# THE CAPACITANCE AND RESISTANCE OF THE TWO-COMPONENT BILAYER LIPID MEMBRANE MODELLING OF THE CELL MEMBRANE

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Artificial membranes formed of components occurring in natural ones are often used in studies of biological membranes. Many functions of biological membranes have been reproduced and explained in studies of model membranes. It has been demonstrated in numerous experiments that the properties of lipid membranes formed of artificial components are similar to those of natural cell membranes.

Lipid bilayers formed of phospholipids and cholesterol were the subject of many studies because those compounds are present in biological membranes. Various techniques were used to investigate the interaction of phospholipids and cholesterol, e.g. monolayer surface chemistry, Raman spectroscopy, nuclear magnetic resonance, electron spin resonance, calorimetry, neutron diffraction and X-ray diffraction. The impedance measurement method was applied in our study. A Model 273A set from PAR was used. During the measurements, the membrane was polarized with alternating voltage of 4 mV amplitude in the 0.1 Hz - 10 kHz frequency range. The capacitance and electric resistance of lipid membranes generated from a solution containing egg phosphatidylcholine and cholesterol in an n-butanol:n-decane solvent system (1:1 volume ratio) were determined. A potassium chloride solution of 0.1 mol/dm$^3$ was used as the electrolyte. The capacitance of the lecithin and cholesterol membranes amounts to 0.38 and 0.61 $\mu$F/cm$^2$ and the resistance to $1.44\times10^4$ and $2.12\times10^6$ $\Omega$ cm$^2$, respectively. The aim of our research was to determine the parameters of a cholesterol-phosphatidylcholine complex of 1:1 composition.

The mean values of those magnitudes are as follows:

- $4.265\times10^{-6}$ mol/m$^2$ - surface concentration ($\Gamma_3$),
- 0.54 $\mu$F/cm$^2$ - capacitance ($C_3$),
- $1.381\times10^{-6}$ $\Omega^{-1}$ cm$^{-2}$ - conductance $\left(R_3^{-1}\right)$,
- $3.748\times10^7$ - stability constant of the complex (K).