Photochemical Reactions in Inclusion Compounds

Tali Lavy, Menahem Kaftory, *Department of Chemistry, Technion - Israel Institute of Technology, Haifa, Israel.* E-mail: lavyt@tx.technion.ac.il

In inclusion compounds the guest molecules occupy space formed by the host molecules. Carrying out photochemical reactions in inclusion compounds proved to be a unique method for the synthesis of a large variety of compounds. The research deals with unimolecular and bimolecular photochemical reactions in inclusion compounds. In a recent publication the effect of the reaction core on the homogeneity/heterogeneity of the reaction was studied. A question arises from this recent study: what happens if the volume of the product is smaller than that of the reactant? Free volumes are not anticipated to exist. Therefore it is expected that the following possibilities will occur: either destruction of the crystal as a result of the collapse of the cavity's walls (heterogeneous reaction) or that some other molecules will occupy the free space. We have encountered for the first time few examples where a photochemical dimerization reaction is taking place in a single crystal of inclusion compound and at the end of the reaction water molecules penetrate into the free space without destruction the crystal lattice. Moreover, at the end of the dimerization, the orientation of the dimer with respect to the host molecules is different than that prior to the reaction. Evidently the dimer is rotating during or after the photoreaction.

The aim of the unimolecular study is to examine to what extent the conformation adopted by N,N disubstituted-α-oxoamides determines its photochemical reaction. We have used different host molecules in order to control the conformation of the guest. It was found that indeed the N,N disubstituted-α-oxoamides show different photochemical behavior which depends on their conformation.

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