

Total and Partial Ionization Cross Sections for the Primary Alcohols Methanol and Ethanol

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The ionization and ion fragmentation of methanol and ethanol induced by electron impact were investigated in this work [1], using a HIDDEN Quadrupole Mass Spectrometer [2]. The Quadrupole Mass Spectrometer was used with an internal ionising electron source resulting in an energy resolution of $\sim 0.8\text{eV}$. Mass spectra and relative abundances of the cations generated by electron with impact energy of 70eV were obtained, and it was recorded that CH_2OH^+ was the most abundant cation for both alcohols, methanol and ethanol. The Total Ionization Cross Section (TICS) for methanol (Figure 1) and the partial ionization cross sections (PICS) for the cations CH_3OH^+ , CH_3^+ , CH_2^+ , $\text{CH}_2\text{O}^+\text{H}$, CO^+H , CH_2O^+ , CO^+ , C^+ , CH^+ were generated for electron impact energies of $10\text{--}100\text{eV}$. Our results are in good agreement with the theoretical and experimental values reported in the literature [3–8], for most of the formed cations. PICS values for ions groups for comparison the measurements of Rejoub *et al.*[3] were also reported, although Rejoub reported data with lower resolution than was recorded in this work [1].

For ethanol, TICS (Figure 2) was obtained and also, PICS for the cations $\text{CH}_3\text{CH}_2\text{O}^+\text{H}$, $\text{CH}_3\text{CHO}^+\text{H}$, CH_3CHO^+ , $\text{C}_2\text{H}_3\text{O}^+$, $\text{C}_2\text{H}_2\text{O}^+$, C_2HO^+ , $\text{CH}_3\text{O}^+\text{H}$, $\text{CH}_2\text{O}^+\text{H}$, CH_2O^+ , C_2H_5^+ , CO^+ or C_2H_4^+ , C_2H_3^+ , C_2H_2^+ , C_2H^+ , C_2^+ , O_2^+ or CH_4^+ , CH_3^+ , CH_2^+ , CH^+ and C^+ . To our knowledge, these are the first PICS measurements reported in the literature for each individual cation. These data has been compared with the groups of the mass reported by Rejoub *et al.* [2]. Finally, the ionization thresholds for methanol and ethanol for the formed cations were generated in this work [1].

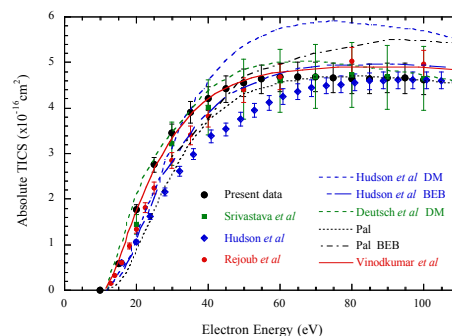


Figure 1: Total ionisation cross section (TICS) for methanol.

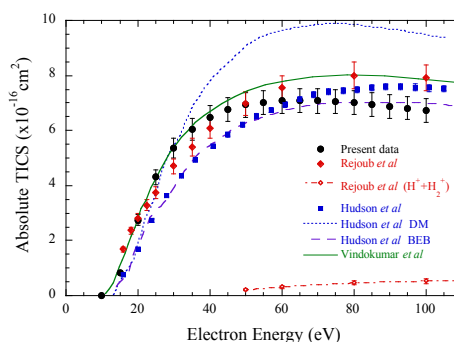


Figure 2: Total ionisation cross section (TICS) for ethanol.

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Reference

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