SeQuant™

Everything runs smoothly …

CARS™ and SAMS™ – The reliable choice for ion chromatography

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CARS™ – Continuous Anion Regeneration System

Low background and high sensitivity in ion chromatography

Determination of anions by ion chromatography is now easy. Simply use the continuous background conductivity suppression system SeQuant™ CARS™ equipped with the membrane suppressor SeQuant™ SAMS™ to enhance your results.

Your benefits

- Low and stable background levels and high sensitivity in routine analysis
- Can be integrated with any ion chromatography system
- Suitable also for high ion-strength eluents and gradient applications

The reliable choice

The CARS™ system is designed for optimised eluent suppression, regardless of flow rate and composition of the mobile phase. This enables that the lowest possible background conductivity level and highest possible analyte sensitivity is always reached, no matter what the application is.

The CARS™ system can successfully be used for standard routine operation, but due to its very high capacity and the continuous rapid regeneration of the suppressor, the system is also suitable for high ion-strength eluents and gradient elution. The robust and flexible design makes it simple to integrate CARS™ and SAMS™ with any ion chromatography system. An example of results obtained with CARS™ and SAMS™ integrated with an ion chromatography system is displayed in figure 1. This example chromatogram shows a separation of a mixture of common anions under standard conditions.

Suppressed conductivity detection

Suppression of the eluent in ion chromatography results in both lower background and higher sensitivity. Typical eluents in anion chromatography are based on anions of weak acids (e.g., OH^-), and therefore the neutralization of these in the suppressor significantly decrease the background conductivity level and noise. The analyte ions, on the other hand, are normally anions of strong acids (e.g., Cl^-); and as such, their conductivity increase when the eluent cations (e.g., Na^+) are exchanged for protons (H^+).

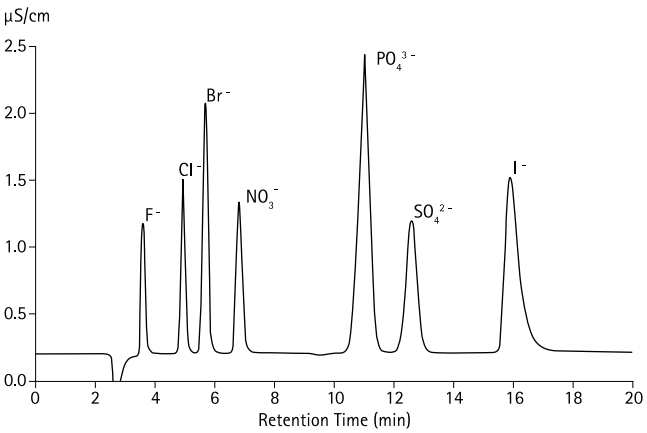


Fig. 1 *Chromatogram for isocratic separation of a mixture of inorganic anions using CARS™ with SAMS™ for suppression of the background conductivity. Eluent; 1.7 mM NaHCO3 / 1.8 mM Na2CO3 pumped at 1 mL/min. Sample; 20 µL of 1-30 ppm of each anion in water.*

Principle and performance of CARS™

In the SeQuant™ CARS™ system, the eluent is suppressed in the SAMS™ suppressor using protons supplied by the CARS™ regeneration cartridge and carried there by the ULB™-P regeneration solution. The CARS™ pump ensures stable operation of the entire system by continuously circulating the ULB™-P solution.

The capacity of the SeQuant™ CARS™ system is very high and the background conductivity reached after the SAMS™ suppressor is very low. Typical expected suppression performance and operation time per installed CARS™ cartridge is listed in table 1.

Eluent Type			Flow Rate	Conductivity	Expect. Cartridge Lifetime
NaOH mM	Na_2CO_3 mM	$NaHCO_3$ mM	mL min^{-1}	µS cm^{-1}	full 8-hour working days
10	–	–	1.0	< 3	170
–	2.4	3.0	1.0	15-20	210
–	2.4	3.0	2.0	15-20	105

Tab. 1 *Typical suppression performance and expected cartridge lifetime of CARS™ with SAMS™ in an ion chromatography system. The example is based on a standard type SAMS™ suppressor and the standard type CARS™ cartridge (0.5 L, 0.9 eq).*

