FLUORESCENCE AND GAMMA RADIATION STUDIES ON SOME DYES AND ITS ANALYTICAL IMPLICATIONS

THESIS SUBMITTED
BY

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FOR

رسالة

Ph.D. Degree

(Chemistry)

TO

Faculty of Science
Ain Shams University

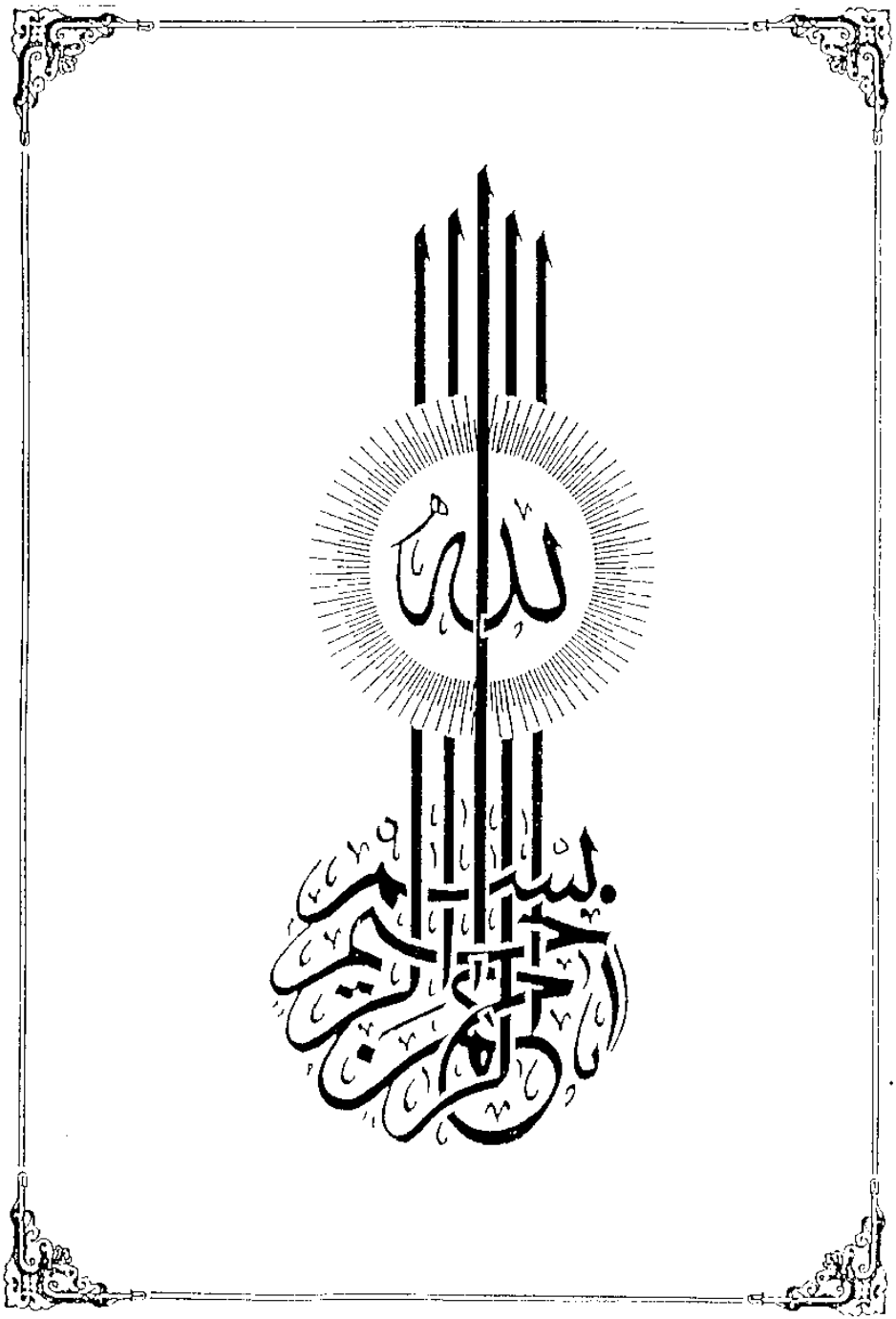
Cairo, Egypt.

1994

Dedicated to

My husband

Dr. Gehad M. Allia



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Aim of The Work

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Great attention has recently been paid to the problem of solvent effect on spectral, chemical and reactivity data of electron donor-acceptor molecules (EDA) of potential industrial applications. In this thesis some photophysical parameters of EDA dyes (1-4) will be studied in different media.

The study includes measuring the fluorescence quantum yields (Φ_f) as a function of viscosity of the medium (in glycerol at different temperatures).

