THE SUBMILLIMETER/THz SPECTRUM OF AlH (X^1Σ^+), CrH (X^6Σ^+), and SH^+ (X^3Σ^-)

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The N = 2 ← 1 transition of the CrH (X^6Σ^+) radical near 730-734 GHz and the J = 2 ← 1 line of AlH (X^1Σ^+) near 755 GHz have been measured using submillimeter/Terahertz direct absorption spectroscopy. CrH was created in an AC discharge of Cr(CO)_6 vapor and H_2 in the presence of argon. AlH was produced from Al(CH_3)_3 vapor and H_2 in argon with an AC discharge. In addition, three fine structure components of the N = 1 ← 0 transition of the SH^+ (X^3Σ^-) cation from 345-683 GHz were recorded. SH^+ was generated from H_2S and argon in an AC discharge. The data have been analyzed, and spectroscopic constants for these species have been refined. These parameters are in excellent agreement with past millimeter, infrared, and optical data. SH^+ is a known interstellar molecule, and these measurements confirm recent observations of this species. The new data for CrH and AlH could facilitate the detection of these species in interstellar/circumstellar gas.