PHOTOCHEMISTRY IN A CONFINED MEDIUM: ZEOLITE

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Selectivity in organic phototransformations continues to be one of the main topics of current research activity. Of the various approaches, the use of constrained and organized media has shown considerable promise. Organized media allow one to design a system and carry out photochemical and photophysical studies within these assemblies in a more temporally and structurally quantifiable fashion than possible in isotropic media. The organized medium we will be discussing in this talk is zeolite (Figure 1). Zeolite, unlike most other organized media, is not 'passive' and it possesses an 'active' reaction cavity. When the walls of the reaction cavity are active, predictions concerning the excited state behavior of guest molecules can be made only by taking into consideration possible interactions that may exist between the cavity and the guest molecules. To be able to plan and rationalize selectivity within a zeolite one needs to understand the internal characteristics of the zeolite itself. This talk deals with two aspects: (a) use of zeolite as a reaction medium to carry out selective phototransformations and (b) use of photophysical probes to explore the characteristics of zeolite interior.

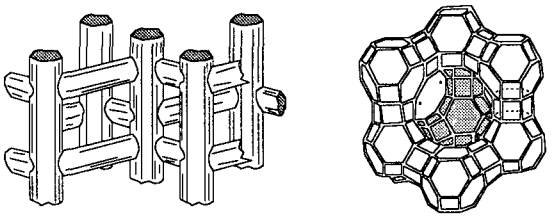

Figure 1: *Internal structure of ZSM and X/Y zeolites*

In Figure 2 the product distribution of several reactions in solution (bottom) and within zeolites (top) are shown. Clearly the selectivity is remarkable within a zeolite compared to that in solution. To be able to manipulate a photoreaction within a zeolite we need to understand how these selectivities are achieved. Our approaches towards these ends will be detailed in the talk.

Zeolite is not only a reaction medium but also a very useful spectroscopic matrix. Unlike most spectroscopic matricies which are inert, zeolite is 'active'. It can trigger processes such as spin mixing, electron transfer and proton transfer. Zeolites can be used to observe phosphorescence from chromophores which never phosphoresce in conventional matrices