FURTHER INVESTIGATIONS OF THE BrO ROTATIONAL SPECTRUM

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The rotational spectrum of the $^2\Pi_{1/2}$ state of BrO has been observed for the first time in selected regions between 80 and 520 GHz. Observations of the $^2\Pi_{3/2}$ state in its ground and first excited vibrational state have been extended to over 600 GHz and improved. In addition, we have observed the $^2\Pi_{3/2}$ $v = 2$ and $^2\Pi_{1/2}$ $v = 1$ states of normal BrO and $Br^{18}O$ in natural abundance in its $^2\Pi_{3/2}$ state. Transitions arising from the $^2\Pi_{3/2}$ $v = 1$ and $^2\Pi_{1/2}$ $v = 0$ states of $Br^{18}O$ have been observed in a slightly enriched sample. Analysis of these new data along with previously published spectra has resulted in improvements in the precision of previously determined parameters as well as the first determination of others. In particular, the equilibrium mechanical constants have been more precisely determined. The quadrupole coupling in the $^2\Pi_{1/2}$ state, the Fermi contact term for the Br nucleus, and the nuclear spin rotation constant have been derived. The effects of isotopic substitution have been used to determine the electron spin rotation coupling constant. The details of the analysis will be presented and the significance of the parameters will be discussed.