GE Healthcare
Life Sciences

Instructions 29-0271-82 AB **Multimodal media**

Capto™ adhere ImpRes

Capto adhere ImpRes is a multimodal BioProcess™ chromatography medium for polishing of monoclonal antibodies and other recombinant/native proteins by packed bed chromatography.

The combination of the high flow agarose used for all Capto products and the small particle size of Capto ImpRes results in good pressure-flow properties as well as impressive resolution. Capto adhere ImpRes provides:

- High resolution chromatography media on the well-established Capto ImpRes platform
- Innovative selectivity of the multimodal ligand
- Efficient design of robust and scalable polishing processes using convenient tools and formats
- High productivity enabling improved process economy

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Please read these instructions carefully before using Capto adhere ImpRes

Safety
For use and handling of the product in a safe way, please refer to the Safety Data Sheet.

1 BioProcess chromatography media

BioProcess chromatography media are developed and supported for production scale chromatography. All BioProcess chromatography media are produced with validated methods and are tested to meet manufacturing requirements. Secure ordering and delivery routines give a reliable supply of chromatography media for production scale. Regulatory Support Files (RSF) are available to assist process validation and submissions to regulatory authorities. BioProcess media cover all purification steps from capture to polishing.

2 Properties of Capto adhere ImpRes

Multimodal functionality

Capto adhere ImpRes has a ligand with multimodal functionality (see figure below). The multimodal functionality gives a different selectivity compared to traditional ion exchangers and also provides the possibility of operating in different regions with respect to pH and conductivity.

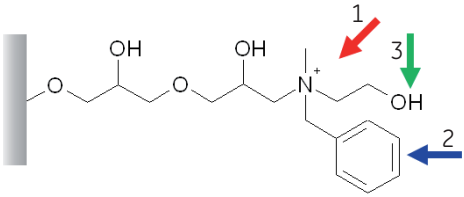

Fig 1. The Capto adhere ImpRes ligand exhibits many functionalities for interaction with a target molecule. The most pronounced are ionic interactions (1), hydrophobic interactions (2) and hydrogen bonding (3). The chromatography medium is designed for polishing, and is based on the high flow agarose base matrix with a small bead size, which gives good pressure-flow properties and high resolution.

Polishing

Capto adhere ImpRes is designed for post protein A polishing of monoclonal antibodies. Removal of leached protein A, aggregates, host cell proteins, nucleic acids and viruses from monoclonal antibodies is performed in either flow-through or bind-elute mode. In flow-through mode the antibody passes directly through the column while the contaminants are bound, while in bind-elute mode the high resolution of the small bead is utilized for separation of antibody monomer from contaminants during elution.

High flow velocities

In spite of the small bead size of Capto adhere ImpRes (average size is 40 µm), the rigid high flow agarose matrix allows high flow velocities (see figure below).

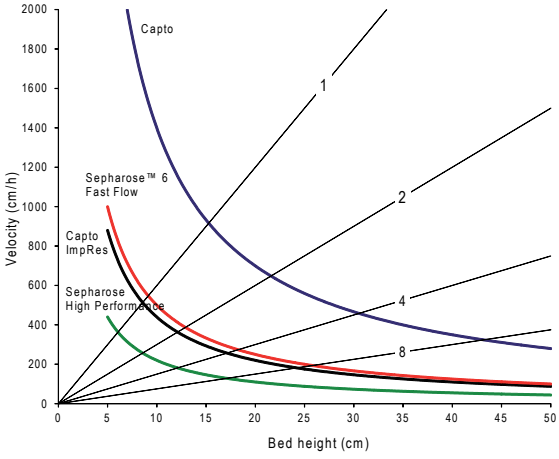

Fig 2. The highly rigid Capto ImpRes matrix allows a large window of operation (area below the curves) at large-scale. Data correspond to a 1 m diameter column at 20°C and viscosity equivalent to water. Gray contours (1, 2, 4, 8) give the residence time in the column in minutes.

Characteristics

The highly cross-linked agarose base matrix gives the medium high chemical and physical stability. Characteristics such as capacity, elution behavior and pressure/flow properties are unaffected by the solutions commonly used in process chromatography and cleaning procedures.