Since quenching processes of radiant energy have significant bearing on structure requirements necessary to get essential information about some photochemical steps in a variety of solar energy conversion systems for increasing the efficiency of producing active quenchers, and because they provide molecular level information about excited state energy transfer which is routinely used in lasers and in molecular yardstick, the thesis will deal with these processes.

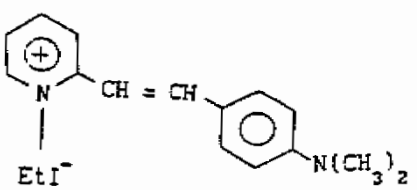
In particular, the absorption and fluorescence spectra of two dyes (2 and 5) will be measured precisely upon the addition of several inorganic fluorescence quenchers. We will report on the factors affecting the rate constant of fluorescence quenching of the above dyes by heavy atom induced by using iodine as quencher

and by electron transfer due to excited state interactions with some inorganic complexes like $K_3[Fe(CN)_6]$ and $K_4[Fe(CN)_6].3H_2O$.

Furthermore, stability towards γ-radiation of this class of compounds with possible application to radiation dosimetry will be investigated. The dyes 2 and 6 in dimethylsulphoxide showed reasonable systematic response. This prompt us to carry out further studies to understand the different factors affecting their radiolysis.

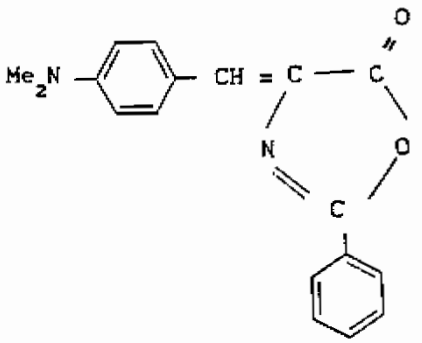
Among these factors are the concentrations of the dyes, the decoloration yield represented by G-value (which is the radiolysis yield per 100eV of absorbed energy) is to be measured under different conditions. The color stability and the radiation response of the dyes under the different conditions are to be determined.

Dye 1



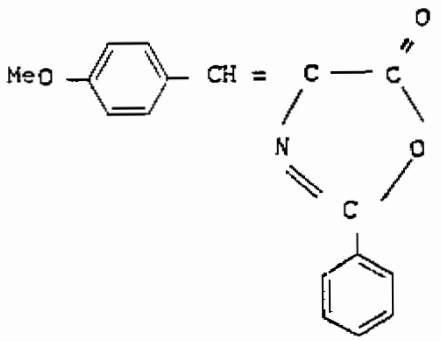
2-(p-N,N'-dimethylamino styryl) pyridine Ethiodide.

Dye 2



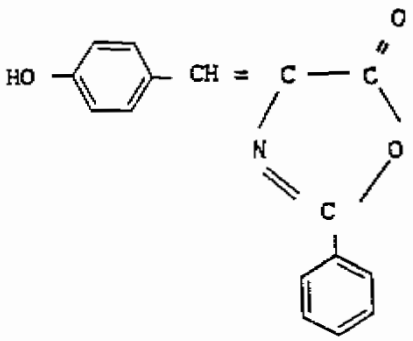
4-(p-N,N'-dimethylamino benzylidine)-2-phenyl-oxazol-5-one.

Dye 3



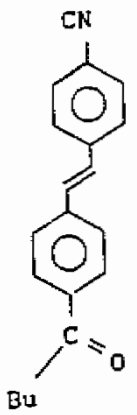
4-(p-Methoxy benzylidine)-2-phenyl-oxazol-5-one.

Dye 4



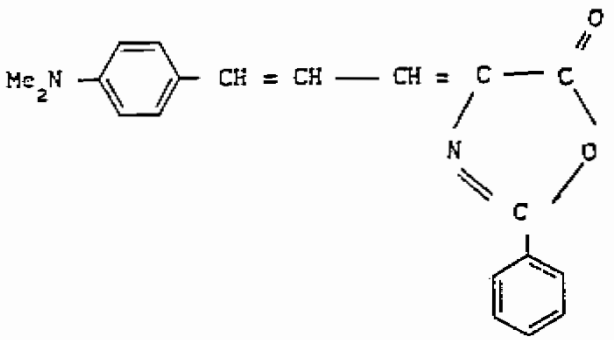
4-(p-hydroxy benzylidine)-2-phenyl-oxazol-5-one.

Dye 5



p-Cyano p'-Valeroyl stilbene.

Dye 6



4-(p-N,N'-dimethylamino cinnamaylidine)-2-phenyl-oxazol-5-one.