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Broadening and shifting coefficients of rovibrational lines of HCl perturbed by He in the fundamental and the first overtone regions

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We present new data obtained using a modern high-resolution FTIR technique on He-broadening and shifting coefficients for the spectral lines for the fundamental and the first overtone vibration-rotation absorption bands of the HCl molecule. [1]

The both bands were recorded simultaneously by using a 20 cm stainless cell with sapphire windows and a Bruker IFS 125HR Fourier spectrometer with a resolution of 0.007 cm^{-1} . The pressure of He was kept in the range of 1–5 atm. Resulting 47 spectra allowed us to evaluate the line parameters in a large interval of J : $J_{\text{max}} = 15$ for the fundamental band and $J_{\text{max}} = 11$ for the overtone band. Most of the values, especially for the overtone transition, are novel.

All observed rovibrational lines have hypsochromic (blue) shift, which it is a typical behavior upon collisions with helium. We did not register any statistically significant difference between the broadening and shift coefficients for H^{35}Cl and H^{37}Cl within our experimental uncertainty. The results are compared with existing literature values, the data for other hydrogen halides perturbed by helium [2] and HCl in mixture with other collision partners [3–6].

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