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Lipophilicity of acetylcholine and related ions examined by ion transfer voltammetry at a polarized room-temperature ionic liquid membrane

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Abstract

Ion transfer voltammetry at a polarized room-temperature ionic liquid (IL) membrane was used to evaluate the standard Gibbs energy of ion transfer from water to IL. This quantity was considered to be a measure of the ion lipophilicity, which is one of the factors playing a role in the extraction and transport processes in the two-phase liquid and liquid membrane systems. On this basis, the lipophilicity of several biologically active ions was compared, namely of neurotransmitter acetylcholine (ACH^+) and several related ions including choline (CH^+ , precursor for ACH^+), muscarine (MUS^+ , agonist of the muscarinic ACH^+ receptors), protonated atropine (ATH^+ , antagonist of the muscarinic ACH^+ receptors), protonated scopolamine (SAH^+ , antagonist of the muscarinic ACH^+), and the tetramethylammonium ion (TMA^+) representing their charged moiety. Cyclic voltammetric measurements were carried out using a 4-electrode cell with the IL membrane composed of highly hydrophobic tridodecylmethylammonium tetrakis[3,5-bis(trifluoromethyl)phenyl] borate. Analysis of the voltammetric data provided the values of the

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