

## Reactive collisions of electrons with molecular cations of astrophysical interest: effects to $\text{H}_2^+$ , $\text{HD}^+$ , $\text{H}_3^+$

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The dissociative recombination (DR) together with the competing reactions – ro-vibrational excitation/de-excitation of the hydrogen molecular ion plays a decisive role in astrophysical ionized media: stars and interstellar molecular clouds, early Universe.

Using a stepwise method based on Multichannel Quantum Defect Theory (MQDT) [1], cross sections and rate coefficients have been obtained for reactions induced on  $\text{HD}^+$ [2],  $\text{H}_2^+$  [3] and  $\text{D}_2^+$  [6].

For  $\text{H}_2^+$ , the full rotational computations improved considerably, the accuracy of the resulting dissociative recombination cross sections and Maxwell isotropic rate coefficients [5]. The different mechanisms taken into account for  $\text{H}_2^+$ , i.e. direct vs indirect and rotational vs non-rotational processes are presented.

An analytic three-channel model was developed for the description of simultaneous direct and indirect DR cross sections of  $\text{H}_3^+$  [4].

For these analyzed systems the results is in good agreement with the CRYRING (Stockholm) and TSR (Heidelberg) *magnetic* storage ring results.

### References:

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