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31.10.2019 Warszawa

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Synthesis and physicochemical properties of mono and diheterotruzenes derivatives

Abstract

Literature part of this work describes synthetic methods of truxene and its 5,10,15-triheteroderivatives along with paths for their further functionalization. The influence of the presence of three heteroatoms in the truxene π -electron system on its electronic structure and physicochemical properties was discussed along with presentation of potential applications areas, in particular within the optoelectronic industry.

The research part presents the novel and effective methodology for the synthesis of unsymmetrical heterotruzenes, namely 5-hetero and 5,10-diheterotruzenes, which contain nitrogen, oxygen or sulfur atoms in their structure. The influence of the presence of one heteroatom on the electronic structure, spectroscopy, thermochemistry and electrochemistry of the presented aromatic systems was discussed in detail. Changes in physicochemical properties resulting from the successive exchange of carbon atoms to heteroatoms were also observed. In order to assess the utility of unsymmetrical heterotruzene for optoelectronic purposes, the spectroscopic properties of five synthesized donor-acceptor systems based on the 5-thiatruzene derivative were investigated.

Keywords:

truxene, 5-heterotruzene, 5,10-diheterotruzene, 5,10,15-triheterotruzene, oxatruzene, azatruzene, thiatruzene, synthesis, photocyclization, functionalization, spectroscopy, emission, fluorescence, phosphorescence, thermochemistry, electrochemistry, structure