Dialysis — A Unique Proven Sample Preparation Technique for Ion Chromatography

Jay C. Gandhi, Metrohm-Peak, Inc., Houston, Texas, USA.

What is dialysis? Dialysis is a membrane-based sample preparation technique, which has recently been employed by Metrohm for in-line sample preparation for ion chromatography applications. This promising technique reduces cost of sample preparation materials and labour time. Direct quantification (external calibration) in Metrohm’s patented “stopped flow” dialysis sample preparation process provides the highest recovery of all dialysis techniques. It is easily integrated into most ion chromatography applications as a front-end sample preparation. If you are analysing for anions and cations in beverages, oil-emulsions, petrochemical products, processed or non-processed food products, dialysis is the right tool for your sample preparation needs. Following are a few of the sample matrices, which can use dialysis for sample preparation.

- Environmental (waste water with flocculants, coagulants, heavy organics, etc.)
- Food industry (milk, beverages, processed foods, non-processed foods, etc.)
- Petrochemicals (diesel fuel, cutting oils, industrial light density oils, etc.)
- Clinical Laboratories (serum, urine, blood, etc.)
- Forensic Laboratories (extracts from fire debris, ions in hair extracts, etc.)
- Cosmetic Industry (anions in shampoo, soaps, lotions, etc.)

Experimental Conditions (for shown chromatogram of orange juice analysis)

A Metrohm Modular Ion Chromatographic system is used for the analysis: model 754 dialysis unit, 732 conductivity detector, 709 dual piston IC pump, 766 autosampler, 733 IC separation centre, 753 MSM and IC-Net 2.1 software. Sample used for dialysis = 10 mL. Eluent = 3.2 mM Na₂CO₃ + 1 mM NaHCO₃. The Metrosep A Supp 5-250 column is employed for separation of common anions and organic acids in a single isocratic analysis.

Results and Discussion

Figure 1 demonstrates excellent separation and identification of anions and organic acids in orange juice. Dilution with ultrapure de-ionized water was required for orange juice because of high calcium lactate fortification in the brand tested. The study was conducted with no dilution or sample preparation for this brand of orange juice containing high pulp content. Various name brands of same product have different organic acids such as malic, tartaric etc. Similarly citric acid can be also analysed with an organic acid column or a gradient system using the same Metrosep A Supp 5 column. Dialysis for sample preparation technique can be employed for previously mentioned sample matrices.

Conclusion

Dialysis is proven sample preparation technique for ion extraction. Because of its ruggedness and usefulness, cost reduction in sample preparation steps can be achieved without compromising the quality of ion analysis.

References

Metrohm Application Works AW-US6-0049-122002
Metrohm Application Works AW US6-0050-122002
Metrohm Application Works AW DE8-0518-092002

Figure 1: Chromatogram of orange juice analysis by dialysis.

Peaks: 2 = lactate, 3 = formate, 4 = chloride, 5 = phosphate, 7 = sulphate, 8 = ascorbate (vitamin C).