

Generation of line lists for the manganese bearing diatomics of MnH, MnF and MnCl

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At present, to the best of our knowledge, there are no line lists in the literature for MnH, MnF and MnCl: hence this work opens up the possibility of detection of these molecules in space. It has been speculated that MnH could exist in the ISM and, coupled with the favourable abundance of manganese this acts as motivation for this work.

This line list created for MnH as part of the ExoMol group consists of 10 low-lying electronic states. Using the available experimental data for the $A^7\Pi - X^7\Sigma^+$ system, the Potential Energy Curves (PECs) of the X and A states were refined to an accuracy of around 0.5 cm^{-1} . The experimentally derived term values presented by Balfour (1990, 1992) for the $a^5\Sigma^+$, $b^5\Pi$, $c^5\Sigma^+$, $d^5\Pi$ and $e^5\Sigma^+$ states were processed and used in the final line list. Our line list has a coverage in J up to 50 which we show to be more than adequate for temperatures up to 3000 K and a wavelength range extending from around 0.3 to 10 microns.

For MnCl and MnF, unrefined line lists covering the first 8 electronic states have been created. Future work will be to refine the *ab initio* curves to the available experimental measurements for the $X^7\Sigma^+$, $A^7\Pi$, $a^5\Sigma^+$, $b^5\Pi$, $c^5\Sigma^+$, $d^5\Pi$ and $e^5\Sigma^+$ for MnF and the $X^7\Sigma^+$ state for MnCl hence producing refined line lists.

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