

Population of ground and lowest excited state of Sulfur via SH⁺ dissociative recombination

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The presence of SH⁺ in the interstellar medium (ISM) has been observed and reported in [1-3]. It's destruction by dissociative recombination (DR) is significant and of importance to describe its chemistry.

Based on the Multichannel Quantum Defect Theory (MQDT) [4], a first theoretical study of the DR of SH⁺ through ²Π states of SH [5] was carried out, we are using the newly available results for the ⁴Π states [6] to attempted further calculations at low energy (below ionization threshold) of cross sections and rate coefficients in order to explain the disparity between the previous results and the experimental results. The branching ratio is also presented here.

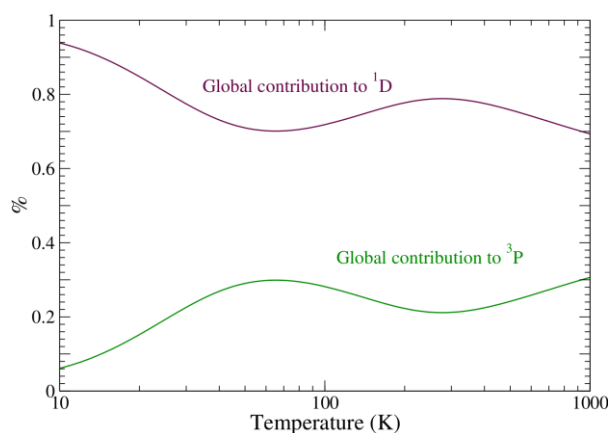


Fig : Yield (in percents) of the global contributions to the two sets of atomic fragments.

Following the work on the rotational effects on CH⁺ [7], it is our intention to include them for SH⁺ calculation and improve the agreement with experimental results. Preliminary results have already been calculated by M. D. Epée Epée.

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[1] K. M. Menten, F. Wyrowski, A. Belloche, R. Güsten, L. Dedes, and H. S. P. Müller, *Astron. Astrophys.* 525, A77 (2011).

[2] B. Godard, E. Falgarone, M. Gerin, D. C. Lis, M. De Luca, J. H. Black, J. R. Goicoechea, J. Cernicharo, D. A. Neufeld, K. M. Menten, and M. Emprechtinger, *Astron. Astrophys.* 540, A87 (2012).

[3] Z. Nagy, F. F. S. Van der Tak, V. Ossenkopf, M. Gerin, F. Le Petit, J. Le Bourlot, J. H. Black, J. R. Goicoechea, C. Joblin, M. Röellig, and E. A. Bergin, *Astron. Astrophys.* 550, A96 (2013).

[4] K Chakrabarti *et al* 2018 *J. Phys. B: At. Mol. Opt. Phys.* **51** 104002

[5] Kashinski D. O., Talbi D., Hickman A. P., Di Nallo, O. E., Colboc F., Chakrabarti K., Schneider I. F., and Mezei J. Zs., 2017, *J. Chem. Phys.*, 146, 204109.

[6] Kashinski D. O., Bohnemann J., Hickman A. P., Talbi D., 2021, *Theoretical Chemistry Accounts*, 140, 64.

[7] Mezei, Z.J.; Epée Epée, M.D.; Motapon, O.; Schneider, I.F. Dissociative Recombination of CH⁺ Molecular Ion Induced by Very Low Energy Electrons. *Atoms* **2019**, 7, 82.