ABSTRACT

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Title of Thesis: **Optimization of methods for determination of singlet oxygen production and fluorescence emission of azaphthalocyanine derivatives**

Photodynamic therapy (PDT) with a singlet oxygen as an essential agent is believed to be an alternative way of cancer treatment or treatment of some cutaneous diseases. The principle of PDT is based on excitation of a photosensitizer by light absorption, followed by transfer of energy to tissue oxygen ($^3O_2$) forming cytotoxic singlet oxygen ($^1O_2$). The efficiency by which photosensitizer transforms absorbed energy to singlet oxygen is characterized by *singlet oxygen quantum yields (Φ_Δ).*

The aim of this thesis was to develop and optimize absolute method for determination of Φ_Δ. In comparison to a relative method, no reference is needed in this case, which enables accurate results with lower error. Verification of the new method was performed in *N*,*N*-dimethylformamide with a zinc phthalocyanine as a model photosensitizer because of its well-known Φ_Δ and with 1,3–diphenylisobenzofuran as a chemical quencher of $^1O_2$.

Different sources of light for excitation and different set-ups of the instrumentation were tried and compared. Efficient and accurate method for absolute determination of Φ_Δ was successfully developed. This method will be used for Φ_Δ measurements of the new compounds prepared in Azaphthalocyanine group on Department of Pharmaceutical Chemistry and Pharmaceutical Analysis.

Furthermore the determination of an effect of solvent on a fluorescence quantum yield (Φ_F) was also a part of this work as well as determination of photophysical properties of two series of phthalocyanine derivatives.