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Absolute measurements of dissociative electron attachment to formic acid

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Synopsis High resolution, low noise measurements of absolute cross sections for dissociative electron attachment to formic acid were measured.

We present the study of dissociatiative electron attachment (DEA) to the simplest organic acid - the formic acid (HCOOH). The study was motivated by current interest of theory in the process and, according to astrophysical observations, by possible role HCOOH could play in the chemistry governing the formation of more complex molecules in the interstellar media. [1]

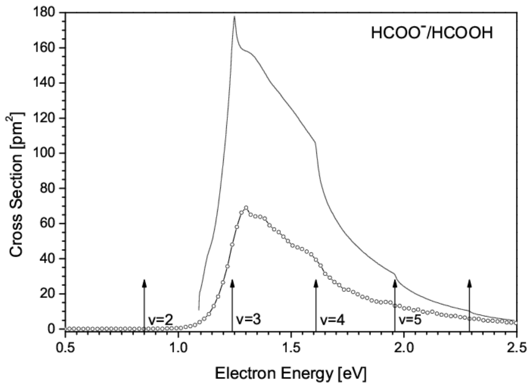

Figure 1. DEA cross section for $HCOO^-$/HCOOH; line with circles - experimental data, solid line - theory of Gallup *et al.* [5]; arrows - thresholds for excitations of the O-H stretch vibrational mode.

Four anionic fragments resulting from DEA to HCOOH have been observed: $HCOO^-$, OH^-, O^- and H^-. Corresponding DEA spectra have been measured under the resolution of approximately 60 meV by standard trochoidal electron monochromator (TEM)/quadrupole masss spectrometer instrument and subsequently normalized to absolute values from recently constructed time-of-flight/TEM instrument [2]. Similar relative spectra were reported at lower resolution and lower signal/noise ratio by Pelc *et al.* [3] and on absolute scale by Prabhudesai *et al.* [4]. Spectrum of the process

$$e^- + HCOOH \to HCOO^- \to H + HCOO^- \quad (1)$$

shows unique, the step-like structure, that is in agreement with one dimensional R-matrix model of Gallup *et al.* [5], who propose that the rotation of the O-H bond out of plane, caused by σ^*/ π^* coupling is not essential for the description of DEA to the formic acid - contrary to the conclusion of Ref. [6]. Absolute DEA cross sections for production of the remaining fragments from HCOOH will be presented at the conference.

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