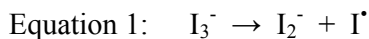


Ultrafast Photodissociation of Solid State Triiodide - Sample Preparation

Heather Wheeler, Ralph Ernstorfer, Robert E. Jordan, R. J. Dwayne Miller
Department of Chemistry, University of Toronto, Toronto, ON, Canada

Ultrafast electron diffraction is an extremely useful tool that makes it possible to visualize atomic motions in three-dimensional space with respect to time. This is referred to as “the molecular movie,” the making of which was the project goal. The molecular movie enables one to watch a chemical reaction as it happens, a feat that requires a time scale on the order of 100 femtoseconds (10^{-15} s)¹.

The reaction of interest was the photodissociation reaction undergone by the triiodide anion (Equation 1)².



Triiodide was chosen for a number of reasons. It is a simple, triatomic anion, making it relatively easy to study. It also has a number of unique characteristics. For example, it violates the octet rule and has excited electronic states below the electronic detachment threshold³. Furthermore, triiodide has broad absorption peaks centred at 290 and 350 nm², making it possible to use the readily available 266 nm light to induce the reaction.

The main task of the summer was to create a thin film of a triiodide-containing salt that is stable under vacuum. This task proved not to be trivial. At this point, such a film has not been successfully created.

¹ Dwyer, J. R., Miller, R. J. D., et al. *Phil. Trans. R. Soc. A.*, (2006) **364**, 741-778.

² Landrum, G., Goldberg, N., and Hoffmann, R. *J. Chem. Soc.*, (1997) **19**, 3605-3613.

³ Banin, U., Waldman, A., and Ruhman, S. *J. Chem. Phys.*, (1992) **96** (3), 2416-2419.