

57 LIF	CHAr	Methyldyne – argon (1/1)		$C_{\infty v}$
		(weakly bound complex)		(effective symmetry class) (large-amplitude motion) CH · Ar

State	$\tilde{X}^2\Pi$	$\tilde{A}^2\Delta$
Energy [eV]	0.00	2.88
$r(\text{Ar} \dots \text{H}) [\text{\AA}]$	4.03 ^{a)}	

CH/D radicals were produced by the multiphoton dissociation of bromoform ($\text{CHBr}_3/\text{CDBr}_3$). The bromoform was entrained in a stream of neon to which small amounts of argon were added. The mixture was expanded through a nozzle into an evacuated chamber and was photolyzed at a short distance from the nozzle. The CH/D radicals were excited by a tunable dye laser in the region of the $\tilde{A}^2\Delta - \tilde{X}^2\Pi$ bands and fluorescence spectra were recorded. The spectra showed both vibrational and rotational structures. From the former, lower limits for the dissociation energies in the ground and excited states were obtained, $D_0(\text{CH}(\tilde{A}) - \text{Ar}) \geq 70 \text{ cm}^{-1}$, $D_0(\text{CH}(\tilde{X}) - \text{Ar}) \geq 166 \text{ cm}^{-1}$. From the latter the rotational structure was analyzed on the basis of a linear structure for the excited state with the argon atom opposite to the hydrogen atom, and a T-shaped structure for the ground state. From the rotational constant for the lowest level in the excited state, the bond length from the Ar atom to the H atom was deduced (see table).

^{a)} For the lowest vibrational level.

Komissarov, A.V., Heaven, M.C.: J. Chem. Phys. **113** (2000) 1775.