magnetic Beads are uniform spheres that are much smaller in size than others.

7.2. Comparison of Protein Purification Yield

Using Bioneer's Ni-NTA magnetic beads and other companies' products, 6xHis-Tagged DNA Polymerase (97kDa) expressed in *E.coli* was separated from cell lysate, and the protein yield—the amount of purified protein obtained from the loaded sample solution—was compared relative to each magnetic bead product. Figure 5 shows the purification yield with Bioneer's Ni-NTA magnetic beads is notably higher, due to the increased surface area of Bioneer's beads in accordance with a smaller particle size.

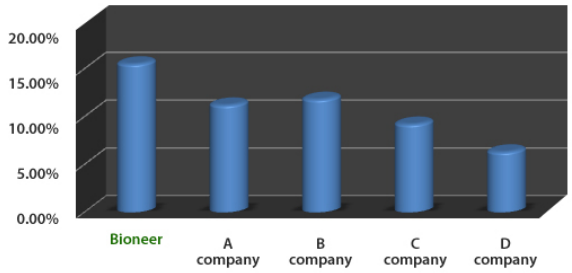


Figure 5. Comparison of protein purification yield between Bioneer's Magnetic Beads and other companies'

1. Legal Statement

AccuNanoBead™ Silica Magnetic Beads technology' is currently patent pending in South Korea and other international regions.

2. Ordering Information

Cat No.	Product Description	Pack size
TA-1010-1	Silica Magnetic Nanobeads, size 400nm	0.5 g/25 ml
TA-1010-2	Silica Magnetic Nanobeads, size 400nm	1.0 g/50 ml
TA-1010-3	Silica Magnetic Nanobeads, size 400nm	10 g/500 ml
TA-1011-1	NH2 Magnetic Beads, size 400nm	0.5 g/25 ml
TA-1012-1	COOH Magnetic Beads, size 400nm	0.5 g/25 ml
TA-1013-1	Epoxy Magnetic Beads, size 400nm	0.5 g/25 ml
TA-1014-1	C18 Magnetic Beads, size 400nm	0.5 g/25 ml
TA-1015-1	Streptavidin Magnetic Beads, size 400nm	50 mg/25 ml
TA-1016-1	Biotin Magnetic Beads, size 400nm	0.5 g/25 ml
TA-1017-1	Ni-NTA Magnetic Beads, size 400nm	0.5 g/25 ml
TA-1018-1	Ni-IDA Magnetic Beads, size 400nm	0.5 g/25 ml
TA-1019-1	Thiol Magnetic Beads, size 400nm	0.5 g/25 ml
TA-1000-1	Magnet Φ15x1.5 and Screw Tube 1.5ml	1 set

* Please contact us to inquire about large quantity orders.

AccuPrep™ His-tagged Protein Purification Kit

1. Product Overview

AccuPrep™ His-tagged protein Purification kit consists of Ni-NTA Magnetic Beads and other components required to purify His-tagged protein using the Ni-NTA Magnetic Beads.
The matrix of Ni-NTA Magnetic Beads is a spherical silica with an average diameter of 400nm(ranged 200~800 nm), which contains magnetic particles inside and is coated on the surface with Ni^{2+}–charged Nitrilotriacetic acid (NTA), a strong chelating agent. Ni^{2+} binds a 6XHistidine tag that is connected to N- or C-terminal of a recombinant protein of interest. Ni-NTA Magnetic Beads demonstrate a binding capacity of about 50~60mg His-tagged protein per 1 g of Ni-NTA Magnetic Beads.
Ni-NTA Magnetic Beads and *AccuPrep*™ His-tagged protein Purification kit are supplied pre-optimized to fulfill customers' needs in laboratories and production facilities in related industries.

2. Features and Benefits

- Fast and easy purification of His-tagged proteins-less than 30minutes.
- Obtain high-purity protein using SSMB (Spherical Shape Magentic Beads).
- Efficient screening using crude cell lysate.
- Applicable to wide ranged His-Tagged proteins with ease and convenience.

