

INSTRUCTION MANUAL

SERVA *BluePrep* CBD Micro Kit

(Cat. No. 42070.01)

(Cat. No. 42071.01)



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Contents

| | |
|---|-----------|
| 1. SERVA <i>BluePrep</i> CBD Micro Kit | 3 |
| 1.1. Kit Components | 3 |
| 1.2. Specifications | 4 |
| 1.3. Storage Conditions and Product Stability | 4 |
| 2. Procedure | 5 |
| 2.1. CBD Protocol for Acidic Proteins | 5 |
| 2.1.2. Sample Preparation | 6 |
| 2.1.3. Column Activation | 7 |
| 2.1.4. Protein Binding | 7 |
| 2.1.5. Column Wash | 7 |
| 2.1.6. Protein Elution | 8 |
| 2.2. CBD Protocol for Basic Proteins | 8 |
| 2.2.1. Sample Preparation | 9 |
| 2.2.2. Column Activation | 9 |
| 2.2.3. Protein Binding | 10 |
| 2.2.4. Column Wash | 10 |
| 2.2.5. Protein Elution | 10 |
| 3. Troubleshooting Guide | 12 |
| 4. Appendix | 13 |
| 5. Ordering Information | 15 |

Vers. 04/09

1. SERVA *BluePrep* CBD Micro Kit

The SERVA *BluePrep* CBD (concentration, buffer exchange and desalting) Micro Kit provides a fast and simple procedure for concentrating small volumes of dilute protein solutions, for buffer exchange, and for removing different types of salts from protein samples. The kit is highly efficient in removing many different salts commonly used in the laboratory including, but not limited to, MgCl₂, NaCl, KCl, CaCl₂, LiCl and CsCl. The simultaneous removal of salts while concentrating a dilute protein solution makes the kit a convenient method for preparing proteins before running many downstream applications such as SDS-PAGE, isoelectric focusing, X-ray crystallography, NMR spectroscopy, mass spectroscopy and other applications.

The CBD Micro Kit contains solutions for the processing of both acidic and basic protein samples. Each spin column is able to concentrate and desalt up to 50 µg of acidic or basic proteins.

1.1. Kit Components

| Component | Product 42070.01 (25 reactions) | Product 42071.01 (50 reactions) |
|--------------------------------------|------------------------------------|------------------------------------|
| Column Equilibration and Wash Buffer | 30 mL | 60 mL |
| Column Activation and Wash Buffer | 30 mL | 60 mL |
| pH Binding Buffer | 3 mL | 6 mL |
| pH Binding Buffer | 3 | 6 mL |
| Elution Buffer | 4 mL | 8 mL |
| Neutralizer | 1 mL | 1 mL |
| Micro Spin Columns | 25 | 50 |
| Collection Tubes | 25 | 50 |
| Elution tubes (1.7 mL) | 25 | 50 |

1.2. Specifications

| Maximum Protein Input | 50 µg |
|------------------------------|------------|
| Protein Recovery | Up to 99 % |
| Minimum Elution Volume | 30 µL |
| Column Binding Capacity | 50 µg |
| % Salt Removal | Up to 99 % |
| Volume Concentration Factor | Up to 100x |
| Time to Process 12 Reactions | 20 minutes |

1.3. Storage Conditions and Product Stability

If stored at the recommended temperature, the kit components are at least useable until: see expiry date on label. Once opened, all solutions, except for the two binding buffers, should be stored at 4 °C when not in use. The binding buffers should remain at room temperature with the lids tightly closed. Salt crystal formation may occur when stored at 4 °C. If crystals are visible, bring the entire bottle to room temperature and mix gently to redissolve.

Precautions and Disclaimers

This kit is designed for research purposes only. It is not intended for human or diagnostic use.

Ensure that a suitable lab coat, disposable gloves and protective goggles are worn when working with chemicals. For more information, please consult the appropriate Material Safety Data Sheets (MSDSs).

