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Dissociative photoionization dynamics of vinyl chloride in an excitation energy range of 11.0 −14.5 eV

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Photoionization and dissociative photoionization of vinyl chloride (C2H3Cl) in the excitation energy range of 11.0˜14.5 eV were investigated with the method of threshold photoelectron-photoion coincidence (TPEPICO) velocity imaging. Only C2H335Cl+ and C2H337Cl+ molecular ions with a ratio of their natural abundances were detected in the TPEPICO time-of-flight (TOF) mass spectrum at 11.67 eV, indicating that the C2H3Cl+(A2A') excited state is stable and not dissociative. C2H3+ was the unique fragment ion in the dissociation of C2H3Cl+ ion at B2A" and C2A' states below 14.2 eV. Through the TPEPICO 3D time-sliced images of C2H3+ fragment ion, kinetic energy released distribution (KERD) and anisotropic parameters in dissociation of energy-selected C2H3Cl+ ion were obtained. It is shown that the KERD at 13.14 eV is exhibited with an apparent bimodal distribution, and the KERD at 13.65 eV involves an additional shoulder at lower kinetic energy. With the aid of the re-calculated potential energy curves, the detailed dissociative photoionization mechanisms of C2H3Cl+ ion at B2A" and C2A' states have been proposed.

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