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Microwave Assisted Synthesis and Solvato (Media)-Chromic Behaviour of Some New Series Photosensitizing Dyes

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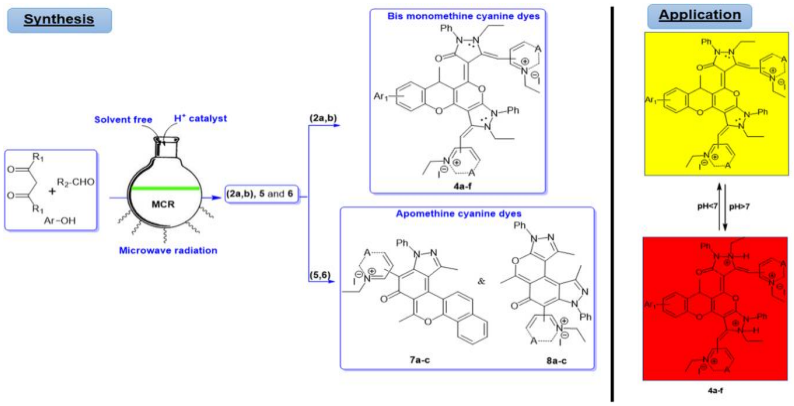
ABSTRACT

The motivation in the synthetic process of new benzo[7',8'] chromeno [2',3':4,5]pyrano [2,3-c] pyrazol, benzo[7,8] chromeno[4,3-e]indazole and pyrazolo[4',3':5,6] pyrano[4,3-e] indazole heterocyclic moieties and related cyanine dyes is to improve the specific characterization, photosensitization behavior, and probable application in the field of biology, medical Science, technology and physics. A new efficient and simple one-pot synthesis of three component reaction were performed for the synthesis of new mono and zero methine cyanine dyes under solvent free microwave condition to provide a green technique, shorter reaction times, high efficiency reactions and high yield product for the synthesis. Such Heterocyclic and related dyes were identified by elemental and spectral analysis. The absorption and emission spectra were investigated in 95% Ethanol to attempt and throw some light on the influence of such new heterocyclic nuclei and to compare or evaluate spectral behaviors. Acid-Base properties (halochromic) in aqueous solutions universal buffer of some selected cyanine dyes were studied to determine the better PH for these photosensitizers.

Graphical abstract



Highlights:

- New bismonomethine and zeromethine cyanine dyes developed by one pot reaction techniques under microwave irradiation and avoiding toxic organic solvent to achieve the green aspect of the process (ecofriendly).
- The intensity of the color of cyanine dyes is depending basically on increasing or decreasing л-delocalization conjugation in the dye molecule.
- Increasing number of charge transfers give better photosensitizers
- Dyes which have more conjugated charge transfer pathways have lower energy gap ($E_{0\text{-}0}$) than those which have one conjugated charge transfer pathway.

Changing the color of the dyes from acidic to basic medium give the opportunity of these dyes to be used as an indicator in analytical chemistry.

Keywords: Synthesis; Photosensitizing dyes; Solvato(media)-chromic behaviour; Photophysical properties.