Development of a disposable sensor based on zeolite-polymer membranes and application to the determination of ionic surfactants

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The unique properties of zeolites such as size, shape and charge selectivity as well as ion-exchange capacity suggest their incorporation into electroanalytical systems. Zeolite filled polydimethylsiloxane membranes allow well-defined potentiometric determinations of a variety of cationic species, e. g. alkali and alkaline earth metal cations and cationic surfactants [1]. The latter class of substances demands particular attention in the context of environmental analysis. Maintenance-free and reliable sensors are highly desirable in this field of analysis.

The current contribution is concerned with the preparation and characterization of disposable all-solid-state sensors for the titrimetric analysis of ionic surfactants. A planar disposable sensor is fabricated by lamination of suitable electrode structures sandwiched between flexible plastic foils. The zeolite-polymer membrane containing 50 per cent (w./w.) zeolite of the faujasite type is cast onto an Au or Ag/AgCl element to form the surfactant sensitive substrate.

The very fast potentiometric response of the sensor can be exploited for potentiometric titrations of surfactants. Without any further pretreatment reproducible and well-defined titration curves are obtained for the titrimetric analysis of anionic surfactants using a cationic surfactant and vice versa. The sensors exhibit shelf-lives longer than 3 months, kept under room temperature and dry conditions.

To demonstrate the practical utility of the developed sensor results concerning the determination of anionic surfactants in commercial detergents and cooling lubricants are presented.

[1] S. Matysik, F.-M. Matysik, J. Mattusch and W.-D. Einicke, Electroanalysis, 1998, 10, 98.