

SURFACE POTENTIAL MEASUREMENTS AT LIPID MEMBRANES WITH PH-INDICATORS

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Fluorescent pH-Indicators are strongly bound to the lipid membrane with long paraffinic substituents. Electrical surface potentials of lipid membranes are determined by measuring the pK-values of two pH-indicators in aqueous solution and bound to the membrane (1). The ionizable group of the pH-indicator – the point of potential measurement – is localized in the plane of the polar headgroups of the lipids, as determined by ^1H -NMR. In the case of lecithin the potential is measured between the phosphate group and the carbonyl group. In lecithin membranes a potential of -60 mV is found. This value indicates an inclined orientation of the phosphatidylcholin dipoles. With a simple electrostatic theory an angle of 10 – 15 degree with respect to the membrane is calculated. Addition of phosphatid acid to the lecithin membrane enhances this negative potential up to - 140 mV. Using the Gouy – Chapman – Theory a dissociation degree of phosphatid acid of 0.15 is calculated (2).

References:

- (1) M.S. Fernandez, P. Fromherz, J. Phys. Chem. 81, 1755 (1977)
- (2) A. Haase, PhD-Thesis, Göttingen/Giessen 1980