Customer-Supplied Reagents and Equipment

- Benchtop microcentrifuge
- pH indicator paper
- Micropipettors
- Other elution buffers (optional)

2. Procedure

The CBD Micro Kit comes with solutions for concentrating and desalting both acidic and basic proteins. Two procedures, one for acidic proteins and another for basic proteins, are described. Proteins with isoelectric points (pI) of less than 7 are by definition acidic proteins. However, for purposes of using the kit, the protocol for acidic proteins applies to any protein whose pI is less than 8.0. Proteins with pI higher than 8.0 are purified using the protocol for basic proteins. If the pI of the protein being purified is not known, the theoretical pI may be calculated using the web-based applications at http://us.expasy.org/tools/pi_tool.html.

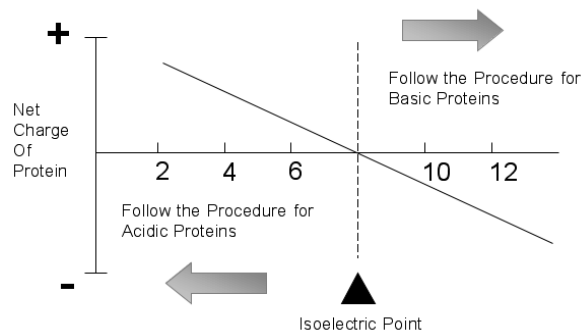


Figure 1. Choosing a procedure based on the isoelectric point (pI).

2.1. CBD Protocol for Acidic Proteins

Proteins with an isoelectric point (pI) of less than 7 are by definition acidic proteins. However, for the purposes of using this kit, the Protocol for Acidic Proteins applies to any protein whose pI is less than 8.0

All centrifugation steps are carried out at 14,000 x g in a benchtop microcentrifuge. Performance of this kit is not affected by temperature, and thus the procedure may be performed at room temperature, 4 °C, or on ice. The user must take discretionary measures, such as chilling samples in ice, to preserve biological activity.

Notes Before Use:

- Ensure that all particulates in your sample have been removed by either filtration or centrifugation prior to starting the procedure
- The column reservoir has a capacity of 650 μ L; hence multiple centrifugations will be required for larger volumes.

2.1.2. Sample Preparation

This step ensures that the protein solution is at the proper pH for column binding.

- a. Obtain protein sample. If particulates are present, clarify the sample through either filtration or centrifugation.
- b. Determine the pH and volume of the protein sample.
- c. Adjust the pH of the protein sample to 4.5 using the **pH Binding Buffer (Acidic)**. The amount of **pH Binding Buffer (Acidic)** required will depend on the starting protein solution. If the starting protein solution is in water, then add one part of the **pH Binding Buffer (Acidic)** to 50 parts of the protein solution. However, if the starting protein solution already contains a buffer, a greater volume of **pH Binding Buffer (Acidic)** may be needed depending on the sample's buffer type and strength, as well as the type of protein. Table 1 below serves only as a guideline for the amount of **pH Binding Buffer (Acidic)** to add for every milliliter of a protein solution in a 100 mM buffer to obtain pH 4.5. Please check the pH after mixing and add more **pH Binding Buffer (Acidic)** if necessary to obtain the desired pH.

Note: If the protein solution is already at the desired pH or lower, **pH Binding Buffer (Acidic)** does not need to be added.

Table 1. pH Adjustment for Acidic Proteins

| Starting pH of Solution | Volume of pH Binding Buffer (Acidic) per mL of protein solution (based on 100 mM buffered solution) |
|--------------------------------|--|
| 5, 6, 7 | 20 μ L |
| 8 | 50 μ L |
| 9, 10, 11 | 80 μ L |
| 12 | 100 μ L |

- d. Mix contents well, and measure the pH. Further adjust the pH if necessary.
- e. Set aside until the Protein Binding step.

2.1.3. Column Activation

- a. Assemble a spin column with a provided collection tube. Open the cap on the column.
- b. Apply 250 μL of **Column Activation and Wash Buffer (Acidic)** to the column and close the cap.
- c. Centrifuge for one minute and discard the flowthrough.
- d. Repeat steps **b** and **c** to complete the column activation step.

2.1.4. Protein Binding

- a. Apply a maximum of 650 μL of protein solution (from the Sample Preparation step) onto the column and centrifuge for one minute.
- b. Discard the flowthrough. Reassemble the spin column with its collection tube.

