

Fig. 1. Elastic scattering of slow electrons by atomic oxygen. 1. Temkin [1], s-wave only. 2. Cooper and Martin [2]. 3. Bauer and Browne [3]. 4. This work, p-wave ref. 2. 5. Neynaber et al. [4]. 6. Sunshine et al. [5].

Table 1
Phase shifts and s-wave cross section for elastic scattering of slow electrons by atomic oxygen.

$k^2 Ry$	$\delta^2 P$	$\delta^4 P$	$Q_0(\pi a_0^2)$
0.00	(1.988)	(0.311)	5.52
0.03	-0.343	-0.075	5.54
0.04	-0.395	-0.100	5.60
0.06	-0.482	-0.143	5.67
0.08	-0.556	-0.179	5.69
0.10	-0.618	-0.209	5.71

(The numbers in parenthesis are the scattering length)

these results are in reasonable agreement with the experimental values of Sunshine et al. [5] in the region close to threshold.

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EXCITATION FUNCTION OF THE MERCURY LINE AT 5461 Å, MEASURED WITH AN IMPROVED ELECTRON ENERGY DISTRIBUTION

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The optical excitation functions of mercury have lately been measured [1, 2] with modern photo-electric equipment. The use of the retarding potential difference method devised for meas-

uring ionization functions [3] enables us also to improve considerably the energy resolution in measuring excitation functions. A drawback is, however, the loss in sensitivity.

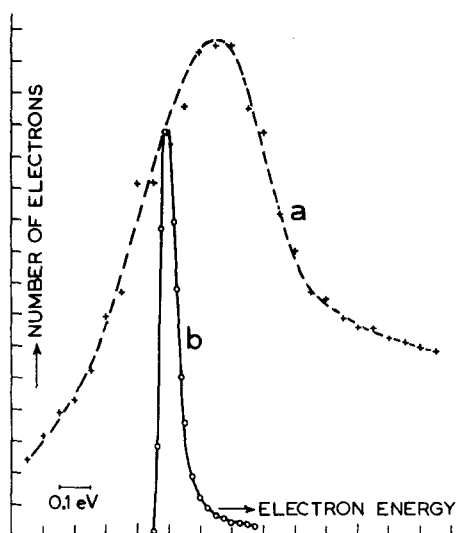


Fig. 1. Energy spread in the electron beam.
a. The whole beam.
b. The set of electrons that contributes to the signal.

We measured the excitation function of the green mercury line at 5461 \AA with the retarding potential difference method. Use was made of a modified excitation tube according to Jongerius [1]. A set of retarding electrodes was inserted that made possible the stopping of all electrons with an excit energy under a certain, adjustable, value, transmitting the others. By modulating the above mentioned value with a frequency of 70 c.p.s. with 0.1 V and using synchronous detection, a signal is obtained that virtually is derived from electrons of such a small energy spread. For focussing we used a homogeneous magnetic field of 50 Oe. The electron beam current was $1.5 - 2.5 \mu\text{A}$, which was modulated, by the retarding electrode, with about 23%; the vapour pressure of the mercury was 10^{-3} Torr. A slice of 1 mm from the light in the measuring cage was focussed on the cathode of a photomultiplier after it had passed an interference filter.

Each measuring point was recorded for 40 seconds, which resulted in an accuracy in the maximum of 2%, and at 15 V of 4%. The energy spread in the electron beam, measured with a retarding field on the measuring cage has a halfwidth of about 0.5 eV, so that the results of Jongerius could be reproduced. With modulation, the width obtained the expected value of 0.1 eV (fig. 1).

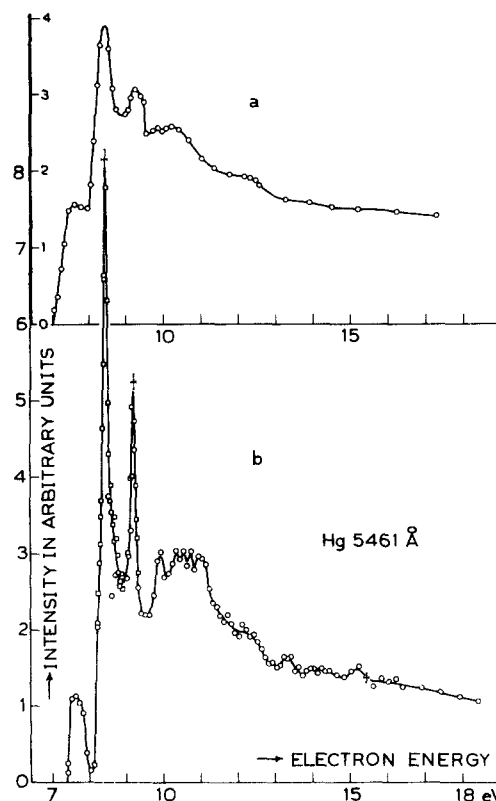


Fig. 2. Excitation function of the 5461 \AA line of mercury.
a. According to Jongerius [1].
b. Measured with the retarding potential difference.

Concerning the excitation function thus found we may make the following remarks:

The first maximum is now fully resolved, but the width (0.4 eV) and height (equal to the value at 18 V) are the same as formerly found. The large second and third maxima are much narrower (0.1 eV) and higher, so that the shape of these resonances is still determined by the resolving power of the apparatus, and it may be that the excitation function for these electron energies is considerably larger.

References

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