INFRARED SPECTROSCOPY AND PHOTOCHEMISTRY OF NITROMETHANE ADSORBED ON ALKALI HALIDE FILMS: CONFORMERS AND QUENCHING

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Nitromethane was adsorbed at low temperature onto sublimated alkali halide films. We have observed two conformational isomers on these surfaces, manifest as a temperature-dependent splitting of the asymmetric C-H stretching modes. The energy difference and barrier height to interconversion between these conformations were determined for molecules adsorbed on NaCl, NaBr, KCl, and KBr films over temperatures ranging from 12 K to 160 K.

Irradiation of the adsorbate at wavelengths above 250 nm does not yield any observable photoproducts, while irradiation using wavelengths below 250 nm produces a variety of photoproduct species. The surface apparently has little effect on the π - π^* (198 nm gas phase) photochemistry, but quenches the n - π^* photochemistry (singlet-singlet: 270 nm; singlet-triplet: 326 nm) to an undetectable level.