ULTRAVIOLET AND INFRARED OSCILLATOR STRENGTHS FOR OH^+

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OH^+ is an important astrophysical species. OH+ has been detected in the interstellar medium by UV and terahertz spectroscopy. Following the recent analysis of OH^+ emission spectra,[a] empirical potential energy surfaces have been calculated for the $A^3\Pi$ and $X^3\Sigma^-$ states using the RKR method. Ab initio transition and dipole moment functions were calculated and together with the potential energy surfaces have been used to compute oscillator strengths using Le Roy's LEVEL program.[b] The new oscillator strengths account for the Herman–Wallis effect, a rotational dependence in the vibrational wavefunction, and are now in good agreement with the measured lifetime.[c] The Herman–Wallis effect creates a 5% difference in UV oscillator strengths by J" = 15 and an 80% difference in oscillator strengths by J" = 10 in the IR. We recommend these new oscillator strengths be used to determine OH^+ column densities.

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[a] Hodges, J. N., & Bernath, P. F. Astrophys. J., 840.2 (2017) 81

[b] Le Roy, R. J., J. Quant. Spectrosc. Radiat. Transf. 186 (2017) 167

[c] Möhlmann, G. R., et al., Chem. Phys. 31.2 (1978) 273