IR POLARIZATION STUDY OF THE UV PHOTOLYSIS OF ACETYL CHLORIDE

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Infrared polarization spectroscopy is used to determine the alignments of the photoreagent and photoproducts after the ultraviolet photolysis of acetyl chloride. Matrix-isolated (argon) and neat samples of acetyl chloride are irradiated with polarized 266 nm light, producing complexes of ketene ($H_2C{=}C{=}O$) and HCl through a concerted elimination reaction. The alignment of the vibrational dipoles of the HCl and ketene products, and the remaining acetyl chloride is measured. The cos^2 angular distributions allow the orientation of the molecules to be calculated relative to a laboratory axis. Possible geometries for the reaction coordinate and the HCl-ketene complex are deduced from the determined orientations.