Soft X-Ray Induced Photolysis of Aceton Isolated in Deuterium Matrices *	U15

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Photofragmentation induced by soft x-ray synchrotron radiation near the oxygen K edge (535 eV) has, for the first time, been observed for acetone isolated in low temperature solid D2 matrices by matrix isolation Fourier transform infrared (FTIR) spectroscopy. The matrix absorption bands were sharp and well resolved, though slightly energy shifted compared to the gas phase data. The final products from photofragmentation were determined by comparing the obtained difference FTIR spectra with their literature IR data. Although methyl and acetyl radicals of particular interest were not observed directly in our FTIR spectra, the secondary photolytic products derived from these two radicals, such as methane, ethane, acetylacetone and diketone, were detected. The related underlying pathways of photolysis were proposed accordingly. Quantum yields were estimated for this photoreaction at different irradiation energies and various matrix concentrations. Kinetics analysis of acetones photolysis in very dilute D2 matrices shows that the fragmentation is unimolecular. Carbon monoxide emerged from photolysis might perhaps be the only primary product that was trapped by the solid D2 matrix. The formation of carbon dioxide in this photodecomposition process indicated apparently the creation of the neutral atomic oxygen, which would in turn signify the possible existence of a minor channel involving the atomic site selective fragmentation mechanism when core excitation occurred near the oxygen K edge of acetone in the cold D2 matrices. But the overall photolysis here apparently lacks the atomic site or core excited state selectivity, as seen in the gas phase, and the underlying cause of this is discussed in terms of the delocalization of the valence hole which arises from autoionization or Auger decay of the core hole state.

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