Table 1. Characteristics of Capto adhere ImpRes

Matrix	highly cross-linked agarose
Functional group	multimodal strong anion exchanger
Particle size (d_{50v}) [1]	36 to 44 µm
Total ionic capacity	0.08 to 0.11 mmol Cl^-/ml medium
Maximum flow velocity [2]	at least 220 cm/h in a 1 m diameter column with 20 cm bed height at 20°C using process buffers with the same viscosity as water at < 3 bar (0.3 MPa)
pH stability [3]	
Working range	3 to 12
Cleaning-in-place	2 to 14
Working temperature [4]	4°C to 30°C
Chemical stability [5]	All commonly used aqueous buffers, 1 M acetic acid, 1 M sodium hydroxide
Storage	4°C to 30°C in 20% ethanol
Regulatory support	Regulatory support file is available.

1 d_{50v} is the average particle size of the cumulative volume distribution.

2 The capacity for selective removal of some key contaminants may decrease at high flow velocity.

3 Working range: pH interval where the medium can be operated without significant change in function.
Cleaning-in-place: pH stability where the medium can be subjected to cleaning-in-place without significant change in function.

4 Capto adhere ImpRes can be used under cold-room conditions, but the capacity for some key contaminants may decrease.

5 No significant change in nitrogen and carbon content after 1 week storage in 1 M NaOH at 40°C.

3 Method design and optimization

Introduction

Aim

The aim of designing and optimizing a method for the separation of biomolecules is to identify conditions that promote binding of the highest amount of target molecule, in the shortest possible time with highest possible product recovery and purity. For optimization of binding conditions, pH and conductivity (salt concentration) should be screened.

Screening

When using Capto adhere ImpRes, protein binding can be expected at pH values lower than those used with traditional ion exchangers due to the contribution from non-electrostatic interactions. The multimodal nature of the ligand results in different interaction modes, electrostatic *versus* hydrophobic, depending on buffer conditions and target protein characteristics. A thorough screening of conditions is therefore strongly recommended on Capto adhere ImpRes in order to optimize conditions for binding and elution.

Workflow

The recommended workflow is described in the figure below. It starts with screening of conditions in high throughput formats, followed by optimization, preferably by applying Design of Experiments (DoE), in small columns and finally scale-up to large columns.

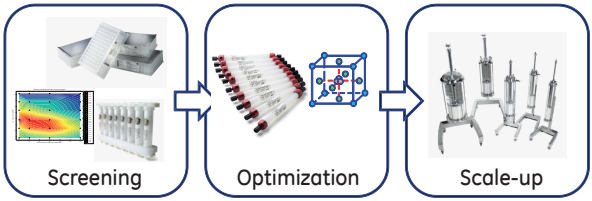

Fig 3. Recommended workflow during process development.

Prepacked chromatography media

Prefilled PreDictor™ plates or PreDictor RoboColumn™ are recommended for condition screening while prepacked HiScreen™ columns are recommended for optimization. Optimization in columns is preferentially done by using Design of Experiments (DoE). DoE can also be used to evaluate plate data, but often raw data analysis of plate data is enough to find conditions that can be used during optimization in packed bed. For experimental setup, data handling, analysis and evaluation of raw data from plates, the Assist software from GE Healthcare will be useful.

An example of screening and optimization of a bind-elute application on Capto adhere ImpRes is found in Application note *MAb polishing in Bind & Elute mode using Capto adhere ImpRes* (29-0273-38).

General purification protocol

Flowthrough mode	Bind-elute mode
• Adjust pH and conductivity of the sample to desired conditions • Equilibrate the column with starting buffer with the same pH and conductivity as the sample • Load the sample onto the column and collect the flowthrough fraction (sample in flowthrough) • Wash out unbound material with starting buffer and collect together with the flowthrough fraction • Regenerate the column at low pH[1] • If necessary, perform a clean-in-place (CIP) of the column	• Adjust pH and conductivity of the sample to desired conditions • Equilibrate the column with starting buffer with the same pH and conductivity as the sample • Load the sample onto the column • Wash out unbound material with starting buffer • Elute bound material and collect the elution fraction • Regenerate the column at low pH[1] • If necessary perform a clean-in-place of the column.

