Electrochemical behavior and detection of diclofenac at a microporous Si3N4 membrane modified water-1,6-dichlorohexane interface system

ABSTRACT

The electrochemical behavior when the liquid–liquid interface was modified by commercially available, microporous silicon nitride membrane, was achieved using cyclic voltammetry with tetramethyl ammonium. The transfer characteristics of the ionizable drug diclofenac (DCF^-), as an anti-inflammatory, anti-rheumatic, antipyretic, and analgesic treatment in common use in biomedical applications, were also investigated across microporous silicon nitride-modified liquid interface. Thus, some thermodynamic variables for DCF^- , such as the standard Gibbs energy of transfer, the standard transfer potential and lipophilicity were estimated. Furthermore, the influence of possible interfering substances (ascorbic acid, sugar, amino acid, urea, and metal ions) on the detection of DCF^- was investigated. An electrochemical DCF sensor is investigated using differential pulse voltammetry (DPV) as the quantification technique, a linear range of 8–56 µM and a limit of detection of 1.5 µM was possible due to the miniaturized interfaces formed within silicon nitride.

Keyword: Ion transfer; Diclofenac anion; Microporous Si3N4 membrane; Cyclic voltammetry; Water–1,6-dichlorohexane