

## BcMag™ Cyanopropyl Magnetic Beads

### Introduction

BcMag™ Cyanopropyl magnetic Beads are ~ 1 µm uniform, silica-based, superpara-magnetic beads containing Cyanopropyl groups on their surface. The beads are specifically designed for quickly purifying, desalting and concentrating femtomolar to picomolar scale of very hydrophobic peptides or proteins that may be irreversibly retained on more hydrophobic C18 beads, manually or automatically without the need for laborious repeat of pipetting and centrifugation.

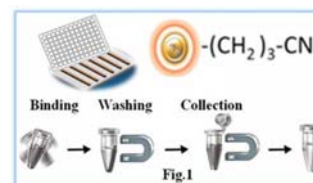
### Features and Advantages:

Quick, Easy and one-step high-throughput procedure; eliminates columns or filters, or laborious repeat of pipetting or centrifugation (Fig.1)

High binding capacity

Scalable - easily adjusts for sample size and automation

Reproducible results



### Product Characteristics

|                       |                                 |
|-----------------------|---------------------------------|
| Composition           | Silica-coated iron oxide        |
| Bead Size             | 1µm diameter                    |
| Number of Beads       | ~1.7 x 10 <sup>8</sup> beads/mg |
| Surface Area          | ~100 m <sup>2</sup> /g          |
| Magnetization         | ~40 EMU/g                       |
| Type of Magnetization | Superparamagnetic               |
| Effective Density     | 2.5 g/ml                        |
| Formulation           | Lyophilized Powder              |
| Binding Capacity      | >20 µg protein / mg of Beads    |
| Storage               | Store at 4°C upon receipt       |

### Note:

- To achieve maximum binding to the BcMag™ CYANOPROPYL Magnetic Beads, TFA (trifluoroacetic acid) or other ion-pairing agents should be between 0.1%–1.0% at a pH of <4. If samples contain excess organic solvents such as methanol or acetonitrile (ACN), the solvents should be completely removed. Samples can be dried in a vacuum evaporator and resuspended in sample buffer (below). To optimize binding, detergents in samples should be diluted with 0.1% TFA till SDS <0.1%, or Triton® <1%, or Tween® <0.5%.
- To avoid excessive beads drying between steps, the entire procedure should be carried out in a timely manner.
- The quantity of beads used in each individual application should be empirically titrated. We recommend use of 10 µl (0.5 mg) BcMag™ CYANOPROPYL Beads for binding of ~ 10 µg protein and 5µl elution buffer for 0.5 mg beads. The volumes can be scaled up or down accordingly.
- In order to get the best results, users are encouraged to determine the optimal working conditions based on the protocol and suggestions described in the Trouble shooting section

### 1. Materials Required

#### • Buffers

Equilibration buffer: 0.5% TFA (trifluoroacetic acid) in 5% ACN (acetonitrile)

Sample Binding Buffer: 2% TFA in 5% ACN

Washing buffer: 0.5 % TFA in 5% ACN

Elution Buffer: 70% ACN

#### • Magnetic Separator (for manual operation)

Based on sample volume, user can choose one of the following magnetic Separators: BcMag separator-2 for holding two individual 1.5 ml centrifuge tubes, Cat. No. MS-01; BcMag separator-6 for holding six individual 1.5 ml centrifuge tubes, Cat. No. MS-02; BcMag separator-24 for holding twenty-four individual 1.5 ml centrifuge tubes, Cat. No. MS-03; BcMag separator-50 for holding one 50 ml and one 15 ml centrifuge tube, Cat. No. MS-04

### 2.1 Magnetic Beads Preparation

- Suspend the magnetic beads with 50% Methanol (concentration of 50mg/ml), mix very well by vortex (store at 4°C if not used immediately)
- Transfer 10µl (50 mg/ml) of completely suspended magnetic beads to a microcentrifuge tube.



3. Place the tube onto a magnetic separator for 1-3 minutes until the supernatant is clear.
4. Aspirate and discard the supernatant with a pipette while the tube remains in the separator.
5. Remove the tube from the separator and resuspend the beads with 100  $\mu$ l Equilibration buffer.
6. Repeat steps 2 to 4 for three times.
7. Resuspend the beads with 10 $\mu$ l Equilibration buffer.

## 2.2 Sample Binding

1. Mix sample (~10 $\mu$ g protein/ peptide) with 1/3 volume of Sample Binding Buffer and add to the tube containing the washed beads from step 2.1.6.
2. Thoroughly mix beads and sample using a pipette and leave at room temperature for 2 minutes to allow proteins to bind to the beads.
3. Place the tube onto the magnetic separator for 1-3 minutes (no longer than 3 minutes) until the supernatant is clear. Aspirate and discard the supernatant with a pipette while the tube remains in the separator.
4. Remove the tube from the separator and resuspend the beads with 100 $\mu$ l washing buffer.
5. Place the tube onto the magnetic separator for 1-3 minutes until the supernatant is clear. Aspirate and discard the supernatant with a pipette while the tube remains in the separator.
6. Repeat steps 2 to 4 for four times.

## 2.3. Elution

1. Remove the tube from the separator, add 5 $\mu$ l elution buffer, resuspend the beads and incubate for 2 minutes at room temperature.
2. Place the tube on the magnetic separator for 1-3 minutes and transfer the supernatant containing the eluted protein to a new tube. (User should optimize elution conditions for individual proteins by adjusting acetonitrile concentrations, such as 20%, 50%, 80%).
3. For MALDI-MS analysis, mix 1 $\mu$ l of the eluate with 1 $\mu$ l of matrix solution and spot 0.5 $\mu$ l onto a MALDI-MS target plate.

## Troubleshooting

### Problem 1: Poor adsorption of proteins/Peptides to beads

Possible causes:

- Hydrophobic interaction is not strong enough.  
Suggestion: Increase the NaCl concentration (up to 0.2 M) used during adsorption
- Biomolecules not completely solubilized in the sample buffer.  
Suggestion: Use denaturing conditions during adsorption. Add Guanidine HCl to the sample to achieve a final concentration between 1– 6 M.
- Sample's chemical properties do not support hydrophobic interaction with reverse-phase beads.  
Suggestion: Choose suitable reverse phase beads for your sample.

### Problem 2: Poor elution from BcMag™ CYANOPROPYL Beads

Possible causes:

- Hydrophobic interaction is too strong  
Suggestion: Increase the acetonitrile concentration used during elution. Decrease the NaCl concentration used during adsorption
- Proteins/peptides are not readily soluble in organic solutions.  
Suggestion: Decrease the organic solvent concentration used during elution.
- Protein bound too tightly to beads.  
Suggestion: Choose more suitable reverse phase beads for your sample.

### Problem 3: Poor yield

Possible causes:

- The quantity of the proteins or peptide of interest in the sample is too low.  
Suggestion:
- If small sample quantities are used, decreasing the amount of beads used and volume of the elution buffer. An elution volume of 10 $\mu$ l acetonitrile per mg of beads is recommended
- Use larger amount of starting sample.