

## CM Persefose FF

### 1. Basic product information

CM Persefose FF is a weak cation-exchange chromatography resin that takes advantage of the differences in the nature and magnitude of charge of different molecules under specific conditions to separate them. This chromatographic resin can be used successfully for the separation and purification of various biological molecules such as recombinant proteins, antibodies, nucleic acids, viruses and virus-like particles, and polysaccharides.

CM Persefose FF has superior scale-up performance:

- (1) The highly cross-linked agarose matrix has excellent rigidity, so it can achieve high process flow rate under low back pressure and improve process efficiency.
- (2) Through chemical modification, it has high chemical compatibility and is resistant to cleaning-in-place (CIP) such as when using sodium hydroxide.

### 2. Chromatography resin parameters

Resin type	Weak cation exchange
Functional group	$-\text{O}-\text{CH}_2\text{COO}^-$
Matrix	Highly cross-linked agarose
Median particle size	90 $\mu\text{m}$
Total ionic capacity	0.09– 0.13 mmol $\text{H}^+$ /ml
Dynamic binding capacity	>50 mg lysozyme/ml*
Recommended flow rate	300–600 cm/h
Maximum flow rate	700 cm/h
Maximum working pressure	3 bar
Working temperature	4–30°C

\*Measurement conditions of dynamic binding capacity: packing height, 10 cm; test flow rate, 300 cm/h; test buffer, 20 mM sodium phosphate, pH 7.2; test sample, 4 mg/ml lysozyme, when lysozyme breakthrough reaches 10% of the starting concentration.

### 3. Chemical resistance

pH stability*	2–14
Chemical stability	All commonly used aqueous buffers, 30% isopropanol**, 75% ethanol**, 1M NaOH, 1M acetic acid, 6M guanidine HCl, 8M urea
Avoid	Oxidising agents, cationic detergents

\* The physical and chemical properties and functions of the chromatographic resin have no obvious change after being placed in an environment of 40°C and pH 2–14 for 7 days.

\*\* v/v, volume ratio

## 4. Method of use

### 4.1 Chromatographic conditions

(1) Buffer selection: the buffer salt whose buffer group does not interact with the chromatographic resin should be selected. If the binding and elution mode is used, the equilibration buffer should be a low salt (less than 5 mS/cm) and low pH (usually 1 pH unit lower than the isoelectric point of the target molecule) buffer to facilitate the binding of the target molecule. Consider the stability of the sample in the buffer; the elution buffer is usually a buffer with a high concentration of salt (such as 1M NaCl) added to the equilibration buffer. If the flow-through mode is used, the equilibration buffer should adopt conditions that are conducive to the binding of impurities. After the target molecule has completely flowed through, directly use a high-concentration salt rinse.

(2) Flow rate: generally, choose a linear flow rate of 300~600 cm/h according to the bed height of the column.

(3) Sample pretreatment: to prevent the sample from clogging the column, the sample needs to be filtered with a 0.45 µm microporous membrane before loading it. It is recommended that the pH and conductivity of the sample is adjusted to be consistent with the equilibration buffer (dilution, ultrafiltration and desalting can be used to adjust the pH and conductivity of the sample).

### 4.2 Chromatographic steps

(1) Equilibration: use equilibration buffer to fully equilibrate the chromatography column until the pH and conductivity are stable and basically consistent with the equilibration buffer. This step usually requires 3–5 column bed volumes (CV).

(2) Sample loading\*: according to the binding capacity measured in the small test, determine the loading volume and loading amount of the sample on CM Persefose FF.

(3) Impurity washing\*: use equilibration buffer or other suitable buffer to wash the chromatography column until the UV stabilises and returns to the baseline.

(4) Elution\*: elution is achieved by increasing the concentration of salt ions. The concentration of salt ions in the eluent can be gradually increased through a linear gradient or a step gradient to elute molecules with different binding strengths. pH gradient elution or mixed elution can also be used.

(5) Regeneration: rinse the column with a high-salt buffer (such as 2M NaCl).

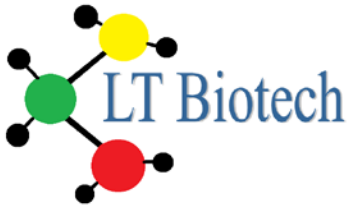
(6) Re-equilibration: re-equilibrate the column with equilibration buffer.

\* If the flow-through mode is used, the ‘sample loading’ step should be set to collect; the ‘washing’ step should stop the collection after all the target molecules have passed through; the ‘elution’ step should directly use high-salt buffer – impurities can be washed away.

## 5. Cleaning and regeneration

Contaminants (e.g. lipids, endotoxins and proteins) accumulate on the column as the number of uses of the chromatography resin increases. Determine the frequency of CIP according to the degree of contamination of the chromatography resin (if the contamination is considerable, CIP is recommended after each use to ensure repeatability of results and to prolong the working life of the chromatography resin). For different types of impurities and contaminants, the recommended cleaning conditions are as follows:

- Removal of strongly binding proteins: wash with 5 CV of 2M NaCl solution or use a high salt buffer not lower than pH 2, such as 1M NaAc solution.
- Removal of strongly hydrophobic proteins and precipitated proteins: first wash with 5 CV of 1M NaOH solution, then wash the lye with 5–10 CV of ultra pure or pure water.



- Removal of lipoproteins and lipids: first wash with 5 CV of 70% ethanol or 30% isopropanol, then rinse with 5–10 CV of ultra pure or pure water.

Note: 70% ethanol or 30% isopropanol should be degassed before use; the flow rate should be 30–60 cm/h during CIP. Reverse cleaning should be used when the clogging is severe.

To reduce the microbial load, it is recommended that 0.5~1M NaOH solution is used to treat the chromatographic resin. Treatment time is 15~30 minutes.

## 6. Storage

Keep the unopened chromatography resin in the original container and store at 4~30°C in a well-ventilated, dry and clean place. Do not freeze. Wash the used column with 2–3 CV of 20% ethanol solution and store at 2~8°C.

## 7. Destruction and recycling

Since chromatography resin is difficult to degrade in nature, it is recommended that the waste chromatography resin is incinerated to protect the environment. For chromatography resin that has been in contact with biologically active samples such as viruses and blood, follow the local biosafety requirements before destroying or disposing of it.

## 8. Packing method

Detailed information on resin packaging is available on request. Please contact your local distributor.

## 9. Ordering information

Product name: CM Persefose FF

Product Cat. No	Package
723-00025	25 ml
723-00100	100 ml
723-00500	500 ml
723-01000	1 L
723-05000	5 L
723-10000	10 L
723-20000	20 L