

# A PRACTICAL GUIDE TO ION CHROMATOGRAPHY

## An introduction and troubleshooting manual

### Foreword

This guide will show you some of the most common practical issues that occur during analysis of *anions* by ion chromatography. Many users find the technique difficult and hard to understand. It is our hope that we will be able to explain a few of the most fundamental prerequisites for analysis of water samples. We also want to give you guidance on troubleshooting of the instruments. If your ion chromatographic problems cannot be solved with this guide, SeQuant will be happy to assist you.

First of all, we recommend that you visit our web pages (<http://www.sequant.com>), where you will find more information on applications and our products.

### The Ion Chromatographic System

Figure 1 shows an ion chromatographic system with suppressor. Eluent is pumped by an eluent pump through an injection valve, where exactly reproducible sample volumes are injected.

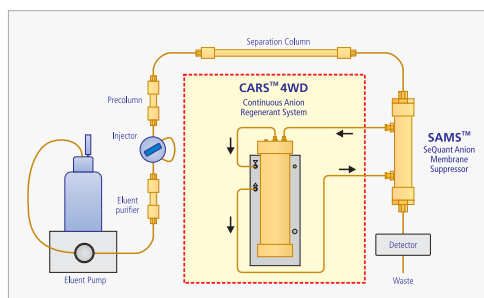


Figure 1: Anion chromatography system comprising a SAMS™ suppressor with CARS™ 4WD for continuous regeneration.

The sample ions are carried by an eluent flow to a separation column, where interaction with fixed ions of opposite charge (*i.e.*, positive) take place.

The ions are thereby slowed down to an extent characteristic of each ion and arrive separated at the “*suppressor*”, where the eluent and analyte ions are transformed before they reach the detector.

The detector measures the electrolytic conductivity of the eluate and the function of the suppressor is both to reduce the background of the eluent and to increase the sensitivity for the sample ions. The detector signals can be evaluated manually from recorder charts or automatically with an integrator or a computer-based data-acquisition system with suitable chromatography software.

As with all chromatographic techniques it is very important to recognize the chromatographic terms *efficiency*, *capacity* and *selectivity*. If these factors are kept in mind, it is easier to achieve good separations in a time-saving and economic way:

### Efficiency

An efficient chromatographic system will generally produce high and narrow chromatographic peaks, and thus provide good sensitivity. The efficiency is controlled by the column choice and careful selection of other components of the flow system.

### Capacity

The capacity term has to do with the ability of the column to attract ions and the eluent strength required to elute these through the column. To put it simply, the capacity relates to the retention time of the ions and the ability to accommodate samples with a large span in ion concentrations.

### Selectivity

Selectivity refers to the capability of the separation system in achieving separation between different analytes. The selectivity depends on the chemical and physical qualities of the column, that result in interactions with the ions to be separated, and also on the choice of eluent.