EXTENDED ANALYSIS OF THE $\nu_4/\nu_7/\nu_{10}$ BANDS OF $^{12}$C$_2$H$_4$: LINE STRENGTHS, WIDTHS, AND SHIFTS

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The high-resolution infrared spectra of $^{12}$C$_2$H$_4$ were analyzed in the region of 600 - 1200 cm$^{-1}$, where $\nu_4/\nu_7/\nu_{10}$ bands are located. More than 2700 line strengths (300, 1400 and 1000 for $\nu_4$, $\nu_7$ and $\nu_{10}$, respectively) were determined from the fit of their line shapes with a Hartmann-Tran profile ($J_{\text{max.}} = 30$ and $K_{\text{max.}} = 10$ for $\nu_4$, $J_{\text{max.}} = 40$ and $K_{\text{max.}} = 17$ for $\nu_7$, $J_{\text{max.}} = 35$ and $K_{\text{max.}} = 15$ for $\nu_{10}$). These data were used in the fit of the effective dipole moment parameters and six such parameters were obtained which reproduce the strengths of the 2700 initial lines with the $d_{rms} = 2.5\%$. Self-broadening and self-shift coefficients were determined from the multi-spectrum analysis for sets of lines ($J K_a = K'_a K'_c$) ← ($J' K'_a K'_c$), $K_a = 9,15,12$ (in general, more than 900 lines for determination of self-broadening coefficients and above 500 lines for determination of self-shift coefficients).

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