

PHOTOABSORPTION, He(I)- AND THRESHOLD PHOTOELECTRON SPECTRA AND CIS-SPECTROSCOPY OF VINYLCHLORIDE (C_2H_3Cl).

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In the framework of a program aiming at the detailed investigation of the ionization and dissociation dynamics of ethylene halide clusters, we started to study their isolated monomers. In a first step we extended the spectroscopic data of these compounds by measuring their photoabsorption (PAS), threshold-(TPES) and He(I)-(PES) photo-electron and constant ion state (CIS)-spectra. An important member in this series is vinylchloride (C_2H_3Cl) and a complete set of results obtained for this molecule will be presented at the conference.

The present investigation was performed at the synchrotron radiation facility BESSY (Berlin) using a 3m NIM monochromator equipped with a 2400 1/mm Pt-grating. At its focal plane an ionization chamber is set up, followed by a tandem electron spectrometer made of two 180° electrostatic deflection analyzers working at constant pass energy.

The PAS of C_2H_3Cl (fig.1), has been recorded between 8-12 eV photon energy with a LiF window. It has been analyzed in detail in terms of three Rydberg series, i.e. ns, np and nd converging to the two first ionization limits, i.e. at 10.013 ± 0.005 eV and 11.674 ± 0.005 eV. Many of these Rydberg states are observed with their vibrational structure which has been disentangled and vibrational wavenumbers have been assigned to vibrational normal modes in the superexcited states. The underlying background has been ascribed to valence-to-virtual valence transitions (noticed A-E in fig.1).

The TPES and the He(I)-PES of C_2H_3Cl were recorded. Fig. 2 shows three bands of the latter, as well as their analysis. However, in the TPES from 10.5-11.5 eV photon energy the numerous observed features have been assigned to the population of vibrationally excited states of the ground state of the molecular ion through autoionization. The intermediate neutral and final ionic states were identified. Compared to the corresponding He(I)-PES, dramatic changes in the relative intensities of the bands and within each band have to be mentioned. For the main progression in the X^2A'' band and a few features in the 10.5-11.5 eV energy range, CIS-spectra have been recorded and analyzed with the help of the PAS and the TPES.

Fig.1: The PAS spectrum of C_2H_3Cl from 8-12 eV.

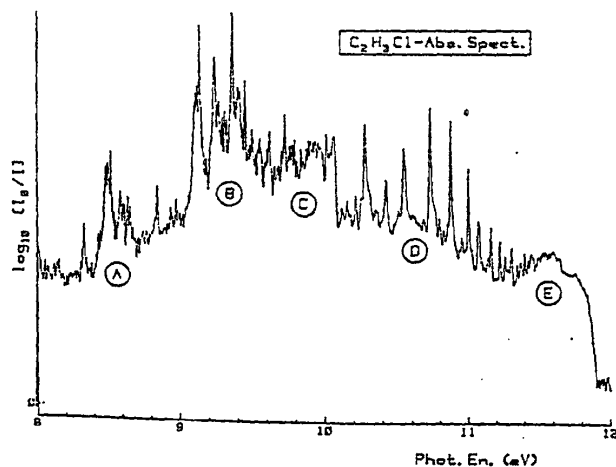


Fig. 2: Three bands of the TPES of C_2H_3Cl .

