

BIS-SPIROPYRAN ON THE BASIS OF BENZODIPYRROLOQUINOXALINE AS A PHOTOCHROMIC LIGAND IN METAL COMPLEXES

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In recent years, spiropyrans have attracted significant attention due to their ability to bind metal ions and form coordination complexes in which they act as ligands. Coordination with metal ions enhances the stability of the polar merocyanine form of spiropyrans.

We have synthesized a series of substituted bis-spiropyrans that exhibit photochromic behavior. Of particular interest is the potential of these bis-spiropyrans to form metal complexes. As the object of study, we selected bis-spiropyran, synthesized from dipyrrolobenzoquinoxaline. Its molecule contains an additional donor center — an OCH₃ (methoxy) group — in the ortho position relative to the phenolic oxygen atom, which facilitates metal-ion coordination and enhances complex stability.

According to literature data, the formation of open merocyanine forms in bis-spiropyrans typically occurs through the opening of only one pyran ring, resulting in a unilaterally opened asymmetric monomerocyanine structure.

In the UV spectrum pure ligand in MeCN show intense absorption bands in the UV region, and just a weak absorption in the Vis region ($\lambda_{\text{max}}=606\text{nm}$). The NMR spectrum of compound is consistent with a symmetrical structure and exhibits a cis-coupling constant between the pyran protons, characteristic of the cyclic isomeric structure.

To form the complex, a solution of metal salts (ZnCl₂, CuCl₂, MnCl₂ x 4H₂O) in acetonitrile was added to a solution of the ligand in acetonitrile. In all cases, the color of the ligand solution changed immediately. Within 30 minutes, the solutions darkened and turned different shades of red, indicating the slow spontaneous formation of the open ligand form, which is stabilized by coordination with metal ions. This structural transformation of the ligand is expected to be reflected in corresponding changes in the electronic and luminescence spectra. In the UV spectrum of the complex (L-Zn) a long-wavelength absorption maximum hypsochromically shifted to 585nm with increased intensity (0.38).