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# MO 107

## DETERMINATION OF SMALL-ANGLE ELECTRON DIFFERENTIAL CROSS SECTIONS FROM THEIR LARGER ANGLE MEASUREMENTS

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We demonstrate how small-angle electron differential cross sections (DCSs) for both optically allowed and forbidden transitions can be determined accurately from their more reliably measured larger angle data [1]. The procedure is particularly effective for electron impact energy from near threshold to about ten times threshold. Examples are given for measured transitions in Li [2], Na [3], Mg [4], Xe [5], Hg [6], Ba [7] and $N_2O$ [8]. Values of DCSs at and near zero scattering angles, a difficult angular regime to access experimentally, are recommended. Some illustrative examples are shown in the figures.

Fig. (a) shows the GOS, from the DCS measurement of Zubek *et.al.* [6], versus $K^2$ for the Hg 6 $^1S$ - 6 $^1P$ transition at 12.2 and 15eV. The measurement is at 10°, 20°, 30°, 40° and 50° at both energies. Clearly, the data points can be connected by straight lines up to 50°. Thus, the DCSs at $\theta = 0°$ can be obtained from the larger angle data.

Fig. (b) gives results for the Xe $5p^5(^2P_{3/2})6s$ excitation from the measurement of Ester and Kessler [5]. The data points at 15, 30, 40 and 80eV can be continued through straight lines to $\theta = 0°$. Note that the linear region shrinks to near zero degree with increasing energy. For example, at 100eV data near $\theta = 0°$ are necessary for reliable continuation. The Suzuki *et.al.* [5] data at 100eV demonstrates this very well (not shown).

In Fig. (c) is presented the GOS (arbitrary units), from the DCS measurement [8], for the $N_2O$ $2^1\Sigma$ state. The data at 15, 20, 30 and 50eV are characteristic of dipole forbidden transitions; their zero degree data points can be connected by a straight line (see Z. Felfli and A.Z. Msezane). The arrows indicate that the data points corresponding to 0° at 15, 20 and 30eV require lowering for compatibility with the others. Within experimental errors, the data points at 15, 20 and 30eV lie on straight lines up to beyond 20° while for those at 50 and 80eV the straight lines cover angles only up to 10°.

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