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## Photophysical Properties and Photodynamic Activity of Zinc Diazaporphyrinate

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5,15-Diazaporphyrins (DAP) with  $\beta$ -alkyl substituents are promising macroheterocyclic compounds for creating new materials for sensors, photovoltaic devices, and potential photosensitizers in photodynamic therapy. However, at the moment, their practical application is limited due to the difficult availability and poor knowledge of their properties. In connection with this, a promising task is the synthesis and study of a number of properties of these compounds. The object of this study is a zinc complex of 3,7,13,17-tetramethyl-2,8,12,18-tetraamyl-5,15-diazaporphyrin (ZnDAP), which was obtained by the [2+2]-condensation of the corresponding dipyrromethenes with sodium azide in pyridine with the addition of lead acetate. The resulting lead complex (PbDAP) is labile, and in chromatographic purification gives the free base diazaporphyrin. Subsequent boiling of DAP with zinc acetate in dichloromethane with a small addition of methanol gives a zinc complex.

ZnDAP is characterized by a narrow Q-band of absorption ( $\lambda_Q = 590$  nm,  $\Delta\nu_{1/2} = 287$  cm<sup>-1</sup>,  $\epsilon \sim 10^4$  M<sup>-1</sup>cm<sup>-1</sup>), wide Soret band ( $\lambda_B = 376$  nm) and intense fluorescence with  $\lambda_{em} = 593$  nm in a neutral medium. The efficiency of generation of singlet oxygen upon irradiation of a solution of ZnDAP in DMF by visible light in the wavelength range 500-800 nm was evaluated by the spectrophotometric method based on measuring the concentration of 1,3-diphenylisobenzofuran (DPBF). Solution of zinc phthalocyanine in DMF ( $\Phi_\Delta = 0.55$ ) was used as a standard. The obtained data prove the high efficiency of ZnDAP for photosensitized generation of singlet oxygen.

Aggregation of ZnDAP takes place in water-organic media containing more than 40% of the water. This process is accompanied by a shift and broadening of both bands in the absorption spectrum ( $\lambda_B = 352$  nm,  $\lambda_Q = 592$  nm), as well as a decrease in extinction and complete fluorescence quenching. In aqueous solutions of surfactants with a concentration above critical concentration of micelle formation, solubilization of the monomeric form of the chromophore in the surfactant micelles is not observed, which indicates a high stability of the aggregates being formed. When the ZnDAP solution is acidified, diprotonization occurs along the *meso*-nitrogen atoms, which does not affect the central metal atom. This form is distinguished by the bathochromic shift of both bands in the ESP ( $\lambda_B = 382$  nm,  $\lambda_Q = 623$  nm) and less intense fluorescence in the 630 nm region compared to the neutral monomeric form of the chromophore.