

ABSTRACT

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Title of Thesis: Comparison of Photophysical Properties of Different Types of Azaphthalocyanines

Phthalocyanines and their aza-analogues azaphthalocyanines are organic dyes with planar macrocyclic structure and metal cation coordinated in the center. They can be used in many applications - for example as sensors, dyes or sensitizers in photodynamic therapy.

The aim of this study was to compare photophysical properties (absorption, fluorescence, singlet oxygen production), solubility, aggregation and acid-base properties of several molecules **1-7** that differ in the type of macrocyclic core (see Figure below).

The strength of absorption expressed as an extinction coefficient increased with the bathochromic shift of the Q-band. The position of the Q band depended on the number of conjugated double bonds and on the position of the peripheral substituents. Isosteric exchange of benzene rings to pyrazine rings shifted Q-band to shorter wavelength.

Quantum yields of singlet oxygen (Φ_{Δ}) and quantum yields of fluorescence (Φ_F) were determined in pyridine and THF by comparative method with ZnPc as a reference. Φ_{Δ} ranged between 0.49 and 0.92, while Φ_F were significantly lower 0.06-0.40.

Solubility of the compounds in the series **1-7** was compared in toluene and ranged between 0.15-112.80 mg/ml. Further, solubility of **1** and its corresponding aza-analogue **2** was determined also in other solvents showing on better solubility of aza-analogue **2**. Aggregation can be observed only at higher concentration (over 10 μ M) with the exception of **4**, where it is present at a lower concentration. Protonation of azomethine nitrogens of compounds **1**, **4** and **5** occurred at lower concentration of acid in comparison with their aza-analogues.

