SPECTROSCOPY OF THE FeH RADICAL; THE CURRENT STATE OF PLAY

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The visible spectrum of FeH is dominated by two strong band systems, one in the blue at around 493 nm and one in the green at around 532 nm [a,b]. High resolution studies, carried out on room temperature samples, have established that these bands arise primarily from the $g^6\Phi - a^6\Delta$[c] and $e^6\Pi - a^6\Delta$[d] transitions respectively.

Extensive dispersed fluorescence studies have been carried out on rovibrational lines in the three lowest energy spin components of the (0,0) vibrational band of the $e^6\Pi - a^6\Delta$ system of FeH. These have revealed the positions of the (0,1) band and two further, very weak systems at around 600 nm and 630 nm. The 600 nm system has been assigned as the $e^6\Pi - c^6\Sigma^+$ transition, whilst the lines around 630 nm have been tentatively identified with the $e^6\Pi - b^6\Pi$ transition. Characterisation of the $c^6\Sigma^+$ state has enabled the first parity assignments in FeH and represents the first identification of all six of the spin components in a sextet state of this radical. Following on from this, attempts are currently being made to observe $e^6\Pi - c^6\Sigma^+$ transitions involving the three highest energy spin components of the $e^6\Pi$ state. A review of data collected in the early, high temperature study[a,b] is also being carried out in the light of the assignments made during this work.

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