INFRARED SPECTROSCOPY OF CH$_3$Cl-(ORTHO-H$_2$)$_n$ CLUSTERS IN SOLID PARAHYDROGEN

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CH$_3$Cl doped solid parahydrogen (p-H$_2$) crystals have been studied using high-resolution FT-IR. Similar to related studies of CH$_3$F in solid p-H$_2$, multiplet structures are observed in the C-Cl stretch region, which are assigned to clustering of the CH$_3$Cl with ortho-H$_2$ molecules present in the sample. In this study individual vibrational absorptions are observed for clusters in the size range of $n=0-5$. In contrast with the CH$_3$F studies,$^a$ at low temperature ($T=1.8$ K) absorptions features 2.8 cm$^{-1}$ to the blue of the main features are observed to grow in intensity. These low temperature absorption features are believed to be due to CH$_3$Cl in a new structurally distinct crystal environment that must occur by reorganization of the solid hydrogen around the CH$_3$Cl impurity at low temperature. Experimental results and analysis will be presented to support this hypothesis.