

## SPECTROSCOPIC CHARACTERIZATION OF HIGHLY PREDISSOCIATIVE LEVELS OF THE OH $A^2\Sigma^+$ STATE

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The OH radical plays a major role in atmospheric and combustion environments, where it is generally detected by Laser Induced Fluorescence (LIF) using the  $A^2\Sigma^+ - X^2\Pi$  band system. Excited vibrational levels of the OH  $A^2\Sigma^+$  ( $v \geq 3$ ) state have been difficult to study by LIF due to rapid predissociation, which results in a fluorescence quantum yield that is essentially zero. In the present work, the OH  $A^2\Sigma^+$  ( $v = 4$ ) state is characterized using a Fluorescence Depletion Infrared (FDIR) spectroscopy technique. A UV laser promotes OH radicals from the  $v'' = 1$  level of the ground  $X^2\Pi$  state to the  $v' = 2$  level of the excited  $A^2\Sigma^+$  state. An IR laser further excites the OH radicals on an overtone transition to the  $v = 4$  level of the  $A^2\Sigma^+$  state. Fluorescence is collected from OH  $A^2\Sigma^+$  ( $v' = 2$ ) exclusively, which is depleted when the IR laser is resonant with a  $4 \leftarrow 2$  overtone transition. The IR frequencies of various P- and R-branch lines of the overtone transition are measured, and spectroscopic constants for the  $A^2\Sigma^+$  ( $v = 4$ ) state are extracted using combination differences. The rotational, centrifugal distortion, and spin-rotation constants are determined, along with the vibrational frequency for the overtone transition. These constants are compared with calculated values from Dunham coefficients for the OH  $A^2\Sigma^+$  state and a merged fit of experimental data from previous studies.