Electronic Spectroscopy of RhH and RhD in the 430 - 470 nm Region

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We report on our recent spectroscopic study of RhH and RhD. These molecules were generated in a laser vaporization molecular beam source and detected by laser induced fluorescence. Eight bands of RhD as well as two bands of RhH were observed for the first time in the 430 - 470 nm region. Rotational analyses have been carried out for all of the bands. The ground state has $\Omega'' = 3$ and is assigned to a $^3\Delta_3$ state, consistent with recent *ab initio* calculations. The electronic configuration of the ground state is believed to be $9\sigma^2 5\pi^4 2\delta^3 10\sigma^1$. The excited states (three of them have $\Omega' = 3$, one $\Omega' = 2$, and another $\Omega' = 4$) may arise from the $\{Rh^+ 4d^7 5s^1\ {}^3F\}$ supermultiplet [a]. The electronic structures of RhH and RhD are also compared with those of the isovalent CoH and CoD molecules [b].

[a] J. A. Gray, M. Li, T. Nelis, and R. W. Field, J. Chem. Phys. 95, 7164 (1991).
[b] M. Barnes, A. J. Merer, and G. F. Metha, J. Mol. Spectrosc. 173, 100 (1995).