[1] e.g., 0.1 to 0.5 M acetic acid, pH 3.0

Sample preparation

Before sample loading, pH and conductivity of the sample should be adjusted to desired loading conditions. This is done either by buffer exchange or by direct adjustment of pH and conductivity. Buffers normally used for ion exchange chromatography can also be used for Capto adhere ImpRes (Table 2).

Table 2. Recommended buffers

pH interval	Buffer[1 2]	Concentration (mM)[3]
4 - 5.5	Acetate	20 – 100
3 – 6.5	Citrate	20 - 200
5.5 - 6.5	Bis-Tris	20 - 50
6 - 7.5	Phosphate	20 - 200
7.5 - 9	Tris	20 - 50
8.8 – 10.6	Glycin-NaOH	20 - 100

[1] The choice of buffer systems and salts may influence both yield and contaminant clearance.

[2] Buffers in the interval 5.5 – 8 will normally be most efficient for contaminant removal.

[3] Conductivity can be adjusted by addition of salt or by varying the buffer concentration.

Buffer exchange

For preparation of well-defined samples for optimization of loading conditions in lab scale, buffer exchange can easily be performed on HiPrep™ 26/10 desalting, using sample volumes up to 15 ml per column.

Conductivity and pH adjustment

For larger volumes of sample, sample preparation is preferably performed by diafiltration or directly by adjustment of pH and conductivity.

Equilibration of packed column

After packing, and before a purification run, equilibrate with at least 5 column volumes starting buffer or until the column effluent shows stable conductivity and pH values.

4 Column packing

Recommended columns

Column	Inner diameter (mm)	Bed volume [1]	Maximum Bed height (cm)
Lab scale			
Tricorn™ 5/100	5	2 ml	10
Tricorn 10/100	10	8 ml	10
HiScale™ 16/20	16	20 to 40 ml	20
HiScale 16/40	16	20 to 70 ml	35
HiScale 26/20	26	53 to 106 ml	20
HiScale 26/40	26	53 to 186 ml	35
HiScale 50/20	50	196 to 393 ml	20
HiScale 50/40	50	196 to 687 ml	35
Production scale			
AxiChrom™	50 to 200	0.2 to 12.5 l	40
AxiChrom [2]	300 to 1 000	7 to 314 l	40
BPG™ [3]	100 to 300	1 to 28 l	40
Chromaflow™ [4]	400 to 800	12 to 151 l	30

1 Bed volume range calculated from 10 cm bed height to maximum bed height.

2 Maximum bed height for AxiChrom 1000 is 20 cm.

3 Note that the pressure rating for BPG 450 is too low for Capto adhere ImpRes media.

4 Chromaflow columns with inner diameters >600 mm are not recommended for packing with Capto adhere ImpRes media. Maximum flow velocity for Chromaflow 600 is approximately 150 cm/h with 20 cm bed height at 20°C using process buffers with the same viscosity as water.

All large-scale columns can be supplied as variable bed height columns.

For practical instructions in good packing techniques, see the CD-ROM *Column Packing - The Movie* (18-1165-33).
For more details about packing HiScale columns, see instructions *HiScale columns (16, 26, 50) and accessories* (28-9674-70).
For information on packing of process scale columns, including appropriate packing solutions, please contact your local GE Healthcare representative.

Packing Tricorn columns

The following instructions are for packing Tricorn 5/100 and Tricorn 10/100 columns with a 10 cm bed height.

For more details about packing Tricorn columns, see the instructions *Tricorn Empty High Performance Columns* (28-4094-88).

Packing preparations

Materials

- Capto adhere ImpRes
- Plastic spoon or spatula
- Glass filter G4
- Vacuum suction equipment
- Filter flask
- Measuring cylinder
- Thin capillary
- 10 mM NaCl
- Tricorn 5/100 column, Tricorn Glass Tube 5/100 (to be used as packing tube), and Tricorn Packing Connector 5-5, or
- Tricorn 10/100 column, Tricorn Packing Equipment 10/100, which includes the 10-mm packing connector, 100-mm glass tube (to be used as packing tube).
- Bottom unit with filter holder, cap, and stop plug.

Equipment

ÄKTA™ systems, or a stand-alone pump such as Pump P-900, depending on the flow rate required, can be used for packing.

