

ELASTIC AND INELASTIC SCATTERING OF ELECTRONS BY ATOMIC HYDROGEN IN OCHKUR APPROXIMATION

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For the processes of elastic and inelastic scattering of electrons by atoms, recently Ochkur (1964) has given a formulation which differs from the Born-Oppenheimer approximation by the neglect of certain higher order terms. By doing so, Ochkur obtains for the case of excitation of He atom by an incoming electron, results which agree with experimental findings better than those obtained with other methods. Ochkur (1965) has applied the same method to determine ionisation of hydrogen atom by electron impact and he obtains quite close agreement with experimental results.

We have applied Ochkur's formulation to determine the 1S-1S elastic scattering of the electron by hydrogen at 13.6 eV and also to find the degree of 1S to 2S state excitation of the hydrogen atom when the energy of the incoming electron is 11.7 eV, which is near the threshold energy. The total elastic cross-section (1S-1S) for 13.6 eV turns out to be $8.83 \pi a^2 (a_0\text{-Bohr radius})$ compared with the value $4.748 \pi a_0^2$ obtained by Burke *et al.*, (1963) from close-coupling approximation; there is no experimental results for this energy, the nearest experimental value is about $4.8 \pi a_0^2$ at 12.3 eV. The total excitation cross-section (1S-2S) is $0.292 \pi a_0^2$ obtained by us whereas the corresponding value of Burke *et al.*, (1963) from close-coupling approximation is about $0.26 \pi a_0^2$; the experimental value of Lichten and Schulz (1959) is $(0.35 \pm 0.05) \pi a_0^2$. Considering the extreme simplicity of calculation with Ochkur method, the agreement with experimental results is commendable.

We may mention here that Born-Oppenheimer method tends to give misleading result near the threshold energy.

Numerical calculations of elastic scattering for 1S-1S process 1S-2S as well as 1S-2P excitation processes are in progress and will be published soon.

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