Note: If desired, the flowthrough can be saved in a fresh tube for assessing your protein's binding efficiency.

- c. Depending on your sample volume, repeat steps **a** and **b** until the entire protein sample has been applied to the column.
- d. Discard any remaining flowthrough and reassemble the spin column with its collection tube.

2.1.5. Column Wash

- a. Apply 250 μL of **Column Activation and Wash Buffer (Acidic)** to the column and centrifuge for one minute.
- b. Discard the flowthrough and reassemble the spin column with its collection tube.
- c. Add another 250 μL of **Column Activation and Wash Buffer (Acidic)** to the column and centrifuge for one minute.
- d. Inspect the column and ensure that the liquid has passed through into the collection tube. There should be no liquid in the column. If necessary, spin for an additional minute to dry.

2.1.6. Protein Elution

The supplied Elution Buffer consists of 50 mM sodium phosphate pH 12.5. In order to perform buffer exchange or to elute in a salt-free solution, please consult Appendix (Optional Elution Buffers) for a list of alternative elution solutions that have been tested with the kit.

- a. Add 5 μ L **Neutralizer** to a provided 1.7 mL elution tube.
- b. Transfer the spin column from the Column Wash procedure into the elution tube.
- c. Apply 25 μ L of **Elution Buffer** to the column and centrifuge for one minute to elute the bound protein.
- d. Add another 25 μ L of **Elution Buffer** and centrifuge for one minute into the same microcentrifuge tube.

Note: Approximately 95 % of bound protein is recovered in the first two elutions. If desired, a third elution using 50 μ L of **Elution Buffer** may be carried out. This should be collected into a different tube (to which 5 μ L of **Neutralizer** is pre-added) to prevent dilution of the first two elutions.

Protein samples are now ready for downstream applications.

2.2. CBD Protocol for Basic Proteins

Proteins with an isoelectric point (pI) of less than 7 are by definition acidic proteins. However, for the purposes of using this kit, the Protocol for Acidic Proteins applies to any protein whose pI is less than 8.0. Proteins with a pI higher than 8.0 are purified using the Protocol for Basic Proteins.

All centrifugation steps are carried out at 14,000 x g in a benchtop microcentrifuge. Performance of this kit is not affected by temperature, and thus the procedure may be performed at room temperature, 4 °C, or on ice. The user must take discretionary measures, such as chilling samples in ice, to preserve biological activity.

Notes Before Use:

- Ensure that all particulates in your sample have been removed by either filtration or centrifugation prior to starting the procedure
- The column reservoir has a capacity of 650 μ L; hence multiple centrifugations will be required for larger volumes

2.2.1. Sample Preparation

This step ensures that the protein solution is at the proper pH for column binding.

- a. Obtain protein sample. If particulates are present, clarify the sample through either filtration or centrifugation.
- b. Determine the pH and volume of the protein sample.
- c. Adjust the pH of the protein sample to 7.0 using the **pH Binding Buffer (Basic)**. The amount of **pH Binding Buffer (Basic)** required will depend on the starting protein solution. If the starting protein solution is in water, then add one part of the **pH Binding Buffer (Basic)** to 50 parts of the protein solution. However, if the starting protein solution already contains a buffer, a greater volume of **pH Binding Buffer (Basic)** may be needed depending on the sample's buffer type and strength, as well as the type of protein. Table 2 below serves only as a guideline for the amount of **pH Binding Buffer (Basic)** to add for every milliliter of a protein solution in a 100 mM buffer to obtain pH 7.0. Please check the pH after mixing and add more **pH Binding Buffer (Basic)** if necessary to obtain the desired pH.

Table 2. pH Adjustment for Basic Proteins

| Starting pH of Solution | Volume of pH Binding Buffer (Basic) per mL of protein solution (based on 100 mM buffered solution) |
|-------------------------|--|
| 4 | 150 μ L |
| 5, 6 | 80 μ L |
| 8, 9, 10 | 60 μ L |
| 11, 12 | 80 μ L |

- d. Check the pH after mixing and add more **pH Binding Buffer (Basic)** if necessary to return the solution to a pH of 7.0.
- e. Set aside until the Protein Binding step.