Equilibrate all materials to room temperature.

Washing the chromatography medium

Mount the glass filter funnel onto the filtering flask. Suspend the medium by shaking and pour into the funnel and wash according to the following instructions:

Step	Action
1	Wash 5 times with 5 ml 10 mM NaCl/ml chromatography medium.
2	Gently stir with a spatula between additions.
3	Move the washed medium from the funnel into a beaker and add 10 mM NaCl to obtain a 50% slurry concentration.

Preparing the packing slurry

Check the slurry concentration after settling overnight in a measuring cylinder or use the method for slurry concentration measurement described in Application note 28-9259-32. Tricorn columns can be packed with an excess of medium to be removed after packing.

Packing procedure

Main features

Table 3. Main features of the packing method.

	Tricorn 5/100	Tricorn 10/100
Slurry packing solution	10 mM NaCl	
Slurry concentration	50%	50%
Phase 1		
Packing velocity	2250 cm/h	2250 cm/h
Packing flow	7.4 ml/min	29.4 ml/min
Packing time	3 min	3 min
Phase 2		
Packing velocity	2250 cm/h	2250 cm/h
Packing flow	7.4 ml/min	29.4 ml/min
Packing time	20 min	20 min

Procedure

Step	Action
	Preparing packing
1	Assemble the column according to the column instructions *Tricorn Empty High Performance Columns*, code no 28-4094-88). For additional information, please visit Technical support at www.gelifesciences.com/tricorn.
2	Put a stop plug in the bottom of the column tube and pour the suspended media slurry (50%) into the top of the packing tube, filling both column tube and packing tube. Avoid formation of air bubbles in the medium by pouring it along a thin capillary.
3	Attach an extra bottom unit or an adapter unit to the top of the packing tube. Place a beaker beneath the column tube and connect a pump to the top of the packing unit. Remove the stop plug from the bottom of the column tube.
	Phase 1
4	Pack the media at 7.4 ml/min (Tricorn 5/100) or 29.4 ml/min (Tricorn 10/100) for 3 minutes.
5	When the medium is packed, switch off the pump, attach the stop plug into bottom of the column tube, disconnect the pump and remove the packing tube and packing connector. If necessary, remove excess medium by re-suspending the top of the packed bed and remove with a Pasteur pipette or spatula.
6	Fill up the column with the same solution that was used for packing the column.
7	Place a pre-wet filter on top of the solution in the column and gently push it into the column tube with the filter tool. ***Note:*** *Coarse filter should not be used with Capto adhere ImpRes.*
8	Prepare the adapter unit by screwing the guiding ring inside the adapter unit out to its outer rim and then turn it back 1.5 turns.

Step	Action
9	Wet the O-ring on the adapter unit by dipping it into water or buffer.
10	Screw the adapter unit onto the column tube, ensuring the inner part of the guiding ring fits into the slot on the column tube threads. Ensure that there are no trapped air bubbles.
11	Screw the adapter down to approximately 1 mm above the surface of the bed.
12	Connect the pump to the adapter unit. Remove the stop plug in the bottom of the column.
	Phase 2
13	Pack the media at 7.4 ml/min (Tricorn 5/100) or 29.4 ml/min (Tricorn 10/100) for 20 minutes. ***Note:*** *It is important to keep the time 20 minutes.*
14	Turn the adapter down to the bed surface (make sure not to compress the bed).
15	Switch off the pump, attach the stop plug into bottom of the column tube and disconnect the pump slowly.
16	Press the adapter lock down into the locked position.
17	Screw a stop plug into the adapter unit. The column is now ready to be used.

Testing the packed column

See section *Evaluation of column packing*.

Packing HiScale columns

Introduction

The following instructions are for packing HiScale 16/20, 16/40 and HiScale 26/20, 26/40, 50/20 and 50/40 with 10, 20 and 35 cm bed heights.

For more details about packing HiScale columns, see instructions *HiScale columns (16, 26, 50) and accessories* (28-9674-70).

