The annular photoreactor

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The present state of calculation and design of the well-stirred annular photoreactor is analysed. The results of the research on this topic carried out in the laboratory of the Chemical Engineering Department in the Faculty of Chemistry of Barcelona are presented. A study of measurements of the radiation flow rate that reaches the reactor from the lamp and the intensity profiles of radiation in the photoreactor is made in order to calibrate the photoreactor. Furthermore, a study of photochemical decomposition of some organic pollutants such as sodium dodecylbenzenesulphonate, formic acid etc. is presented.

The triplet state of the quinoxalinium cation in a quinolinium perchlorate host crystal
II: Investigation by electron spin resonance at 1.2 K

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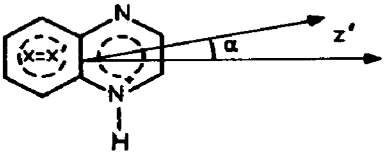
The quinoxalinium cation QH^+ is an example of a conjugate acid of a polynuclear aromatic azine whose lower electronic states and intramolecular radiative and radiationless processes are partly understood [1]. Electron spin resonance experiments were performed with a K band superheterodyne spectrometer. The zero-field splitting (ZFS) parameters were evaluated for two sites for QH^+, and two different orientation possibilities for the principal axes x', y' and z' of the ZFS tensor are illustrated.



For site I $\alpha = 43°$ or $\alpha = -10°$ and for site II $\alpha = 6°$ or $\alpha = 27°$. Hyperfine structure is observed for $H \parallel z'$ and $H \parallel y'$. The results obtained do not indicate 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. 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.