



# Study of Photosensitive Properties of Hemicyanines Dyes

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## Abstract

The Hemicyanines are generally heterocyclic N-atom at one end and conjugated methine chain. The heterocyclic N-atom are tertiary nature having some positive charge. The heterocyclic part such as pyridine, indole, quinoline and their derivatives with proper substitution gives new Hemicyanines are characterised by elemental analysis, IR, UV spectra. This invention relates to synthesis and photosensitivity of Hemicyanines dye which belongs to the synthesis of a functional dyes and the application of the functional dye as a fluorescent dye. These Hemicyanines dyes are widely used as powerful photo sensitizer and also used for optical information recording media, tools for laser technology, solar energy devices, dying agent for silk, cotton, paper, fabric and synthetic fibre etc.

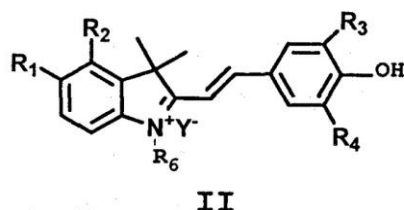
## Introduction

The Hemicyanines dyes has good light stability and suitable in water soluble, good permeability of cell membrane. They have strong fluorescent property in cell. The synthesised Hemicyanines molecules have pH probe properties, solid -state fluorescent properties and binding properties with biomacromolecules according to different substituents. The anions for pH probe the compound can be adjust the pKa according to the different substituents. The compound can be adjusted to the solid-state emission wavelength according to different substituents and anions which are used as a biological molecules probe. The compound has good response to the biological molecules and living cell, they can be used for cell staining. They can prevent the interference of biomass auto fluorescence because of longer absorption and emission wavelength.

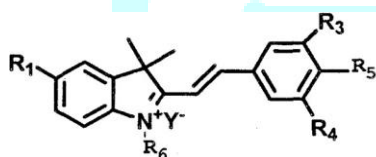
## Indole Hemicyanines dye

In recent years some synthesised Hemicyanines dyes has been used to the test of DNA and that are comparing to Indole, pyridine, quinoline, benzothiazoles. The two dye stuffs of being joined by flexible chain in the first three class of Hemicyanines dye. The indole Hemicyanines are used for detection of biomolecules and also used

for protein detection. Lipotropic compounds are those that help catalyse the breakdown of fat during metabolism in the body. A lipotropic nutrient promotes or encourages the export of fat from the liver. Lipotropics are necessary for maintenance of a healthy liver, and for burning the exported fat for additional energy. Without lipotropics, such as choline and inositol, fats and bile can become trapped in the liver, causing severe problems such as cirrhosis. The lipotropy can make probe pass cytolema and form a film surface sediment. If the indole Hemicyanines dyes that has not contain watersoluble group has good membrane permeability. on the other hand long wavelength dye stuff not only can be avoided absorption and the fluorescence of organism self, can also reduce the damage of laser pair when using.



3. according to the described class indole hemicyanine dye of claim 1, it is characterized in that: when R2=H, n=1, form structural formula II



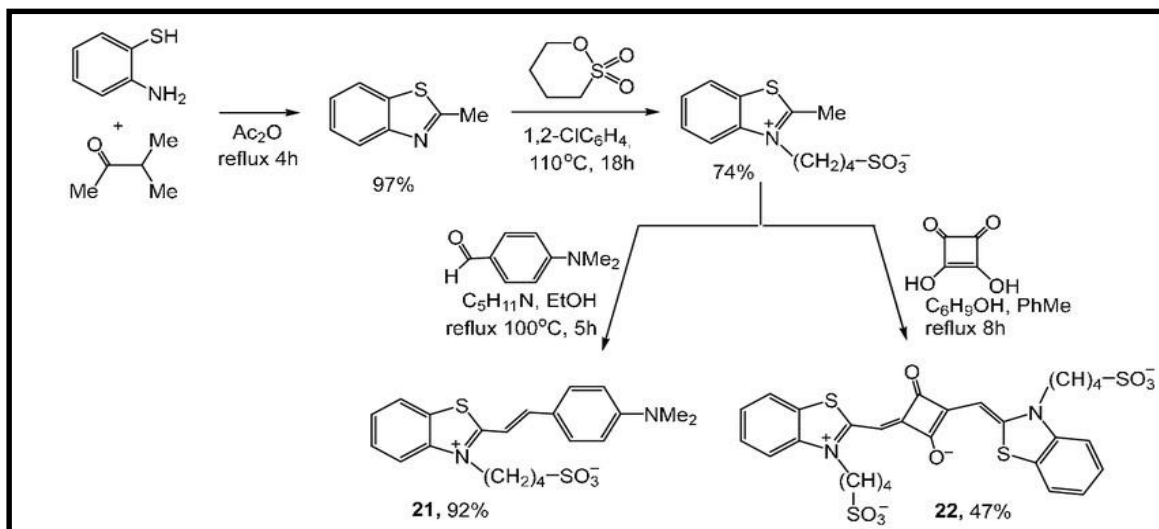
Wherein: R1=H, halogen, nitro, sulfonic group.

