THE MgH $B^2\Sigma^+ - X^2\Sigma^+$ TRANSITION: A NEW TOOL FOR STUDYING MAGNESIUM ISOTOPE ABUNDANCES

P. BERNATH, G. LI, Department of Chemistry, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1; L. WALLACE, K. HINKLE, Kitt Peak National Observatory, National Optical Astronomy Observatories, Tucson, AZ 85726; R. S. RAM, Dept. of Chemistry, University of Arizona, Tucson, AZ 85721.

We have identified lines from the 0-3, 0-4, 0-5, 0-6, 0-7, 1-3, 1-4, 1-7 and 1-8 bands of the $^{24}$MgH $B^2\Sigma^+ - X^2\Sigma^+$ transition in sunspot umbral spectra. Lines of the 0-7 and 1-8 bands in the uncluttered 750 nm region are the most obvious but $B^2\Sigma^+ - X^2\Sigma^+$ lines have been tracked as far to the blue as 530 nm. In combination with weak lines of the 0-7 bands of the $^{25}$MgH and $^{26}$MgH isotopes, the solar isotope ratio $^{24}$Mg:$^{25}$Mg:$^{26}$Mg has been measured as 76:12:12, in agreement with the much better determined terrestrial ratio 79:10:11.

The intensity distribution of bands with $\nu''$ from 4 to 8 has been measured and found to show no anomalies; the excitation temperature of 3100K agrees well with a value of 3200K determined from SiO in a sunspot spectrum.

We have also analysed an archival hollow cathode emission spectrum and combined these new data with the existing millimeter wave and solar measurements to obtain improved spectroscopic constants.

The lines of the MgH $B^2\Sigma^+ - X^2\Sigma^+$ transition are much more cleanly separated and much less blended than lines from the stronger $A^2\Pi - X^2\Sigma^+$ transition. The $B^2\Sigma^+ - X^2\Sigma^+$ lines should prove useful in isotopic abundance analyses for stars where the $A^2\Pi - X^2\Sigma^+$ transition is too strong to yield useful results.