Materials needed

- Capto adhere ImpRes
- HiScale column
- HiScale packing tube (depending on bed height)
- Plastic spoon or spatula
- Glass filter G4
- Vacuum suction equipment
- Filter flask
- Measuring cylinder
- 20% ethanol with 0.4 M NaCl

Equipment

ÄKTA systems, or a stand-alone pump such as Pump P-900, depending on the flow rate required, can be used for packing.

Equilibrate all materials to room temperature.

Definitions

The bed height of a gravity settled bed differs from the bed height of a bed settled at a given flow (consolidated). Therefore, the compression factor (CF) has to be separated from the packing factor (PF).

$L_{settled}$	Bed height measured after settling by gravity.
L_{cons}	Consolidated bed height Bed height measured after settling the medium at a given flow velocity.
L_{packed}	Packed bed height
CF	Compression factor CF = $L_{settled}/L_{packed}$
PF	Packing factor PF = L_{cons}/L_{packed}
A_C	Cross sectional area of the column
V_C	Column volume $V_C = L_{packed} \times A_C$
C_{slurry}	Concentration of the slurry

Preparation of the slurry

To measure the slurry concentration, let the medium settle in 20% ethanol at least overnight in a measuring cylinder or use the method for slurry concentration measurement described in application note 28-9259-32. This method can also be used for HiScale columns.

Washing the medium

Mount a glass filter funnel onto a filtering flask. Suspend the medium by shaking and pour into the funnel and wash according to the following instructions:

- 5 times with 5 ml 20% ethanol, 0.4 M NaCl/ml chromatography medium
- Gently stir with a spatula between additions
- Move the washed medium from the funnel into a beaker and add 20% ethanol, 0.4 M NaCl to obtain a 50% slurry concentration.

Packing parameters

Table 4. Main features of the packing method for HiScale 16/20 and HiScale 16/40

Product	HiScale 16/20	HiScale 16/40	
Bed height (cm)	10	20	35
Slurry/ packing solution	20% ethanol with 0.4 M NaCl		
Slurry concentration (%)	50	50	50
Packing factor (PF)	1.12	1.12	1.09
Packing velocity (cm/h)	600	500	350
Packing flow rate (ml/min)	20.1	16.7	11.7
Flow condition (cm/h)	600	500	350
Flow condition (ml/min)	20.1	16.7	11.7

Table 5. Main features of the packing method for HiScale 26/20 and HiScale 26/40

Product	HiScale 26/20	HiScale 26/40	
Bed height (cm)	10	20	35
Slurry/ packing solution	20% ethanol with 0.4 M NaCl		
Slurry concentration (%)	50	50	50
Packing factor (PF)	1.12	1.12	1.09
Packing velocity (cm/h)	600	500	350
Packing flow rate (ml/min)	53.0	44.2	31.0

Table 6. Main features of the packing method for HiScale 50/20 and HiScale 50/40

Product	HiScale 50/20	HiScale 50/40	
Bed height (cm)	10	20	35
Slurry/ packing solution	20% ethanol with 0.4 M NaCl		
Slurry concentration (%)	50	50	50
Packing factor (PF)	1.12	1.12	1.09
Packing velocity (cm/h)	600	500	350
Packing flow rate (ml/min)	196.3	163.5	114.5

Packing procedure

Step	Action
1	Assemble the column according to the column instructions (*HiScale columns (16, 26, 50) and accessories*, code no 28-9674-70).
2	Mount the column tube in a stand.
3	Connect the bottom adapter unit to the pump or a syringe and prime the bottom net with a slow flow of packing solution. This is easiest done if the nets are dry, but if air is trapped under the net it can be removed by a light suction with a syringe.
4	Mount the bottom adapter unit in the bottom of the column tube and tighten the O-ring.
5	Fill the column with approximately 1 cm packing liquid using the pump/syringe. Disconnect the pump/syringe and put a stop plug on the outlet.
6	Mount the packing tube on top of the column tube.
7	Connect the top adapter to the pump and prime it with a slow downward flow. The net needs to be facing the roof as this is done. If air is trapped under the net it can be removed by a light suction with a syringe