R3 and R4 independently are selected from H, hydroxyl, halogen, nitro, C1-4 alkyl separately;

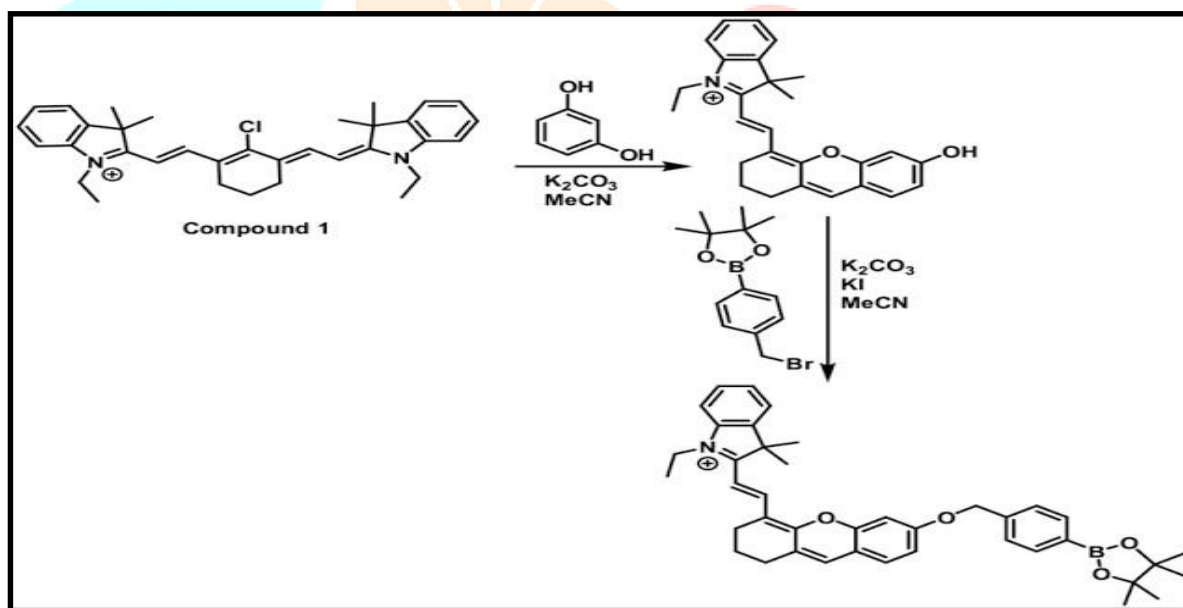
R5 is H, hydroxyl, N ((CH<sub>2</sub>)<sub>m</sub>R7) 2, wherein: R7=H, OH, OAc, COOH, COOCH<sub>3</sub>, phenyl;

### **Benzothiazole-indole Hemicyanine**

Benzothiazole-indole Hemicyanine dyes are widely used in many areas such as frequency, unconverted lasing, optical power limiting, fluorescence probes, molecular electronics and photoinitiated polymerisation. In recent years hemicyanines sensitiser are very interested in research in the area of two photon lasers which are pumped with photon due to their high transformed efficiency and low threshold. Alkylated indole, Benzothiazole possessing similar structures and properties, they are commonly known as electron withdrawing groups in various long -wavelength dyes. The Benzothiazole substituted Hemicyanine shows great photophysical properties. It has been successfully probes for sensing alkaline phosphate and cysteine. A condensation reaction between methoxy intermediate and alkylated Benzothiazole acetic anhydride was carried out to get the methoxy hemi-benzothiazole cyanine.



synthesis of benzothiazole based hemicyanines dyes.



synthesis of indole based hemicyanines dyes

## Conclusion

Hemicyanines dyes based on Benzothiazole has been widely used for infra red probs which are used for development of sensing applications. In recent years the developed hemi-benzothiazolecyanine based NIR probes are very useful. In MIR probes the hemicyanines based on benzothiazole is fantastic photosensitiser and is used for cancer cell detection. According to substituent is different in compound the function of fluorescence dye is different in different fields. Benzothiazole indole based hemicyanines dyes are a type of significant functional dyes that have been widely used in many areas such as frequency upconverted lasing, optical power limiting, fluorescence probes, molecular electronics, photo initiated polymerization and Langmuir film.

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