RESONANT ION-DIP INFRARED SPECTROSCOPY OF PHOTOCHEMICAL PRODUCTS: APPLICATION TO THE C_6H_2 AND C_6H_4 PRODUCTS FROM $C_4H_2{}^*$ REACTIONS WITH ALKYNES AND ALKENES.

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The chemical reactions of the long-lived triplet states of diacetylene ($C_4H_2^*$) with small hydrocarbons lead to a rich variety of poly-yne, ene-yne, and aromatic products. Characterization of these products is complicated by the number of isomers of some products which could be present. Resonant two-photon ionization (R2PI) has recently provided one level of spectroscopic characterization, but even here, the similarity of the electronic structures of the isomers can make positive identification difficult. In this talk, we report a first use of resonant ion-dip infrared spectroscopy (RIDIRS) to characterize two key products of $C_4H_2{}^*$ reactions: the C_6H_2 product from $C_4H_2{}^*$ + C_2H_2,C_4H_2, C_3H_4 and (ii) the C_6H_4 product from $C_4H_2{}^*$ + C_2H_4, C_3H_6. The RIDIR spectra of these products is recorded in the CH stretch region. Characteristic absorptions due to acetylene CH stretch, ethylenic (=CH_2), and vinylic (=CHR) are identified. Partially-resolved rotational structure is also evident in the spectra.