Step	Action
8	Fill the column with slurry suspended in packing solution. If needed, top up the slurry with extra packing solution so the top adapter dips into the slurry to avoid air under the net.
9	Mount the top adapter unit on top of the packing tube. Tighten the O-ring firmly and remove the bottom stop plug.
10	Start a downward flow with packing velocity according to Tables in Section *Packing parameters*.
11	Let the flow run until the bed has consolidated.
12	Use the scale on the column to measure the bed height. There might be a build up of media at the column wall after the bed is consolidated and to easier see where the top of the bed is, a light source can be used.
13	Calculate the final bed height by dividing the consolidated bed height with the desired packing factor. $L_{packed} = L_{cons}/PF$. See Tables in Section *Packing parameters*.
14	Turn off the flow and put a stop plug in the bottom.
15	Dismount the top adapter from the packing tube.
16	Over a beaker or a sink, detach the packing tube from the column.
17	Remount the top adapter in the column tube. Make sure no air is trapped under the net and lower the adapter down to 1 to 2 cm above the bed, making sure the surface is not disturbed.
18	Tighten the O-ring on the adapter. Remove the bottom stop plug and carefully start turning the end cap down. While spilling out liquid through the bottom, proceed turning until the calculated final bed height is reached.
19	Make sure that the pressure peaks that occur during turning the end knob down do not exceed the pressure specifications of the media.

Step	Action
20	HiScale 26 or HiScale 50 columns are now ready to be tested. For HiScale 16 flow conditioning should be performed. Start a downward flow to flow condition the bed. The flow rate is shown in Table 4 in Section *Packing parameters*. Let the flow run for about 30 minutes. The HiScale 16 column is now ready to be tested.

Testing the packed column

See Section *Evaluation of column packing*.

5 Evaluation of column packing

Intervals

Test the column efficiency to check the quality of packing. Testing should be done immediately after packing and at regular intervals during the working life of the column and also when separation performance is seen to deteriorate.

Column efficiency testing

The best method of expressing the efficiency of a packed column is in terms of the height equivalent to a theoretical plate (HETP) and the asymmetry factor (A_s). These values are easily determined by applying a sample such as 1% acetone solution to the column. Sodium chloride can also be used as a test substance. Use a concentration of 0.8 M NaCl in water as sample and 0.4 M NaCl in water as eluent.

For more information about column efficiency testing, consult the application note *Column efficiency testing* (28-9372-07).

Note: *The calculated plate number will vary according to the test conditions and it should only be used as a reference value. It is important that test conditions and equipment are kept constant so that results are comparable. Changes of solute, solvent, eluent, sample volume, flow velocity, liquid pathway, temperature, etc. will influence the results.*

Sample volume and flow velocity

For optimal results, the sample volume should be approximately 1% of the column volume and the flow velocity 30 cm/h. If an acceptance limit is defined in relation to column performance, the column plate number can be used as one of the acceptance criteria for column use.

Method for measuring HETP and A_S

Calculate HETP and A_S from the UV curve (or conductivity curve) as follows:

$$HETP = \frac{L}{N}$$

$$N = 5.54 \times \left(\frac{V_R}{W_h}\right)^2$$

L = bed height (cm)

N = number of theoretical plates

V_R = volume eluted from the start of sample application to the peak maximum

W_h = peak width measured as the width of the recorded peak at half of the peak height

V_R and W_h are in the same units

The concept of reduced plate height is often used for comparing column performance.

The reduced plate height, h, is calculated as follows:

$$h = \frac{HETP}{d_{50v}}$$

d_{50v} = mean diameter of the beads (cm)

As a guideline, a value of < 3 is very good.

The peak should be symmetrical, and the asymmetry factor as close to 1 as possible (a typical acceptable range could be $0.8 < A_S < 1.8$).

A change in the shape of the peak is usually the first indication of bed deterioration due to excessive use.

Peak asymmetry factor calculation:

$$A_s = \frac{b}{a}$$

a = ascending part of the peak width at 10% of peak height

b = descending part of the peak width at 10% of peak height

The Figure below shows a UV trace for acetone in a typical test chromatogram from which the HETP and A_s values are calculated.

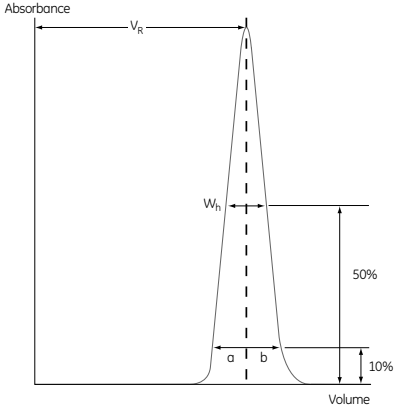

Fig 4. A typical test chromatogram showing the parameters used for HETP and A_s calculations.

