

an appreciable non-planar geometry for QH^+ in the T_1 state in site I. Electron–nuclear double-resonance investigations will probably clarify the structural problems.

1 *Chem. Phys. Lett.*, 65 (1979) 266.

Photophysics of β -carbolines

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Steady state and time-resolved fluorescence techniques were used to study the excited state behaviour of β -carboline and 2-methyl- β -carboline under various conditions of solvent and temperature. In aqueous solutions these molecules exhibit quite unusual excited state acid–base behaviour. In acidic solution the β -carboline cation is responsible for light absorption and fluorescence (λ_{max} , 450 nm; τ_{F} , 22.0 ns). However, excitation of the neutral form of the molecule in alkaline solutions leads to the formation of the β -carboline cation by a rapid proton transfer with water. A diffusion-controlled quenching of the excited state cation by OH^- ions produces another species fluorescing with λ_{max} at 510 nm (τ_{F} , 1.6 ns) which is identified as a zwitterion. The zwitterion is also formed after excitation of the ground state anion at pH 14. $\text{p}K$ values for the ground state and excited state acid–base equilibria are reported. In addition, studies of the temperature dependence of the luminescence have provided some insight into the excited state relaxation mechanisms occurring in these derivatives.

A new photochromic system: absorption spectra, emission spectra and kinetics

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The interest in novel non-silver photosensitive systems has recently stimulated active research in this domain. In this context photochromic systems have become extremely attractive with respect to their use as silver-free imaging systems, as data storage, data display and photoprint systems, as photoresists and for potential solar energy conversion.

Recently we described a new photochromic system based on spiro[1.8a]di-hydroindolizines (1) [1]. In this paper UV, fluorescence and photoacoustic spectra of this new class of compounds 1 as the coloured forms 2 are presented. The reaction rate and the activation parameters of the thermal back reaction $2 \rightarrow 1$ are used to gain insight into the basic processes of the system.

1 G. Hauck and H. Dürr, *Angew. Chem.*, 91 (1979) 1010.

d- π^* transitions for electron injection into the conduction band of semiconductors

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In many asymmetric transition metal complexes with only one aromatic ligand AR, charge transfer (CT) transitions are known leading to charge redistribution along a well-defined central atom to aromatic ligand axis L_nM-AR . If the interaction between the two fragments L_nM and AR is not too strong, we expect the energy needed for such transitions to be proportional to the difference in the redox potentials of the fragments: $E(CT) = a + bE(AR, AR^-)$ for a given M. The constants *a* and *b* can be interpreted within a thermodynamic analysis similar to that used for organic donor-acceptor systems. The enthalpy difference between the ground state and the relaxed d- π^* state is related to the maximum of the d- π^* absorption band by $\Delta H = h\nu_{\max} - \Delta H(\text{reorganization})$. Since the equation for $E(CT)$ can be used to fit many data it seems that the proportionality to $E(AR, AR^-)$ does exist. Using this information, we tried to make an organized charge redistribution in order to collect several charges within a certain geometrical arrangement. Starting with trichlorosilane compounds, in the first step the ligand was attached by a C-Si \equiv O₃ bridge to a colourless metal oxide with semiconductor properties. The oxides had to be dried in vacuum. Once the bulk water has been completely removed, enough hydroxyl groups remain on the surface to react with the trichlorosilane. We used the characteristic -C \equiv N stretching vibration of benzonitrile to analyse the surface modification. The metal complex was built in a later step. Electron injection into the conduction band was detected by measuring photocurrents by applying the lock-in technique.