THE PURE ROTATIONAL SPECTRUM OF ZnS ($X^1\Sigma^+$)

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Millimeter-wave direct-absorption techniques have been used to measure the pure rotational spectrum of ZnS ($X^1\Sigma^+$). This work is the first spectroscopic study of ZnS in the gas phase. This molecule was produced by the reaction of zinc vapor and H_2S under DC discharge conditions. Eight rotational transitions were recorded for four stable zinc isotopologues of ZnS in the v = 0 state, and data were also obtained for ^{64}ZnS and ^{66}ZnS in the v = 1 state. The data have been analyzed and spectroscopic constants and equilibrium parameters have been determined. The equilibrium bond length of ZnS was established to be 2.0464 Å, as compared to 1.7047 Å for ZnO.