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Differential cross sections for electron impact excitation of the electronic bands of phenol

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 R. F. C. Neves^{1,2,3}, D. B. Jones¹, M. C. A. Lopes³, K. L. Nixon³, G. B. da Silva^{1,4}, H. V. Duque^{1,3}, E. M. de Oliveira⁵, R. F. da Costa⁶, M. T. do N. Varella⁷, M. H. F. Bettega⁸,  M. A. P. Lima⁵, K. Ratnavelu⁹, G. García¹⁰, and M. J. Brunger^{1,9, a)}

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ABSTRACT

We report results from a joint theoretical and experimental investigation into electron scattering from the important organic species phenol ($\text{C}_6\text{H}_5\text{OH}$). Specifically, differential cross sections (DCSs) have been measured and calculated for the electron-impact excitation of the electronic states of $\text{C}_6\text{H}_5\text{OH}$. The measurements were carried out at energies in the range 15–40 eV, and for scattered-electron angles between 10° and 90° . The energy resolution of those experiments was typically ~ 80 meV. Corresponding Schwinger multichannel method with pseudo-potentials calculations, with and without Born-closure, were also performed for a sub-set of the excited electronic-states that were accessed in the measurements. Those calculations were conducted at the static exchange plus polarisation (SEP)-level using a minimum orbital basis for single configuration interaction (MOBSCI) approach. Agreement between the measured and calculated DCSs was typically fair, although to obtain quantitative accord, the theory would need to incorporate even more channels into the MOBSCI.

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