2.2.2. Column Activation

- a. Assemble a spin column with a provided collection tube. Open the cap on the column.
- b. Apply 250 μ L of **Column Activation and Wash Buffer (Basic)** to the column and close the cap.
- b. Centrifuge for one minute and discard the flowthrough.
- c. Repeat steps **b** and **c** to complete the column activation step.

2.2.3. Protein Binding

- a. Apply a maximum of 650 μL of protein solution (from the Sample Preparation step) onto the column and centrifuge for one minute.
- b. Discard the flowthrough. Reassemble the spin column with its collection tube.

Note: If desired, the flowthrough can be saved in a fresh tube for assessing your protein's binding efficiency.

- c. Depending on your sample volume, repeat steps **a** and **b** until the entire protein sample has been applied to the column.
- d. Discard any remaining flowthrough and reassemble the spin column with its collection tube.

2.2.4. Column Wash

- a. Apply 250 μL of **Column Activation and Wash Buffer (Basic)** to the column and centrifuge for one minute.
- b. Discard the flowthrough and reassemble the spin column with its collection tube.
- c. Add another 250 μL of **Column Activation and Wash Buffer (Basic)** to the column and centrifuge for one minute.
- d. Inspect the column and ensure that the liquid has passed through into the collection tube. There should be no liquid in the column. If necessary, spin for an additional minute to dry.

2.2.5. Protein Elution

The supplied Elution Buffer consists of 50 mM sodium phosphate pH 12.5. In order to perform buffer exchange or to elute in a salt-free solution, please consult Appendix (Optional Elution Buffers) for a list of alternative elution solutions that have been tested with the kit.

- a. Add 5 μL **Neutralizer** to a provided 1.7 mL elution tube.
- b. Transfer the spin column from the Column Wash procedure into the elution tube.
- c. Apply 25 μL of **Elution Buffer** to the column and centrifuge for one minute to elute the bound protein.
- d. Add another 25 μL of **Elution Buffer** and centrifuge for one minute into the same microcentrifuge tube.

Note: Approximately 95 % of bound protein is recovered in the first two elutions. If desired, a third elution using 50 μ L of Elution Buffer may be carried out. This should be collected into a different tube (to which 5 μ L of Neutralizer is pre-added) to prevent dilution of the first two elutions.

Protein samples are now ready for downstream applications.

3. Troubleshooting Guide

| Problem | Possible Cause | Solution and Explanation |
|---|---|--|
| Protein solution does not flow through the column | Centrifugation speed was too low. | Check the centrifuge and ensure that it is capable of generating 14,000 x g. Sufficient centrifugal force is required to push the liquid through the column. |
| | Inadequate spin time. | Spin an additional minute to ensure that the liquid is able to flow completely through the column. |
| | Protein solution is too viscous. | Dilute the protein solution and adjust the pH to either 4.5 or 7 with the appropriate pH Binding Buffer. Highly viscous materials due to high protein concentrations can slow down flow rate significantly. |
| | Cellular debris is present in the protein solution. | Prior to the sample preparation step, filter the sample with a 0.45 μ M filter or spin down insoluble materials. Solid, insoluble materials can cause severe clogging problems. |
| | Protein solution is not completely dissolved. | Dissolve the sample in a larger amount of buffer. Solid, insoluble materials can cause clogging problems. |
| Poor peptide recovery | Initial volume of sample applied to the column was too low. | Load at least 100 μ L onto the column. This volume ensures that the entire bed is covered sufficiently. |
| | Incorrect procedure was used. | Ensure that the acidic protocol was used for acidic proteins and the basic protocol was used for basic proteins. It is known that when basic proteins are bound with the acidic protocol, elution is inefficient because the basic proteins are bound too tightly. |
| | Incorrect pH adjustment of sample. | Ensure that the pH of the starting protein sample is 4.5 for acidic proteins and 7.0 for basic proteins. |
| | Protein may have precipitated prior to loading onto the column. | If the pH of the protein solution is the same as the pI of the protein(s), precipitation may occur. In this case, adjust the pH of the sample to at least 1 pH unit lower than the pI of your protein. |
| Eluted protein is degraded | Eluted protein was not neutralized. | Add 5 μ L of Neutralizer to each 50 μ L of eluted protein in order to adjust the pH to neutral. Some proteins are sensitive to high pH, such as the elution buffer at pH 12.5. |
| | Proteases may be present. | Use protease inhibitors during all steps of the Sample Preparation. |
| | Bacterial contamination of protein solution. | Prepare the protein sample with 0.015% sodium azide. The elution buffer already contains sodium azide. |
| | Eluted protein was not neutralized quickly enough. | If eluted protein is not neutralized immediately, degradation will occur. We strongly recommend adding Neutralizer in order to lower the pH. |

