

# Matrix-Isolation Spectroscopy of Reactive Organic Species: Molecules and Reactions of Relevance to Interstellar Space

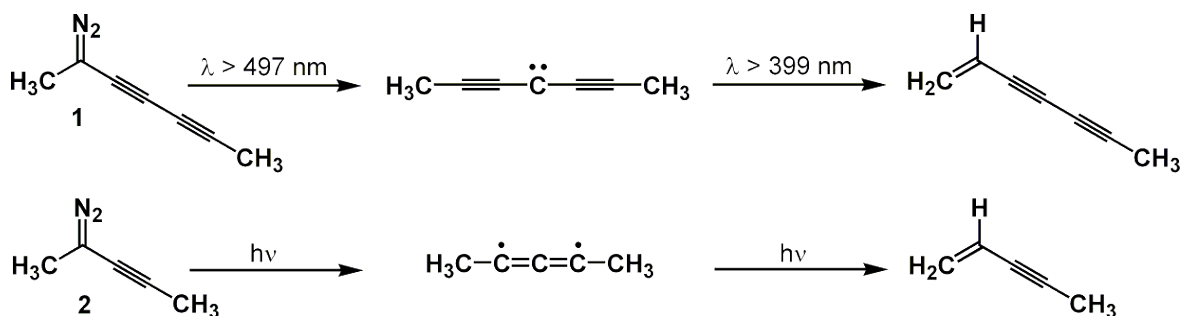
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Matrix isolation, the process of trapping a photochemical precursor in an inert gas at 10 K, provides a means for studying highly reactive intermediates, such as carbenes and radicals. Under matrix isolation conditions, thermal rearrangements are unlikely to occur, and the photochemical interconversion of molecules can be observed. Additionally, matrix isolation is a useful technique for studying suspected tunneling reactions, where molecules rearrange by passing through, instead of over, an energy barrier. Reactive species are typically detected by IR, UV/vis, and/or EPR spectroscopy. Structural assignments are made through comparison of experimental and computed spectral data.

This poster will summarize our studies on the preparation of precursors to diazo compounds **1** and **2**. IR, EPR, and UV/vis spectroscopic data obtained upon matrix isolation of **1** and **2**, as well as their photoproducts, will be highlighted.  $\text{HC}_3\text{N}_2\text{H}$  and  $\text{HC}_5\text{N}_2\text{H}$  derivatives are studied in order to obtain additional spectroscopic examples of mono- or polyalkynyl diradicals or carbenes, respectively, such that we may gain a fuller understanding of the diradical/carbene alternating trend of the  $\text{HC}_n\text{H}$  ( $n = \text{odd}$ ) series.



The conversion of *o*-tolylmethylene (**4**) to *o*-xylylene (**5**) has been shown to occur in the dark at 12 K under matrix isolation. Under these conditions thermal or photochemical reactions are unlikely to occur, thus it is believed this conversion is the result of tunneling. IR, EPR, and UV/vis studies are underway to determine relative rates of the parent and isotopically labeled systems.

