

Publication

Adsorption of Ca^{2+} and La^{3+} to bilayer membranes : measurement of the adsorption enthalpy and binding constant with titration calorimetry**JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)****ID** 153026**Author(s)** Lehrmann, R; Seelig, J**Author(s) at UniBasel** [Seelig, Joachim](#) ;**Year** 1994**Title** Adsorption of Ca^{2+} and La^{3+} to bilayer membranes : measurement of the adsorption enthalpy and binding constant with titration calorimetry**Journal** Biochimica et biophysica acta**Volume** 1189**Number** 1**Pages / Article-Number** 89-95**Keywords** ADSORPTION ENTHALPY, BILAYER MEMBRANE, BINDING CONSTANT, TITRATION CALORIMETRY, CALCIUM ION, LANTHANUM ION

The adsorption of Ca^{2+} and La^{3+} ions to the surface of lipid bilayer membranes was studied with high sensitivity titration calorimetry. Ca^{2+} adsorbs to mixed phosphatidylcholine/phosphatidylglycerol membranes with a reaction enthalpy of ΔH approximately 0.1-0.2 kcal/mol. La^{3+} binds to sonified phosphatidylcholine vesicles with a reaction enthalpy of ΔH approximately +1.8 kcal/mol. Adsorption of La^{3+} to phosphatidylcholine bilayers imparts a net positive charge to the membrane surface which makes the binding of further La^{3+} increasingly more difficult. From the decreasing amplitudes in the calorimetric titration experiment a La^{3+} adsorption constant of K approximately $(4.1 \pm 1.1) \times 10^3 \text{ M}^{-1}$ was evaluated. Electrostatic effects were corrected for by means of the Gouy-Chapman theory. The adsorption constant of Ca^{2+} was determined previously as K approximately $10\text{-}20 \text{ M}^{-1}$ using the same binding model. Since the reaction enthalpies of Ca^{2+} and La^{3+} adsorption are endothermic, the adsorption of both metal ions to the membrane surface is driven by a distinct change in entropy.

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