Dissociative excitation processes of atomic state H(2p) in the H_3^+-He collision

Malkhaz Gochitashvili
Ramaz Lomsadze, Nugzar Mosulishvili

e-mail: malkhaz.gochitashvili@tsu.ge
Tbilisi State University, Physics Department, Chavchavadze av, 3, 0128, Georgia

We have presented results of experimental measurement of the excitation function of hydrogen atomic line $L\alpha$ (λ= 121.6nm), which was emitted during of H_3^+-He collision.

The H_3^+ ion beam leaving the Toneman type ion source was accelerated to a predetermined energy, then focused by the quadruple lenses and analyzed by the magnet mass analyzer (with resolution ~30). The emerging ions passed through collimating slits and finally entered at the collision chamber .The radiation emitted as a result of the excitation of Hydrogen atom was observed at the angle 90^0 to the direction of the beam. The spectroscopic analysis of the emission was performed with a Seya-Namioka vacuum monochromator incorporating a toroidal diffraction grating.

The used experimental device allows to carry out research of the excitation processes in various conditions of experiment. In particular, by changing the pressure of working gas - hydrogen in an ion source it was possible to vary relative fraction of the output of H^+, H_2^+, H_3^+ ions depending on the value of pressure and to investigate influence of internal excitation degree of a molecule on efficiency of the process of Lα. line excitation . The relatively high value of a current of H_3^+ ions was obtained, when pressure in the ionic source reached ~ 0.1 Torr. In this case, the H_3^+ ions with inappreciable internal energy was extracted from the source (In main in v = 0 vibrational state)[1]. In these conditions, vibrationally - excited ions H_3^+ participate in quenching collisions with molecules H_2 :

$$(H_3)^+ * + H_2 \rightarrow H_3^+ + H_2*.$$

Results of measurements are presented on fig.1.

1.H.Hus,F.Youssif,A.Sen and J.B.A.mitchell., Phys.Rev. (1988), **A38**,658.
2.G.H.Dunn,R.Geballe,and D Pretzer, Phys.Rev. (1962), **128**,2200

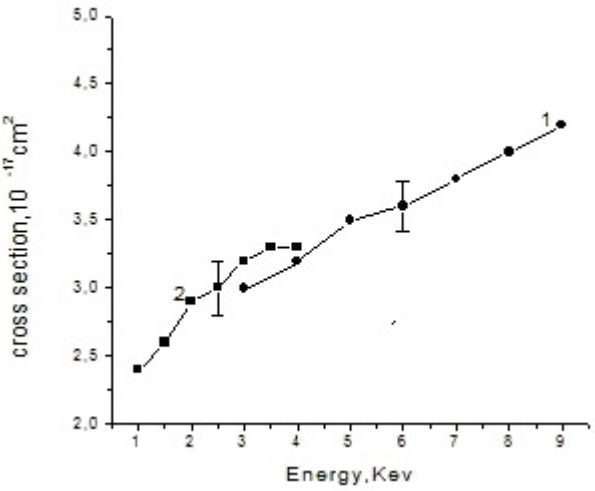

Fig.1. Energy dependence of the Emission cross section of the $L\alpha$ (λ= 121.6nm) line. 1-our result 2-G.H.Dunn at al.[2]