SOLVING THE MYSTERY OF GREEN BANDS OF YTTRIUM MONOHYDRIDE WITH THE HELP OF STARK SPECTROSCOPY.

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Stark spectra for four bands of yttrium hydride in the $19300 - 19800$ cm^{-1} region have been recorded by exciting the molecules in the presence of external electric field up to 16 kV/cm and monitoring laser induced fluorescence. The molecules have been produced in a free jet molecular beam apparatus by laser vaporizing yttrium metal in the presence of He carrier gas doped with $2 - 5\%$ of H_2 or NH_3. Rotational and Ω quantum number assignments of the bands have been established with the help of Stark effect. The electric dipole moments have been measured to be equal to: 1.569(64), 2.325(8), 3.316(11), 2.273(6), and 1.537(8) for the $X^1\Sigma^+$ ground state and the 19385, 19746, 19572, and 19575 cm^{-1} excited states, respectively. Strong variation of the effective Ω quantum number with J has been detected for the lowest rotational levels of the 19572 cm^{-1} state. The effective values have been determined to be equal to $\Omega = 1$ (fixed value), $\Omega = 1.472(7)$, and $\Omega = 1.624(18)$ for $J = 1$, $J = 2$, and $J = 3$, respectively. Possible perturbers of the 19572 cm^{-1} state will be considered. Electronic character of the ground state and the four excited states will be discussed. Correlation of the dipole moment and the Ω quantum number in Stark spectroscopic measurements will be analyzed and required experimental conditions for breaking of such correlation will be determined.