

Title: **Experimental measurement of ion-molecule reaction cross-sections.**

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Recently, the study of gas-phase neutral ion-molecule reactions has become very important in various areas of physics and chemistry. To study these processes, one of the best techniques is to use a radio frequency-guided ion beam (RF-GIB) device, and ion detection is done using a mass spectrometry technique adapted to the experimental device.

This research focuses on measuring the probability of reaction between carbon monoxide ions (CO^+) and methane (CH_4), as a function of collision energy and reactive gas pressure. The possible products of the reaction and the probability in which they are obtained are analyzed, and the same process is repeated several times, varying only the pressure of one of the reagents, methane. Data processing is performed to obtain the cross sections, and if possible the rate constants.

All experiments are performed under high vacuum conditions, with computer control and data acquisition.

Keywords: ion-molecule reactions, cross-section, rate constant, RF-GIB, mass spectrometry, gas pressure.