JH Analytik - Information

ItaChrom II-A Automatic Isotachophoresis System

JH Analytik

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ISOTACHOPHORESIS

Separations of ionic compounds either can be done with chromatographic or electrophoretic techniques.

In contrast to chromatographic techniques electrophoresis uses an applied electric field to separate analytes according to their electrophoretic mobilities.

Unlike other electrophoresis instruments ItaChrom II-A has a two-dimensional setup. The 1st column is used for removing matrix components and concentrating analytes. Afterwards the analytes are transferred into the 2nd column where they are separated and finally detected.
ItaChrom II-A uses a discontinuous electrolyte system, consisting of a leading and a terminating electrolyte. ItaChrom II-A is distributed with capillaries showing 800 and 300 µm inner diameter, respectively.

Low Chemical Consumption

The generally low consumption of chemicals (aqueous solutions only) saves the cost for purchasing and disposing solvents and also provides environmental advantages.

No Sample Preparation

Being a static system uncharged matrix compounds remain in the injection system. Due to the innovative column-coupling technique ItaChrom II-A offers the possibility of cutting-off charged excess components in the first step before analysis takes place in the second step.
Most samples either can be injected directly or after a simple dilution step.
Therefore extensive and time-consuming sample preparation steps are not required.

Fast Method Development

The selectivity of the separation is most strongly influenced by the pH-value. To obtain or optimize a separation only the electrolyte´s pH-value has to be changed in most cases.
ItaChrom II-A has no need for pre-conditioning customary with chromatographic methods.

Low Operating Costs

Compared to conventional methods the expenses per analysis are lower due to the above listed economic aspects.

ItaChrom II-A Isotachophoresis System

Application Fields

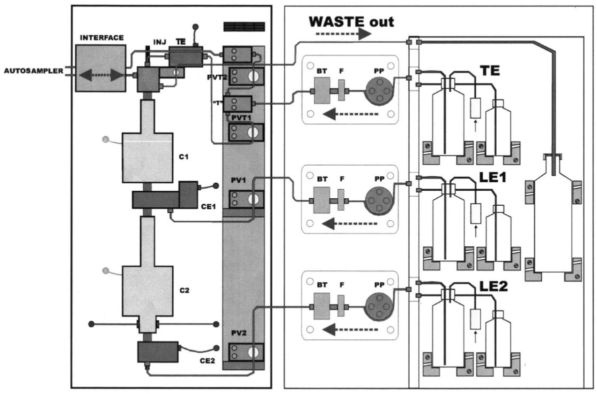
The two-dimensional configuration of ItaChrom II-A expands the possibilities in capillary electrophoresis.
With ItaChrom II-A ion-analysis gains a powerful tool.
The use in analytics of complex matrices is eminently advantageous.

Typical examples in this area are:

- Organic acids in silage
- Organic acids in beverages (wine, juice, etc.)
- Trace impurities in H_2O_2, Glycerol, inks
- Anions and cations in urine and serum
- flavor enhancers, acidifiers, vitamins and other food additives
- Inorganic anions and cations in ground-, surface- or drinking water
- Active agents and metabolites in pharmaceuticals
- Proteins and amino acids

ItaChrom II-A System Design

The design of the separation section of the instrument is shown below:



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Capillary Coupling Technique

The innovative coupling of two capillaries offers the following advantages:

- Injection of high volumes resulting in low detection- and quantification limits
- Removal of excess components or interfering substances after the first capillary
- Various operation modes:
  Two-dimensional Isotachophoresis (ITP/ITP) or coupling of Isotachophoresis with Capillary Zone Electrophoresis (ITP/CZE)

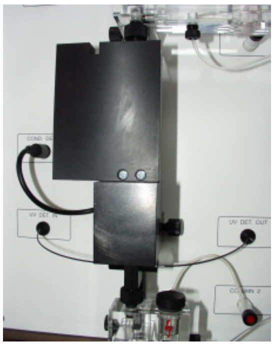
Detection in Isotachophoresis

For the detection of the resolved ionic components it is possible to use conductivity and/or UV/VIS detection. In all cases the capillary serves as measuring cell.

