CONFORMATIONAL COOLING AND ISOMERIZATION OF METHYL NITRITE ISOLATED IN LOW-TEMPERATURE MATRICES

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Conformational cooling is a phenomenon that can occur in matrix-isolation experiments when the gas phase ratio of conformers is not represented in the freshly deposited matrix-isolated sample. Gaseous methyl nitrite exists in two stable conformations: cis-CH_3ONO and trans-CH_3ONO, with cis being the more stable conformer. Previous literature does not show evidence of a change in cis to trans ratio of gas phase methyl nitrite in a supersonic beam, but there is no experimental data studying the effects of conformational cooling using an effusive source combined with matrix isolation. Our experimental results show evidence of conformational cooling, where the relative population of the cis conformer is increased compared to the ratio observed in the gas phase. We also observe an increased degree of conformational cooling when different bath gases are employed (Ar, N_2, and Xe). In addition to demonstrating this phenomenon, we investigated the photoinduced isomerization mechanism in each low-temperature matrix using 355 nm light. In this talk, we will describe the isomerization of matrix isolated CH_3ONO within the framework of caging effects and excited state dynamics, and discuss the role of conformational cooling during matrix deposition.