

Title: **Gas phase ion-molecule reactions: Their dynamics and chemical kinetics**

Student: Alba Fornell Comerma

Date: January 2019

Supervisor/s: Dr. Antonio Aguilar Navarro
Dr. Josep M^a Lucas Alcorta

Departament de Ciència de Materials i Química Física

In the last few years, studies on ion-molecule reactions, particularly the thermal energy charge-transfer ones have been extensive. The interest in this kind of reactions is partly related to their extensive presence in the ionosphere and interstellar chemistry.

In this work, the charge-transfer reaction between Ar⁺ ion and the neutral molecule N₂O, both in gas phase, leading to the formation of N₂O⁺ ion and Ar is studied. Additionally, a qualitative study of the products formed as secondary reactions between the reactants have been made.

The technology used to carry out this project is the so-called Radiofrequency - Guided Ion Beam (RF-GIB). In this technique, the argon ions generated by electron impact, are guided up into the octopole where they collide with N₂O molecules. The ionic products formed, are guided to a quadrupole mass selector analyser and later detected. This process takes place under high vacuum conditions.

Further processing of measured data has made it possible to calculate the reactive cross-section and the rate constant have been estimated.

Keywords: Ion-molecule reaction, reactive cross-section, radiofrequency – guided ion beam, reactive collision, rate constant, high vacuum.