

Revised and extended analysis of doubly ionized bromine: Br III

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Abstract:

The spectrum of doubly ionized bromine (Br III) has been investigated in vacuum ultraviolet wavelength region. Br III is As I –like ion with ground configuration $4s^2 4p^3$. This is a 3-electron system and possessing a complex structure. Its theoretical structure was predicted using Cowan's Configuration Interaction code, involving $4s^2 4p^3$, $4s^2 4p^2 (5p + 6p + 4f + 5f)$ configurations for odd parity matrix and $4s 4p^4$, $4s^2 4p^2 (4d + 5d + 6d + 5s + 6s + 7s + 5g)$, $4s 5p^3 (5p + 4f)$, $4p^4 (4d + 5s)$, $4s 4p^2 (4d^2 + 5s^2)$ configurations for even parity system. The $4s^2 4p^3 - [4s 4p^4 + 4s^2 4p^2 (4d + 5d + 6d + 5s + 6s + 7s)]$ transition array has been studied. Several reported levels of Br III were found to be erroneous and have been revised and new configurations have been added to the analysis. The spectrum used for this work was recorded on a 3-m normal incidence vacuum spectrograph in the wavelength region 300 - 2000Å using a triggered spark source. About 100 energy levels have been established out of which sixty are new. More than 220 lines have been identified in this spectrum. The accuracy of our wavelength measurements for sharp and unblended lines is $\pm 0.005\text{Å}$. The Ionization Potential of Br III is estimated to be at $280700 \pm 300 \text{ cm}^{-1}$ ($34.80 \pm 0.04 \text{ eV}$).