INFRARED SPECTRA AND PHOTOCHEMISTRY OF γ-BUTYROLACTONE AND γ-BUTYROLACTONE-d_6 ISOLATED IN INERT GAS MATRICES

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We report the results of ultraviolet photolysis of γ-butyrolactone and γ-butyrolactone-d_6 trapped in solid nitrogen and argon. The infrared spectra obtained prior to photolysis are in agreement with the gas and liquid phase results obtained by Durig and coworkers[a] and McDermott[b]. The carbonyl stretching mode, observed at 1770 cm^{-1} in the liquid, appears as a doublet at 1803 and 1775 cm^{-1} (1797 and 1788 cm^{-1} for the deuterated isotopomer) in the matrix.

The photoproducts were characterized via infrared spectroscopy. Irradiation at wavelengths below 250 nm results in the production of CO and CO_2. There is also evidence of a secondary photolysis which produces atomic oxygen. Possible mechanisms for the photolysis were evaluated, based on the observed photoproducts and *ab initio* calculations. These results will be compared with those found for the thermal decomposition of this compound.

[a] J. R. Durig, G. L. Coulter, and D. W. Wertz, J. Mol. Spectrosc. 27, 285 (1968).

[b] D. P. McDermott, J. Phys. Chem. 90, 2569 (1986).