THE PERMANENT ELECTRIC DIPOLE MOMENT OF 3D-MONOHYDRIDES: CrD[a].

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A description of the bonding in the ground and low-lying electronic states of the first-row transition metal monohydrides becomes complicated because of the simultaneous involvement of the $3d^n\ 4s^2$, $3d^{n+1}\ 4s^1$ and, to some extent, $3d^n\ 4s^1\ 4p^1$ electron configurations of the metal. The permanent electric dipole moment can provide insight into this complicated bonding. Here we report on the determination of μ_e for chromium CrD. A number of low-N lines of the $X^6\Sigma - A^6\Sigma$ (0,0) band of chromium monodeuteride, CrD, have been recorded at near the natural line width limit by combining a supersonic molecular beam with high resolution laser excitation spectroscopy. The analysis gives the permanent electric dipole moment of the $X^6\Sigma$(v=0) state as 3.51(3)D and 1.152(5)D for the $A^6\Sigma$(v=0) state can be measured with higher precision because of some interesting near degeneracies in its level structure. A comparison with theoretical predictions for CrH[b,c,d,e] and experimental values other 3d transition metal monohydrides will be given.

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