6 Maintenance

For best performance of Capto adhere ImpRes over a long working life time, follow the procedures described below.

Cleaning-In-Place

Cleaning-In-Place (CIP) is a procedure that removes contaminants such as lipids, endotoxins, nucleic acids and precipitated or denatured proteins that remain in the packed column after regeneration. Regular CIP prevents the building-up of contaminants in the medium bed and helps to maintain the capacity, flow properties and general performance of Capto adhere ImpRes.

CIP is normally recommended after each cycle. A specific CIP protocol should be designed for each process according to the type of contaminants present. The frequency of CIP depends on the nature and the condition of the feedstock.

CIP protocols

Precipitated hydrophobically bound proteins or lipoproteins	Wash with at least 3 column volumes 1 M NaOH at a low flow velocity with reversed flow direction. Contact time at least 15 min.
Ionically bound proteins	Wash with 0.5 to 2 column volumes of 2 M NaCl with reversed flow direction.
Lipids and very hydrophobic proteins	Wash with 1-propanol 1 to 5% or isopropanol 5 to 30%. 1-propanol has a higher flash point and might be preferred in an industrial environment.
Nucleic acids	Wash with 0.1 M acetate, pH 3 for 2 to 5 column volumes followed by buffer at neutral pH for 1 to 2 column volumes. Then wash with at least 3 column volumes 1 M NaOH at a low flow velocity with reversed flow direction. Contact time 15 min.

Sanitization

To reduce microbial contamination in the packed column, sanitization using 0.5 to 1 M NaOH with a contact time of 1 hour is recommended. The CIP protocol for precipitated, hydrophobic bound proteins or lipoproteins removes bound contaminants and sanitizes the chromatography medium effectively.

Storage

Store chromatography medium in the container at a temperature of 4°C to 30°C. Ensure that the screw top is fully tightened. Packed columns should be equilibrated in 20% ethanol to prevent microbial growth. After storage, equilibrate with at least 5 column volumes of starting buffer before use.

7 Ordering information

Product	Quantity	Code No
Capto adhere ImpRes	25 ml	17-3715-01
	100 ml	17-3715-02
	1 l	17-3715-03
	5 l	17-3715-04
	10 l	17-3715-05

Related product	Quantity	Code No
HiTrap™ Capto adhere ImpRes	5 × 1 ml	17-3715-10
HiScreen Capto adhere ImpRes	1 × 4.7 ml	17-3715-20
PreDictor Capto adhere ImpRes, 6 µl	4 × 96-well filter plates	17-3715-30
PreDictor Capto adhere ImpRes, 20 µl	4 × 96-well filter plates	17-3715-31
PreDictor RoboColumn Capto adhere ImpRes, 200 µl	One row of eight columns	17-3715-40
PreDictor RoboColumn Capto adhere ImpRes, 600 µl	One row of eight columns	17-3715-41
Assist 1.2 Software package		28-9969-17

Related prepacked product	Quantity	Code No
HiTrap MabSelect SuRe	5 × 1 ml	11-0034-93
HiTrap MabSelect SuRe	5 × 5 ml	11-0034-95
HiPrep 26/10 Desalting	1 × 53 ml	17-5087-01
HiPrep 26/10 Desalting	4 × 53 ml	17-5087-02

Related empty column	Quantity	Code No
Tricorn 5/100 column	1	18-1163-10
Tricorn 10/100 column	1	18-1163-15
HiScale 16/20	1	28-9644-41
HiScale 16/40	1	28-9644-24
HiScale 26/20	1	28-9645-14
HiScale 26/40	1	28-9645-13
HiScale 50/20	1	28-9644-45
HiScale 50/40	1	28-9644-44

Related literature		Code No
Data file	Capto adhere ImpRes	29-0344-97
Application note	MAb polishing in Bind & Elute mode using Capto adhere ImpRes	29-0273-38

For local office contact information, visit
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