VIBRONIC ANALYSIS OF THE $B\ ^2A'$ - $X\ ^2A''$ LASER-INDUCED FLUORESCENCE OF JET-COOLED ETHYLTHIO (C_2H_5S)

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The ethylthio (C_2H_5S) radical was formed by 248-nm laser photolysis of diethyl disulfide ($C_2H_5SSC_2H_5$) or ethyl mercaptan (C_2H_5SH) in a free jet expansion. The B - X fluorescence excitation spectrum was recorded in the wavelength region 398 - 440 nm. Preliminary data show that the origin lies at 23519.6 cm^{-1} with a main progression of C-S stretching (420.5 cm^{-1}). Other vibrational modes at 256.0, 861.0, 1054.6, and 1203.3 cm^{-1} were also observed for the B state. Detection of hot bands in the excitation spectrum enables assignments of three low-lying modes of the X state: 296.2, 479.9, and 672.8 cm^{-1}. Dispersed fluorescence spectra in the spectral region 410 - 520 nm revealed a main progression of C-S stretching (673 cm^{-1} with additional vibrational modes of the X state near 308, 475, 882, 1076, and 1257 cm^{-1}. Observed vibrational wavenumbers of both B and X states agree with theoretical calculations by the B3LYP/cc-PVDZ+f method (for the X state) and the MP2/DZP method (for both states).