Schematic illustration of SAMS™ and CARS™ in operation

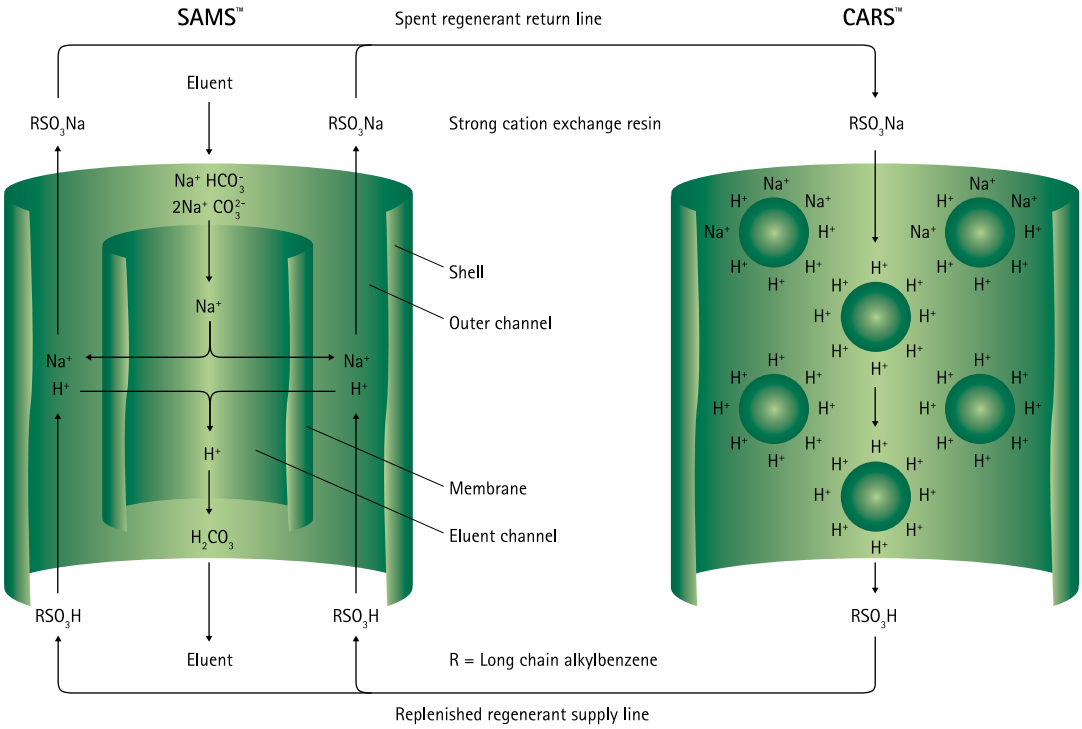


Fig. 2 *In the SAMS™ suppressor (left), eluent cations (Na^+) are replaced by protons (H^+) in an ion exchange process over the suppressor membrane. The protons (H^+) are carried to the outer channel of the SAMS™ suppressor by the ULB™-P regeneration solution (bottom, RSO_3H). After the ion exchange process, the ULB™-P solution (top, RSO_3Na) returns to the CARS™ regeneration cartridge (right) and deposits the former eluent cations (Na^+), while acquiring new protons (H^+) from the ion exchange resin. The process can be continuously repeated until the CARS™ regeneration cartridge is depleted of protons.*

Components of CARS™

The CARS™ regeneration cartridge contains an ultra-pure cation exchanger and constitutes high-capacity source of protons for long-term continuous regeneration of the SAMS™ suppressor. The high capacity warrants a stable performance for standard routine work as well as for gradient applications for numerous working days. The ULB™-P regeneration solution is an ultra-pure liquid cation exchanger (high molecular weight organic acid) with extremely low forbidden penetration through the suppressor membrane. This delivers stable performance exceptionally low and quiet background conductivity.

