

Abstract Submitted
for the GEC10 Meeting of
The American Physical Society

Rotational and vibrational energy transfer in impulsive ion-molecule collisions MASATO NAKAMURA, Nihon University, ATSUSHI ICMIMURA — We study rotational and vibrational energy transfer in large angle scattering of ions from molecules in the energy range of atomic unit. In such a collision, the interaction time is much shorter than the rotational period of the molecule. Sometimes, the interaction time becomes even shorter than the vibrational period. We have proposed a new model (hard potential model) for rotational and vibrational energy transfer in a limit of sudden collision. This model is a natural extension of the previously proposed hard-shell model where only the rotational degree of freedom is taken into account. Using the two models, we have studied systematically how energy-loss spectrum changes with collision energy. Here we study the dependence on mass of the projectile in collisions between closed-shell ions and N_2 . Through the comparison between models and CT calculation, we find that the collision is sudden both rotationally and vibrationally for $H^+ - N_2$, rotationally sudden and vibrationally non-sudden for $Li^+ - N_2$, and non-sudden both rotationally and vibrationally for $Na^+ - N_2$. Non-sudden phenomenon in the case of $Na^+ - N_2$ is related to a double collision mechanism. Comparison with experimental measurements will be given.

Masato Nakamura
Nihon University

Date submitted: 07 Jun 2010

Electronic form version 1.4