

**Shodex**

Operation Manual

Anion separation columns for suppressor method

Shodex IC SI-90 4E

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● Introduction

The Shodex IC SI-90 4E column is developed for use in suppressor method anion chromatography.

The seven anions, fluoride, chloride, nitrite, bromide, nitrate, phosphate and sulfate can be separated quickly with high sensitivity.

● Specifications

Table 1

Product name	Column size (i. d. x L (mm))	Theoretical plate number	Particle size	Application
IC SI-90 4E	4.0 x 250	$\geq 5,000$ ( $\text{SO}_4$ )	9 $\mu\text{m}$	For analysis
IC SI-90G	4.6 x 10	****	9 $\mu\text{m}$	As guard column

The packing material is an anion exchanger made from polyvinylalcohol gel chemically bonded with quaternary ammonium.

The liquid with which the columns are filled at delivery is a mixture of 1.8 mM  $\text{Na}_2\text{CO}_3$  and 1.7 mM  $\text{NaHCO}_3$ .

Table 2

	SI-90 4E
Column material	PEEK
Recommended eluent	1.8 mM $\text{Na}_2\text{CO}_3$ + 1.7 mM $\text{NaHCO}_3$
Maximum flow rate	2.0 mL/min
Recommended flow rate	1.0 mL/min
Maximum pressure	10.0 MPa
Usable pH range	pH 3~12
Recommended temperature range	20 ~ 60 °C

● Sample pretreatment

- 1) Inject the sample into the column only after it has been passed through a 0.45  $\mu\text{m}$  membrane filter to remove particles.
- 2) Any sample containing protein should be injected into the column only after protein has been eliminated from the sample.
- 3) Inject the sample containing organic impurities into the column only after the sample has undergone solid extraction treatment (Sep-Pak PS-1).

● Eluent

Normally aqueous solution of described in the tabel 2 can be used as an eluent for Shodex IC SI columns.

- 1) 1.8 mM  $\text{Na}_2\text{CO}_3$  + 1.7 mM  $\text{NaHCO}_3$

Measure 0.191g of  $\text{Na}_2\text{CO}_3$  and 0.143g of  $\text{NaHCO}_3$  into a 1 liter measuring flask.

Make it up a 1 liter solution using distilled and deionized water.

- 2) Eluent for measuring low concentration ions: 1.0 mM  $\text{Na}_2\text{CO}_3$  + 4.0 mM  $\text{NaHCO}_3$

Measure 0.106g of  $\text{Na}_2\text{CO}_3$  and 0.336g of  $\text{NaHCO}_3$  into a 1 liter measuring flask.

Make it up a 1 liter solution using distilled and deionized water.

CAUTION: This eluent is recommended to use for following cases:

- Injection volume is 50  $\mu\text{L}$  or more
  - Sample contains high concentration of carbonate.
- 3) Eluent for separation of inorganic ions and organic ions such as acetate and formate: 12.0 mM  $\text{Na}_2\text{CO}_3$  (for SI-90)  
Measure 1.008g of  $\text{NaHCO}_3$  into a 1 liter measuring flask and make it up a 1 liter solution using distilled and deionized water.

● Storage

The column should be thoroughly flushed with fresh eluent.

Column disconnected from the LC system should be tightly capped both ends to prevent internal drying, and stored in a room that has less temperature fluctuation.

● Regeneration

Cause	Washing procedure
Polution by low valency hydrophilic ions	Reverse the column and wash by the follwing steps. 1. 15 minutes : deionized water (0.5mL/min) 2. 60 minutes:10 times concentrated eluent (0.5mL/min) 3. 15 minute: deionized water (0.5mL/min) 4. 60 minutes: eluent (0.5mL/min)
Polution by high valency hydrophobic ions	Reverse the column and wash by the follwing steps. 1. 15 minutes : deionized water (0.5mL/min) 2. 10 minutes: 5% acetonitrile (0.5mL/min) 3. 60 minute: 100% acetonitrile (0.5mL/min) 4. 30 minutes: deionized water (0.5mL/min) 5. 60 minutes: eluent
Ireguar peak shape of NO <sub>3</sub>	Washed by the following steps. (the same flow as usual) 1. 15 minutes : deionized water (0.5mL/min) 2. 25 minutes: 1 mM Na <sub>2</sub> CO <sub>3</sub> (0.5mL/min) 3. 3 days: set the end caps and store in room temperature (Repalace the solvent after 3 days stored) 4. 60 minutes: eluent (0.5mL/min)

When a column is deteriorated by the foreign substances remaining in the column or adsorbed by the packing material, the substances might be washed out by the procedure described below. However, sometimes the procedure is not sufficient to regenerate the column and, in such case, it is necessary to replace the column with a new one. And, even if the column can be regenerated, the column performance may be not so good as before.