

THE MYSTERY OF THE ELECTRONIC SPECTRUM OF RUTHENIUM MONOPHOSPHIDE

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Using PH_3 as a reactant gas and ruthenium as the target metal in the UNB laser ablation spectrometer, the ruthenium monophosphide molecule (RuP) has been detected. Dispersed fluorescence experiments have been performed to determine ground state vibrational frequencies and the presence of any low-lying electronic states. Rotationally resolved spectra of two vibrational bands at 577nm and 592nm have been taken; the bands have been identified as 1-0 and 0-0 bands based on isotopic shifts. Ruthenium has seven stable isotopes and rotational transitions have been observed for six of the RuP isotopologues. RuP is isoelectronic to RuN so it is expected that RuP will have a $^2\Sigma^+$ ground state and low resolution spectra indicated a likely $^2\Sigma^+ - ^2\Sigma^+$ electronic transition. Further investigation has led us to believe we are observing a $^2\Pi - ^2\Sigma^+$ transition but mysteriously some important rotational branches are missing. It is hoped that new data to be recorded on a second electronic system we have observed at 535nm will help shed light on this mystery.