Conductivity Detection

Conductivity detection is universally applicable for ionic substances.
With ItaChrom II-A conductivity is recorded by a contactless on-column detection unit. Both, upper and lower columns are equipped with a conductivity detector.

UV/Vis Detection using fiber optics



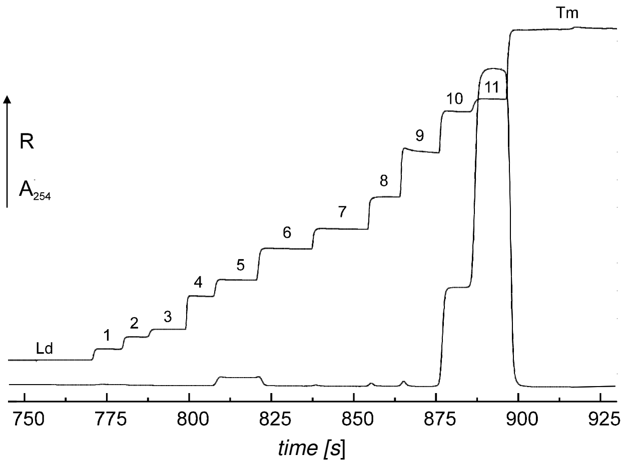
In addition to conductivity detection ItaChrom II-A is equipped with a spectral detection mode. Among simple monochromatic detection polychromatic detection with DAD is also possible. Using special columns it is also possible to employ laser-induced-flourescence (LIF) improving detection limits by several orders of magnitude.

Autosampler

Depending on the application area there are various autosamplers available starting from basic types up to biocompatible samplers equipped with peltier cooling elements etc..

Isotachopherograms / Electropherograms

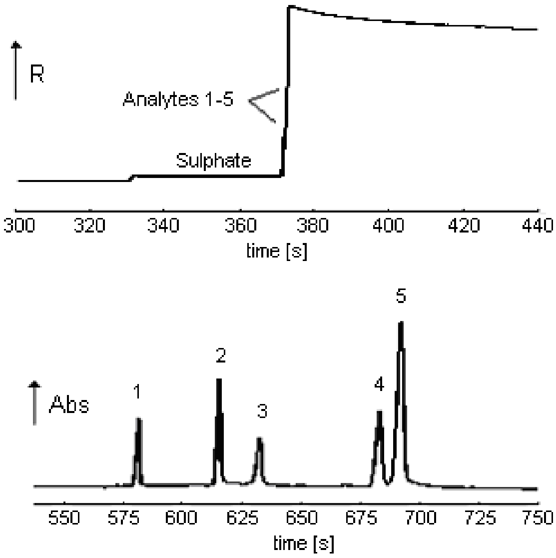
The following diagram shows the signal of a model mixture recorded by the lower conductivity as well as the UV-detecor in ITP/ITP mode



1: Nitrate, 2: Perchlorate, 3: Chlorate, 4: Fluoride,
5: 2-Ketoglutarate,6: Glutarate, 7: Adipate, 8: Acetate, 9: Phosphate,
10: Benzoate,11: 2,4-Dinitrophenolate ; all 100µmol/L

Ld: 10 mmol/L HCl, 20 mmol/L Histidine, 0.1% MHEC, pH = 6
Tm: 10 mmol/L MES

The diagrams below show the signals of a model mixture recorded by the upper conductivity detector and the UV-detector in ITP/CZE mode



1: 2-Naphthylamine-4,8-disulfonic acid
2: 2,4-Dinitrophenol
3: 3-Aminobenzoic acid
4: Sulfanilic acid
5: Sorbic acid; all 1µmol/L

Ld : 10 mmol/L HCl, 20 mmol/L Histidine, 0.1 % MHEC, pH = 6
BGE : 100 mmol/L MES, 10 mmol/L Histidine, 0.1 % MHEC, pH = 6
Tm : 5 mmol/L MES