EXCITED STATE DOUBLE PROTON OR HYDROGEN TRANSFER ON INDIGO IN THE GAS PHASE: EFFECTS IN DEUTERATION.

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Indigo is a highly photostable molecule used in many ancient civilizations such as the Roman and Mayan empires. This brilliant and deep color survived for centuries in many pieces of art. Its photostability is explained by its excited state dynamics. In a previous study, we measured two decay channels upon excitation of the S1 and we concluded that this peculiar molecule undergoes an excited state hydrogen transfer (ESHT) and an excited state proton transfer (ESPT). In our recent work, we studied this de-excitation through selective deuteration of the two target transfer sites on indigo. We monitored the photo-reaction pathways of this molecule using Resonance Enhanced Multi-Photon Ionization (REMPI) coupled with a time-of-flight mass spectrometer and measured the lifetimes of the excited states using pump-probe spectroscopy with mass spectrometric isotopomer selection. We revealed that the slower decay was unaffected by deuteration. The calculated excited state potential energy surfaces show trajectories with a different pathway to the ground state: a sequential double proton or hydrogen transfer.