

THE PHOTOIONIZATION OF VINYL BROMIDE CLUSTERS.

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The present contribution focuses on the results of a photoionization study of vinyl bromide cluster ions. Earlier contributions have reported on the detailed study of the spectroscopy and the dissociation dynamics of vinyl bromide isolated ions [1-3] as well as on the first results of the photoionization of clusters [4]. The study of the cluster ions is believed to bridge a gap between isolated ion and solvated ion reactivity.

The clusters were prepared in a molecular beam seeded in Ar. Typically 3 to 5 bars of C₂H₃Br mixed with Ar were expanded through a 70 μm diameter nozzle at room temperature. The clusters were then ionized by the synchrotron light at the Im-NIM beam line. The ions were analyzed using a quadrupole mass filter.

The mass spectrum displayed in figure 1 shows the presence of dimer ions as well as reaction products at $m/z = 133$ and 135 which correspond to the C₄H₆Br⁺ ions. These fragments can formally be described as resulting from the dissociation of the dimers (C₂H₃Br)₂⁺ → C₄H₆Br⁺ + Br. However it must be stressed that this relation is only formal because the actual parent ion is not known. Mixed clusters [Ar-C₂H₃Br]⁺ and [Ar-C₄H₆Br]⁺ are also observed in figure 1. No other fragments were observed.

We also determined the appearance energy of the dimer ion and the C₄H₆Br⁺ fragment ions to 9.7 eV and 11.7 eV respectively. An interesting feature is observed in the ionization efficiency curves of the dimer ion as presented in figure 2. This resonance might be due to an intracluster Penning ionization as it has been observed in the case of benzene-Ar mixed clusters [5].

An electroionization study of the vinyl bromide clusters is expected to reveal more information concerning this ionization mode.

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Fig. 1: The mass spectrum of C_2H_3Br in Ar recorded at 15eV photon energy and 3 bars stagnation pressure.

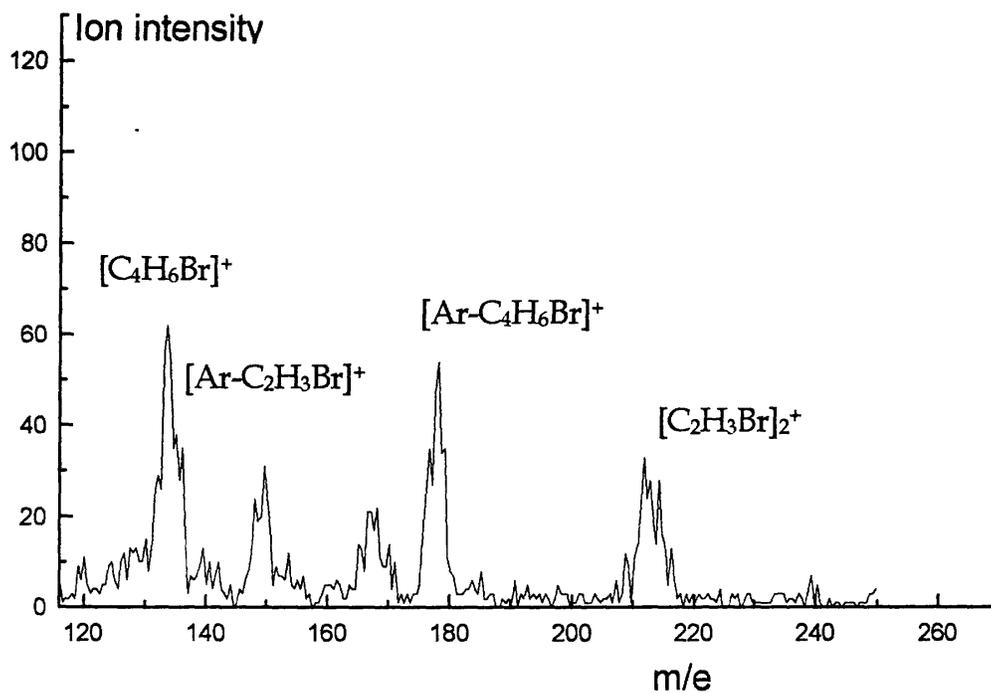
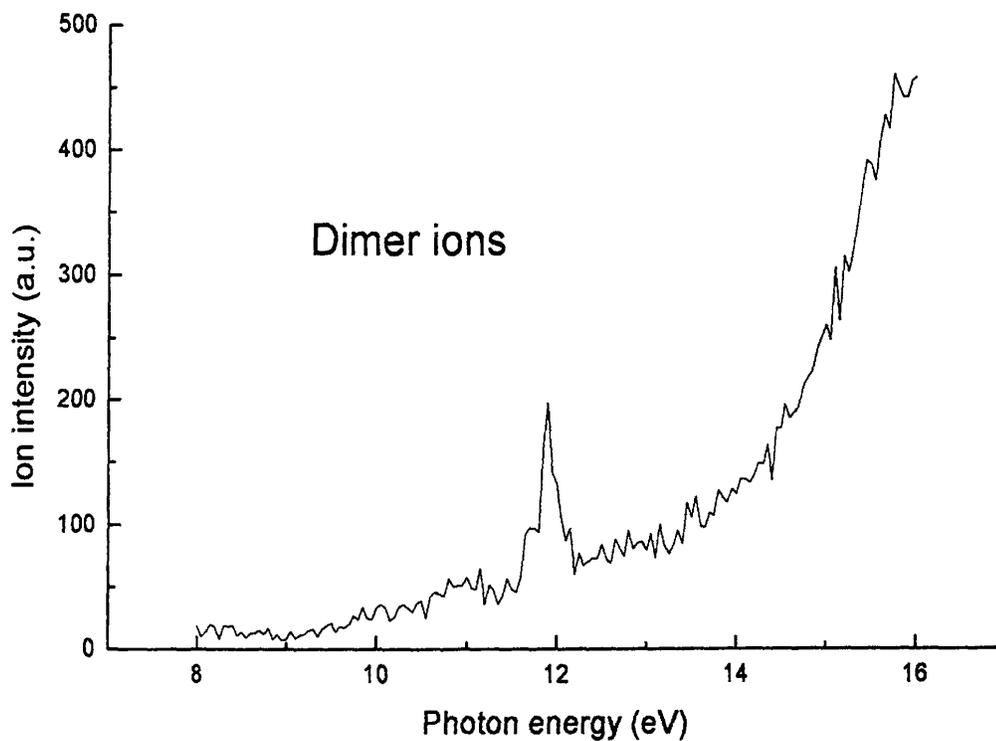


Fig. 2 : The ionization efficiency curve of $(C_2H_3Br)_2$ in Ar.



References.

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