Slow Collisions of C^{6+} with H_2: A Coupled State Calculation*

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In establishing the ionization structures of a plasma containing multiply charged ionic systems the charge transfer mechanism plays a very significant role. These processes oblique in astronomical object are very highly state selective leading to formation ions in an excited state and the resulting emissions become a very useful diagnostic probe of plasma environment [1]. Collisions of multiply charged ions with molecules are very common in astrophysical plasmas. For multi charged ions in X-ray ionized astronomical environments the charge exchange provides a recombination mechanism. To understand this detailed information on the collision cross sections is essential. But the cross section calculations theoretically involving ion-molecules are rather complicate than their atomic counterpart. Just like atom ion systems, the ion molecule charge-transfer processes can easily be described by close and distant encounter events; the former allows to go beyond the pseudo-diatomic picture of the interaction but the latter the interaction remains localized over a limited range of nuclear separations. Thus it can be characterized by a distant collision, where the Coulomb term plays an important role. Freezing the target, H_2 can be treated as an atom with appropriate ionization potential (Ip) [2-5]. This provides considerable simplifications since the calculation reduces to an ion-atom problem.

*) **Partial Support by NNSA**

Reference:

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