

INFRARED SPECTROSCOPY OF CH₂CL IN SOLID PARAHYDROGEN

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Infrared spectra of the chloromethyl radical (CH₂Cl) isolated in solid parahydrogen has been reported. The radical was produced by *in situ* UV photolysis of chloriodomethane (CH₂ClI) in solid parahydrogen. Infrared absorption of the ν_3 (C-Cl stretch), ν_2 (CH₂ scissors), and ν_1 (CH₂ symmetric-stretch) modes of CH₂Cl were clearly observed. The matrix shift of the ν_1 band is -6 cm^{-1} relative to the gas phase band origin. Fine spectral features in the infrared absorption spectra reveal that the radical exhibits uni-axial quantized rotation along molecular *a*-axis in solid parahydrogen. The temporal change of the infrared absorption intensity indicates that the nuclear spin conversion between para ($I = 0$) and ortho ($I = 1$) spin modifications of the radical takes place in solid parahydrogen at 3.6 K. The conversion rate was determined to be 0.0046 min^{-1} , which is comparable to the conversion rate between the $J = 1, I = 1$ and $J = 0, I = 2$ states of CH₄ in solid parahydrogen. We did not observe any significant change of the intensity of the CH₂Cl radical for a few days in solid parahydrogen, which indicates that there is no tunneling reaction between CH₂Cl and H₂ at 3.6 K.