Comparing the predicted and observed permanent electric dipole moments, $\mu_{el}$, for simple diatomic cobalt containing molecules is a means of testing computational methodologies used for modeling cobalt-catalyzed reactions. Here we report on the experimental determination of $\mu_{el}$ for CoH and CoF from the analysis of the Stark shifts in the (0,0) bands of the $A^5\Phi_4 - X^3\Phi_4$ system of cobalt monohydride, CoH, and the $[18\cdot8]^5\Phi_4 - X^3\Phi_4$ system of cobalt monofluoride, CoF. In addition, the proton magnetic hyperfine interaction in CoH is analyzed. The relative values for $\mu_{el}$ are rationalized using a molecular orbital correlation diagram and with high-level ab initio predictions. 

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