4. Appendix

Optional Elution Buffers

Proteins bound to the spin columns are eluted through pH-dependent mechanisms. The efficiency of protein elution depends on high pH above the pI of the protein to be purified. The pH of the elution buffer chosen must be at least one unit higher than the pI of the protein of interest. Solutions not provided with the SERVA *BluePrep* CBD Micro Kit may be utilized if they are more appropriate for your needs. The table below lists optional elution buffers and their observed efficiency when BSA is used as a test protein.

| Elution Buffers | Approximate Protein Recovery |
|---|-------------------------------------|
| 50 mM ammonium hydroxide (approximate pH 11) | 70 % |
| 250 mM ammonium hydroxide (approximate pH 11) | 70 % |
| 1 M ammonium hydroxide (approximate pH 11) | 90 % |
| 1 M ethanolamine (approximate pH 9) | 70 – 80 % |
| 50 mM sodium phosphate (approximate pH 12.5) | 95 % |
| 500 mM sodium phosphate (approximate pH 12.5) | <70 % |
| 100 mM sodium borate (approximate pH 12.5) | 95 -100 % |
| 1 M Tris (approximate pH 12.5) | 95 % |

5. Ordering Information

| Product | Size | Cat. No. |
|---|--------------|-----------------|
| SERVA <i>BluePrep</i> CBD Micro Kit | 25 reactions | 42070.01 |
| SERVA <i>BluePrep</i> CBD Micro Kit | 50 reactions | 42071.01 |
| SERVA <i>BluePrep</i> CBD Macro Kit | 4 reactions | 42072.01 |
| SERVA <i>BluePrep</i> DetergentEx Micro Kit | 25 reactions | 42073.01 |
| SERVA <i>BluePrep</i> DetergentEx Micro Kit | 50 reactions | 42074.01 |
| SERVA <i>BluePrep</i> DetergentEx Macro Kit | 4 reactions | 42075.01 |
| SERVA <i>BluePrep</i> Major Serum Protein Removal Kit | 25 reactions | 42079.01 |
| SERVA <i>BluePrep</i> Urine Concentration Micro Kit | 25 reactions | 42080.01 |
| SERVA <i>BluePrep</i> Urine Concentration Macro Kit | 4 reactions | 42081.01 |
| SERVA <i>BluePrep</i> Protein EndotoxinEx Micro Kit | 20 reactions | 42085.01 |
| SERVA <i>BluePrep</i> Protein EndotoxinEx Macro Kit | 4 reactions | 42086.01 |
| SERVA <i>BluePrep</i> IB Isolation Micro Kit | 20 reactions | 42076.01 |
| SERVA <i>BluePrep</i> IB Isolation Micro Kit | 50 reactions | 42077.01 |
| SERVA <i>BluePrep</i> IB Isolation Macro Kit | 4 reactions | 42078.01 |
| SERVA <i>BluePrep</i> ON-Column Digest Kit | 25 reactions | 42082.01 |
| SERVA <i>BluePrep</i> 2in1 Purification Kit | 20 reactions | 42088.01 |
| SERVA <i>BluePrep</i> 3in1 Purification Kit | 20 reactions | 42087.01 |
| SERVA <i>BluePrep</i> 4in1 Purification Kit | 20 reactions | 42089.01 |
| SERVAB <i>BluePrep</i> IB Solvent | 25 ml | 42083.01 |
| SERVAB <i>BluePrep</i> IB Solvent | 100 ml | 42083.02 |
| SERVAB <i>BluePrep</i> Cell Lysis Reagent | 100 ml | 42084.01 |
| SERVAB <i>BluePrep</i> Cell Lysis Reagent | 500 ml | 42084.02 |