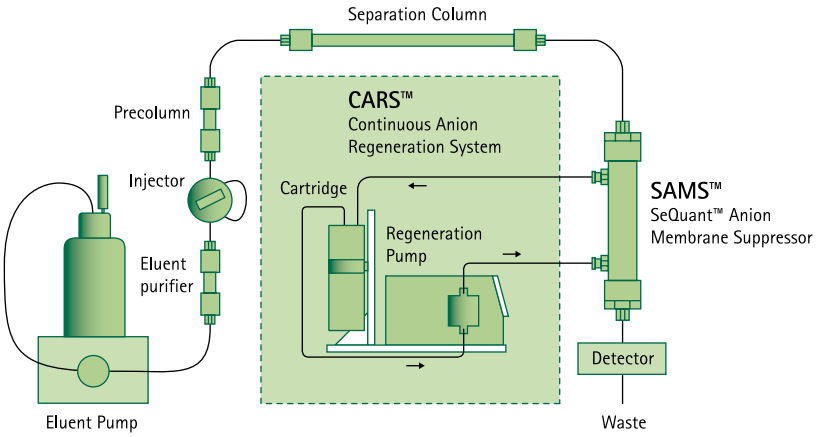
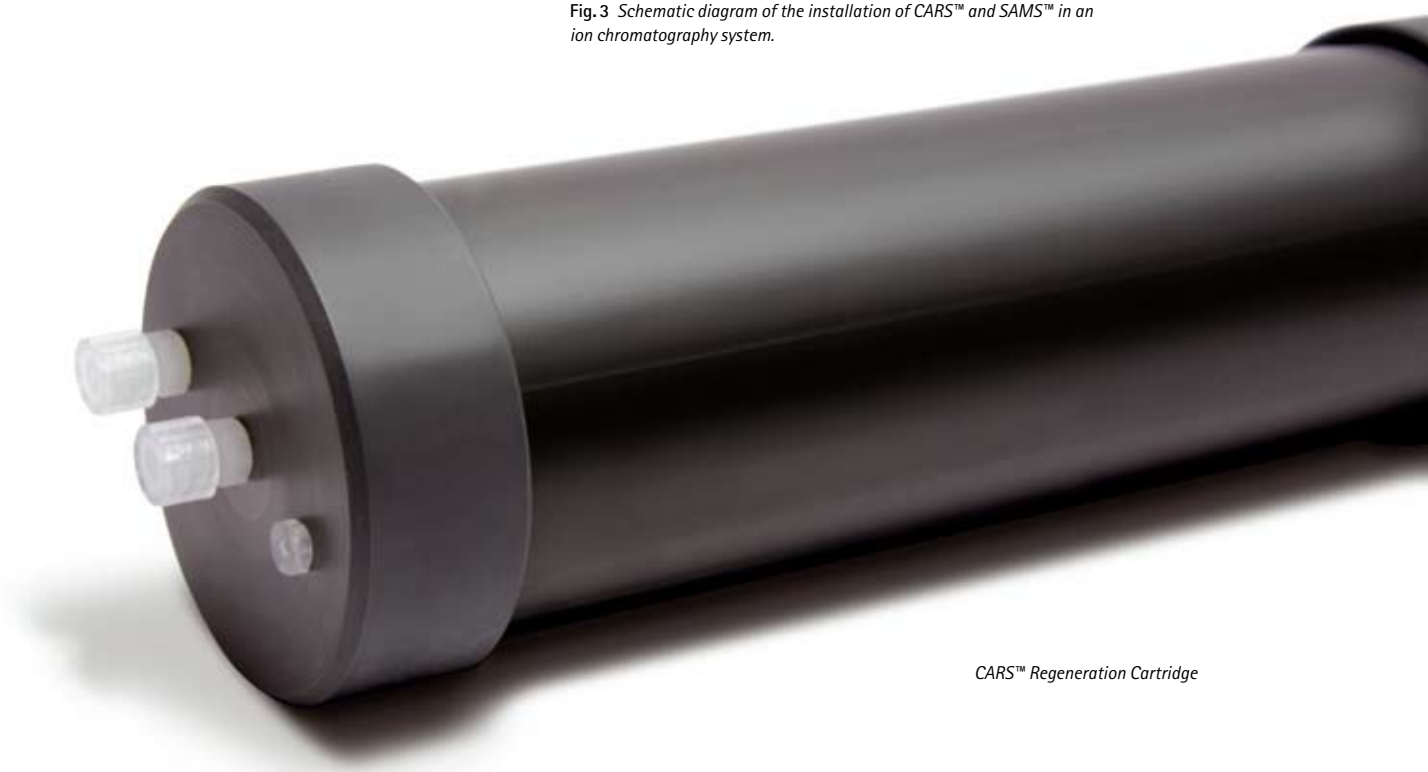


