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SYNTHESIS AND STUDY OF Zn TETRA-SUBSTITUTED PHTALOCYANINE WITH CHALCONIC GROUPS

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The chalcones are considered derivatives of flavonoids and izoflavonoids, which have in their structure aromatic rings connected through a fragment of prop-2-en-1-one. The modification of aromatic rings by different heterocyclic rings creates a wide variety of new substances with a large spectrum of proprieties which can be used in pharmaceutical industry and the production of new medicines. The possibility to play with the chaconnes structures favors the obtaining of pharmaceutical products with low toxicity and high pharmacological action [1]. The chalcones are spread in plants and possess a wide spectrum of uses, due to their antioxidants properties, antibacterial, antifungal, insecticides and anticancer [2].

The antimicrobial resistance is one of the most important threats for our health. This requires efforts to discover new ways to completely eliminate these microbial pathogens. The use of photosensitizes and light is a complementary way to fight against pathogenic microbes. Nowadays, the metalphthalocyanins are intensive studied due to their structures which are rich in π conjugated systems, and have potential applications in various technological areas as optoelectronic devices, gas sensors, static induction transistors and photo receptors in laser beam printers [3].

In the literature are described a series of chalconic derivatives transformed into complexes with non-transitional metals. This type of products is wide studied by the fact that they possess more functional groups which allow the chemical connection with metals, modifying in this way the spectral and medicinal properties.

Also, are known syntheses methods of Zn and Co(II) metalphthalocyanins which has as substituents chalconic fragments. These products are obtained through the following steps: a) syntheses of chalcones with –OH groups by Claisen-Schmidt method, using the KOH as a base and ethanol as solvent; b) the interaction of the respective chalcones with 4-nitrophthalonitrile in the presence of K_2CO_3, nitrogen atmosphere and DMSO for obtaining tetrasubstituted phthalocyanine with chalconic fragments; c) treatment of tetrasubstituted phthalocyanine which contains chalconic fragments with $ZnCl_2$ and $CoCl_2$ salts to give metalphthalocyanins and as catalyst is used the N,N-dimethylethanolamine [4].

The aim of this study is the synthesis of Zn tetrasubstitutedphthalocyanine with chalconic groups by the following scheme:

Zn Tetranitrophthalocyanine (1) was synthesized from 4-nitrophthalonitrile. The formed mixture of 4-nitrophthalonitrile, $Zn(CH_3COO)_2$ and DBU (1,8-diazobicyclo [5.4] undec-7-ene) was refluxed in pentan-1-ol for 8 hours. For purification (1) is treated with HCL (5%) at the temperature of 95 ^oC for 30 min. Zn tetranitrophthalocyanine (1) is treated with Na_2S aqua solution to give Zn tetraaminophthalocyanine (2). The purity of (2) was verified by thin layer chromatography on silica gel, eluent chloroform: tetrahydrofuran 6:1 [5]. 3-(4-Dimethylamino) phenyl-1-(4-isothiocyanatophenyl) prop-2-en-1-one was synthesised from 4-dimethylaminobenzaldehyde and 4-isothiocyanatoacetophenone, as catalyst concentrated HCl at 45 ^oC for 2 hours [6]. The presence of $–NH_2$ group in (2) gives the opportunity to chemically connect the 3-(4-dimethylamino) phenyl-1-(4-isothiocyanatophenyl) prop-2-en-1-one (3) with Zn tetraaminophthalocyanine (2) to give tetrasubstituted Zn phthalocyanine with chalconic groups. The reaction mixture formed from 3-(4-dimethylamino) phenyl-1-(4-isothiocyanatophenyl)prop-2-en-1-one (3) and Zn tetraaminophthalocyanine (2) 4:1 ratio, is

dissolved in DMF and heated to 60-65 ^{o}C for 5 hours. The reaction product is obtained with a yield of 57%. For obtained compounds IR analysis was performed.

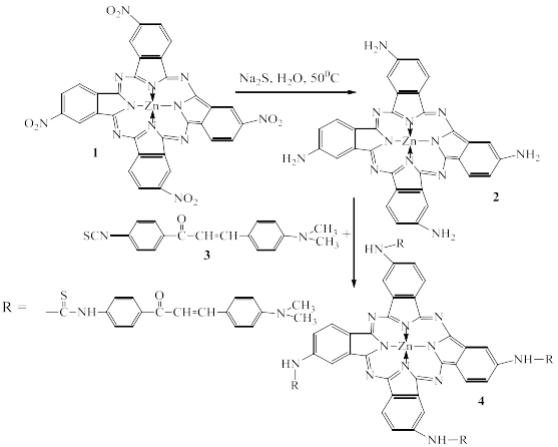


Fig. 1. Synthesis of Zn tetra-substituted phtalocyanine with chalconic groups

The synthesis of one Zn tetrasubstitutedphthalocyanine with chalconic groups was realized and the presence of functional groups was confirmed by IR spectra. These types of compounds can be used as fluorescent substances. The fluorescent characteristics are due to the presence of chalconic groups.

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