CAPSULES
preliminary notes and applications from Bioanalytical Systems, Inc.

Determination of Monomeric Acrylic Acid in Sodium Polyacrylate

Purpose

Sodium polyacrylate is used as a descaling agent in the sugar industry and also as a food additive. It is synthesized via the polymerization of acrylic acid (F1). Since this monomer is toxic, a method for its detection in a sample of sodium polyacrylate is required.

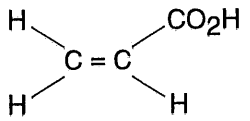

Figure 1. Molecular structure of acrylic acid.

Method

Methods for the determination of acrylic acid have been developed for gas-liquid chromatography, liquid chromatography and ultra-violet spectrophotometry. The advantage of the differential pulse polarographic method developed in this study is that no separation is required prior to the analysis.

Results

Dimethyl formamide (DMF) was used as the solvent for both the standard solutions of acrylic acid (F2) and its extraction from samples of sodium polyacrylate. A calibration curve was constructed using the peak currents of the standard solutions and was found to be linear over the range 10-100 ppm. This curve was then used to quantitate the concentration of acrylic acid in the polyacrylate samples.

Table 1 shows the percentage of acrylic acid found in commercial samples of sodium polyacrylate measured using both the above electrochemical method and ultra-violet spectrophotometry. Comparison of these results shows good agreement between the two techniques.

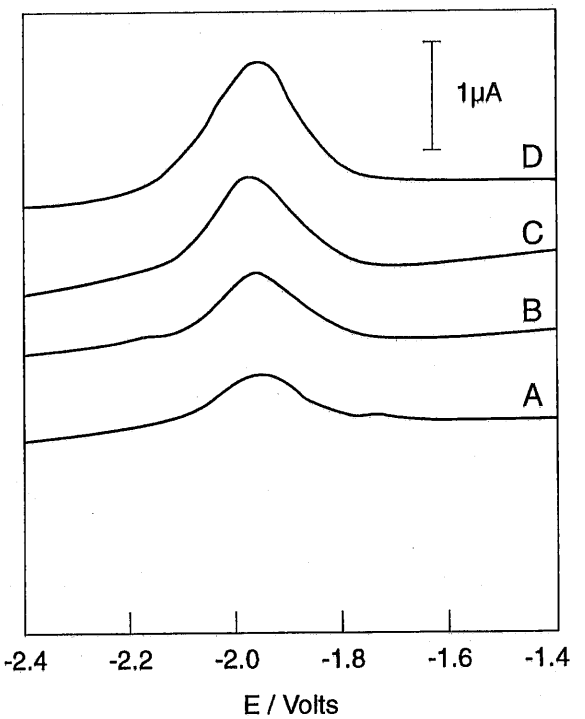

Figure 2. Differential pulse voltammograms fo acrylic acid at various concentrations in DMF; A) 10 ppm B) 20 ppm C) 25 ppm and 30 ppm. Supporting electrode 0.02 M BuN4I. Figure adapted from reference.

Sample	*Differential Pulse Polarography*	*Spectrophotometry*
1	0.123	0.126
2	0.119	0.122
3	0.120	0.118
4	0.117	0.121
5	0.118	0.115

Table 1. Comparison of concentration of acrylic acid in comercial samples determined using differential pulse polarography and UV spectrophotometry.

Reference

Differential Pulse Polarographic Determination of Residual Acrylic Acid in Sodium Polyacrylate, S. Husain, G.S.R. Sastry, R.P. Prasad and G.V.R. Sarma, Electroanalysis 3 (1991) 71-72.