Fig. 3 *Schematic diagram of the installation of CARS™ and SAMS™ in an ion chromatography system.*



CARS™ Regeneration Cartridge

SeQuant™

SAMS™ – robust membrane suppressor for anion chromatography

SeQuant™ SAMS™ is a chemically regenerated membrane suppressor for anion chromatography. Its operation is based on selective exchange of protons (H^+) from an external regeneration channel for cations (e.g., Na^+) from the eluent. Anions are prevented from entering the membrane by ion exclusion, and are thus not transported between the eluent and regeneration streams. SAMS™ is manufactured according to state-of-the-art in chromatographic reactor technology, and features both high transport capability and low band-broadening. Several strong acids (e.g., sulphuric acid) can be used to regenerate the SAMS™ suppressor, although optimum performance is obtained when SAMS™ is used in combination with the SeQuant™ CARS™ system for continuous regeneration.

SAMS™ – Anion Membrane Suppressor

Your benefits

- Dynamically regenerated high-capacity membrane suppressor
- Robust design enabling unattended routine operation

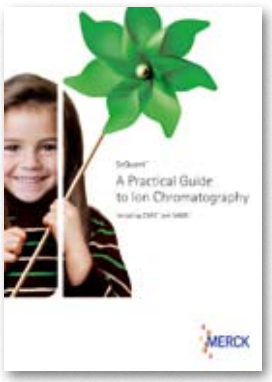
CARS™ system parts


Component	Description	Task	Typical replacement interval
CARS™ Pump	Circulation pump	Ensure continuous and stable delivery of the ULB™-P solution throughout the system	*Not applicable* Only normal instrument service required
CARS™ Regeneration Cartridge	High-capacity source of protons	Supply protons (H^+) to the SAMS™ suppressor	*6-12 months* Depending on hours of use, eluent strength and flow rate, see table 1
ULB™-P Regeneration Solution	Ultra-pure liquid cation exchanger	Carry protons (H^+) from the cartridge to the suppressor, and eluent cations (e.g., Na^+) back to the cartridge	*6-12 months* Typically replaced when a new cartridge is installed or if the system becomes contaminated
SAMS™	Robust membrane suppressor	Exchange eluent cations (e.g., Na^+) to protons (H^+)	*12-24 months* Depending on amounts of samples and their purity

Ordering information

Description	Contents of one Package	Ord. No.
CARS™ Continuous Anion Regeneration System complete system	1 CARS™ pump 1 Cartridge 0.5 L capacity 0.9 eq 1 x 100 mL ULB™-P Regeneration Solution 1 Suppressor Installation Kit	1.50611.0001
CARS™ Regeneration Cartridge for Anion IC 0.5 L, capacity 0.9 eq	1 Cartridge	1.50613.0001
CARS™ Regeneration Cartridge for Anion IC 0.75 L, capacity 1.3 eq	1 Cartridge	1.50614.0001
ULB™-P Regeneration Solution	100 mL	1.50616.0100
SAMS™ Anion IC Suppressor standard analysis, 10-32 fittings	1 Suppressor 100 cm membrane 1 Fitting kit with 10-32 UNF fittings for 1/16" tubing 1 Syringe	1.50609.0001
SAMS™ Anion IC Suppressor gradient analysis, 10-32 fittings	1 Suppressor 200 cm membrane 1 Fitting kit with 10-32 UNF fittings for 1/16" tubing 1 Syringe	1.50610.0001
IC Pressure Relief Valve (100 psi)	1 Valve	1.50618.0001
CARS™ Suppressor Installation Kit	5 m Regeneration channel tubing 6 Luer fittings for regeneration channel	1.50619.0001

For the most up-to-date information, products and applications, please visit **www.mercksequant.com** and ask for your free copy of our booklet **A Practical Guide to Ion Chromatography**.



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Merck KGaA
64271 Darmstadt, Germany
Fax +49 (0)61 51/72-60 80
E-mail: chromatography@merck.de
www.merck-chemicals.com/chromatography
www.mercksequant.com