3. Specifications of Magnetic Beads

- **Matrix :** silica-coated Fe_3O_4
- **Binding capacity :** up to 50~60mg His-tagged proteins/g of Ni-NTA magnetic beads
- **Average particle size :** 400nm
- **Working temperature :** 0 ~ 100℃
- **Storage solution :** 20% EtOH
- **Storage temperature :** Room Temperature
- **Ligand :** Ni^{2+}-charged Nitrilotriacetic acid (NTA)
- **Linker size :** 6 atom space linker
- **pH stability :** pH 2 to 10

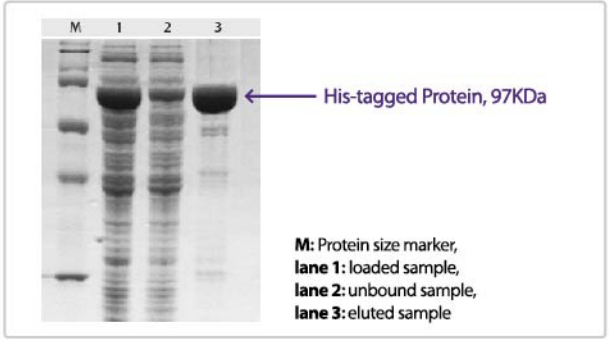
4. Applications

- Affinity purification of recombinant His-tagged proteins
- Pre-test before application to automated purification instrument

5. Performance Evaluation

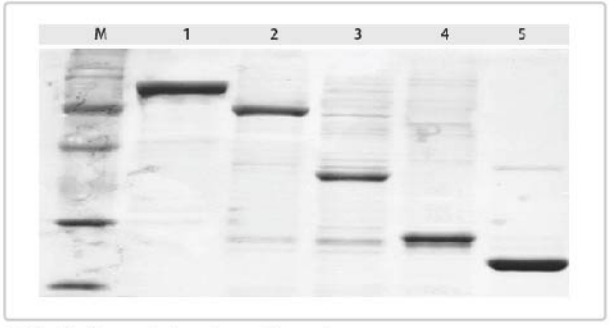
5.1. Target Protein Purification

6XHis-tagged protein was purified on *AccuPrep*™ His-tagged protein Purification kit with more than 90% purity.



5.2. Protein-Size Effect on Purification

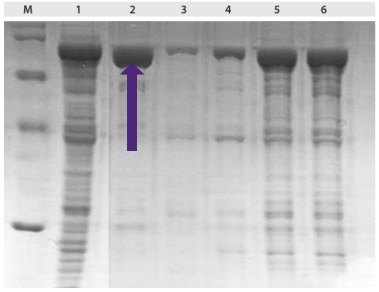
The SDS-PAGE below indicates a wide range of proteins from 25kDa to 94kDa are separated using *AccuPrep*™ His-tagged protein Purification kit.



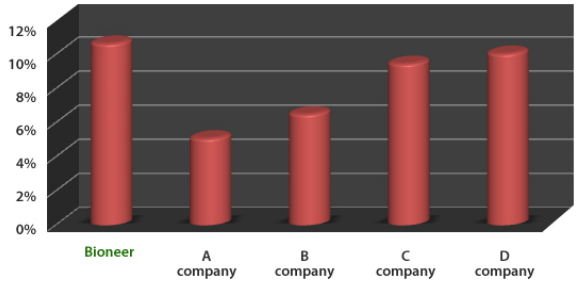
M: Protein Size marker(broad range;Bioneer)
Lane 1: His-tagged protein(Size 97KDa)
Lane 2: His-tagged protein(Size 67KDa)
Lane 3: His-tagged protein(Size 38KDa)
Lane 4: His-tagged protein(Size 27KDa)
Lane 5: His-tagged protein(Size 25KDa)

5.3. Comparison with Other Products

In a comparative experiment using magnetic bead products from Bioneer and competitors, *AccuPrep*™ His-tagged protein Purification kit showed higher performance in terms of yield and purity.

