

PHOTODISSOCIATION SPECTROSCOPY AND PHOTOFRAGMENT IMAGING OF THE $\text{Fe}^+(\text{acetylene})$ AND $\text{Fe}^+(\text{benzene})_{1,2}$ COMPLEXES TO PROBE DISSOCIATION ENERGIES

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Tunable laser photodissociation spectroscopy and photofragment imaging experiments are employed to investigate the dissociation energies of the $\text{Fe}^+(\text{acetylene})$, $\text{Fe}^+(\text{benzene})$, and $\text{Fe}^+(\text{benzene})_2$ ion-molecule complexes. In the spectroscopy experiment, continuous dissociation is observed above a certain energy threshold throughout the visible wavelength region for all three complexes. Photofragment imaging of the Fe^+ photoproduct in the cases of $\text{Fe}^+(\text{acetylene})$ and $\text{Fe}^+(\text{benzene})$, and imaging of the benzene⁺ charge transfer photoproduct of $\text{Fe}^+(\text{benzene})$, provide upper limits on the dissociation energies of these two complexes. The dissociation energies measured from this two-pronged approach agree nicely with values determined previously by collision-induced dissociation. However, these values are inconsistent with those produced from computational chemistry at the DFT level, despite the implementation of functionals recommended for transition metal chemistry.