# ELECTRON SCATTERING FROM FORMIC ACID

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Formic acid (HCOOH) is the simplest of the organic acids and it is thought that it could play a key role in the formation of simple biomolecules such as glycine and acetic acid in the interstellar medium. To date, the majority of studies of this molecule involving electron impact have been of the dissociative attachment cross sections [1,2]. To our knowledge there are no absolute differential scattering measurements in the literature, although there have been measurements of resonant contributions to vibrational excitation [3] and of the grand total scattering cross section [4]. There have also been recent calculations of electron scattering from both formic acid monomers and dimers [5], in which total and differential cross sections have been obtained.

We have studied elastic electron scattering from formic acid using a crossed-beam electron spectrometer. Formic acid [x], which has been further purified by a number of freeze-pump-thaw cycles, is admitted to the scattering system via a temperature-controlled needle valve and gas-handling system. The valve, gas lines, and beam-forming capillary tube through which the gas enters the collision region, are all set to a temperature of 70°C, at which value the beam is mostly comprised of the monomer. HCOOH dimers can also be studied by operating the apparatus at room temperature. The electron beam is obtained from a conventional electron monochromator and scattered electrons are energy analysed before being detected in a channel electron multiplier. The initial experiments have been performed with only moderate energy resolution (~100 meV). At energies above 10 eV this is not likely to lead to significant contributions from unresolved vibrational excitation, principally the $\nu_{7,9}$ modes with energy loss values of 0.077 and 0.079 eV respectively, as the cross sections for these modes appear to be very small at these energies.

Absolute cross sections are obtained using the relative flow technique. Flow rates for HCOOH, and the reference gas He, are measured at a number of temperatures, including both room temperature and 70°C. To establish the relative driving pressures of the two gases, such that the collisional mean-free-paths of the two gases in the beam-forming capillary are equivalent, we have used molecular bond lengths to estimate the hard sphere diameter of HCOOH.

Measurements at energies in the range 10-50 eV will be presented at the meeting and compared, where possible, with the recent theoretical calculations.

**References**

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