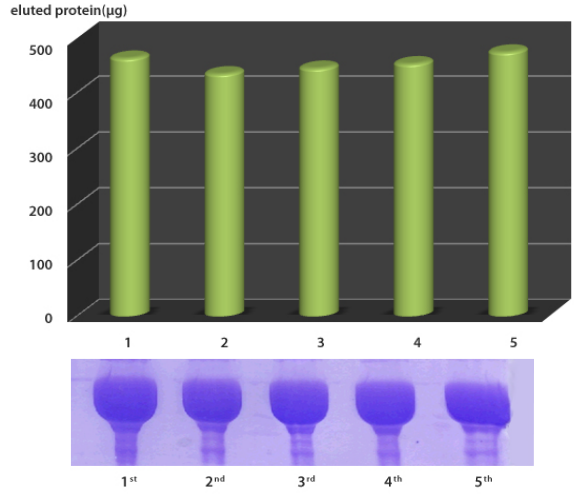


M: Molecular size marker(broad range), **Lane 1:** loading sample, **Lane 2:** Bioneer protein purification kit(K-7200), **Lane 3:** company A, **Lane 4:** company B, **Lane 5:** company C, **Lane 6:** company D



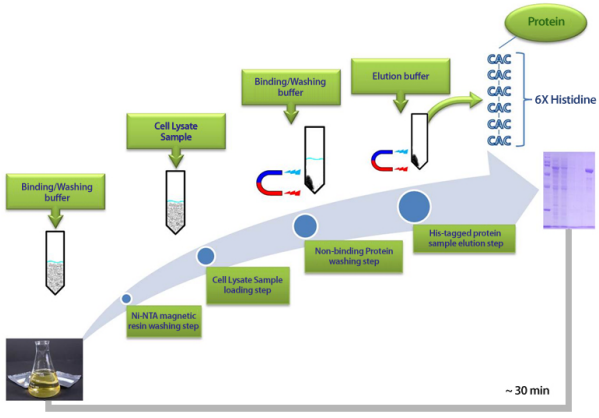
5.4. Reproducibility

In an experiment replicated five times, *AccuPrep*™ His-Tagged Protein purification kit showed consistent protein yield within ±4%.



6. Procedure

A small-scale purification process using *AccuPrep*™ His-Tagged Protein purification kit usually takes about 30 minutes starting from magnetic bead washing.



7. Product Components

Component	Size
Ni-NTA Magnetic silica resin	5 X 1 mL (10% slurry, v/v)
Binding/Washing buffer	100 mL
Elution buffer	15 mL
Neodymium magnet	3 ea
User's Guide	1 ea

8. Ordering Information

Cat No.	Product	size
TA-1010-1	Silica Magnetic Nanobeads, size 400nm	**0.5 g/25 ml**

9. Related Product Information

Cat No.	Product	size
K-7250	*AccuRapid*™ Cell-Free Protein Expression Kit	**45 ul x 24 reactions**
K-7300	*ExiProgen*™ EC Protein Synthesis Kit	**16 reactions**
K-7301	*ExiProgen*™ EC Protein Synthesis Kit	**32 reactions**
K-7302	*ExiProgen*™ EC Protein Synthesis Kit	**96 reactions**
D-2010	*AccuLadder*™ Protein Size Marker (Broad)	**500 ul**
D-2020	*AccuLadder*™ Protein Size Marker (Low)	**500 ul**
TA-1017-1	Ni-NTA Magnetic Beads, size 400nm	**0.5 g/25 ml**
TA-1018-1	Ni-IDA Magnetic Beads, size 400nm	**0.5 g/25 ml**

***AccuNanoBead*™ Ni-NTA Silica Magnetic Beads**

***AccuPrep*™ His-tagged Protein Purification Kit**

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