THE PRODUCTION AND INFRARED SPECTRUM OF A PHOTODIMER OF TRIFLUORONITROSOMETHANE (CF_3NO) ISOLATED IN INERT GAS MATRICES

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We report the results of laser photolysis (λ = 670, 633 nm) of CF_3NO trapped in solid argon, krypton, xenon, nitrogen and oxygen. Infrared spectroscopy was used to characterize the photoproducts and monitor the progress of the photolysis. In the gas phase photolysis, the parent molecule undergoes fragmentation upon S_1 excitation and the nascent fragments react with another monomer to produce the N-nitritoamine, $(CF_3)_2NONO$, previously observed by Mason [a]. Our condensed phase spectra indicate the formation of a different photoproduct, an azo or azoxy compound, with no apparent presence of the nitritoamine, and traces of CF_3 and NO in only the most dilute matrices. The quantum efficiency of this reaction exhibits a dependence on the matrix:reagent ratio. This concentration dependence is consistent with a second photolytic pathway where the S_1 monomer reacts with a ground state monomer in an adjacent matrix site before fragmentation can occur.

[a] J. Mason, J. Chem. Soc. 1963, 4531.