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## Effect of penetration enhancers on the dynamic behavior of phosphatidylcholine headgroups in liposomes

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### Abstract

The results of a time-domain dielectric spectroscopy (TDDS) study of the effect of two skin penetration modulators on phosphatidylcholine (PC) bilayer vesicles are presented. The complex dielectric permittivity spectra of PC vesicle suspensions were described as the sum of two processes: the interfacial polarization of the bilayer and the reorientation of the zwitterionic PC headgroups in a plane approximately tangential to the bilayer surface. The influence of two additives (Azone and Transcutol) on the structure and dynamic behavior of PC headgroups of the bilayer vesicles was analyzed in terms of the interconnection of the dielectric spectra Cole-Davidson parameter,  $\beta$ , and the correlation factor,  $g$ , of the dielectric relaxation Kirkwood cell model. Analytically, these parameters are connected in the proposed model via the spatial distribution of headgroup dipole nonhomogeneities. In terms of the physical modulation of the polar surface phase, it appears that these additives can behave either as enhancers or as retarders. Their activity in this respect depends on the concentration of additive and temperature. © 2000 American Chemical Society.

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