Vinyl mercaptan (ethenethiol, CH$_2$=CHSH) exists in the gas phase in two distinct rotameric forms, syn (planar) and anti (quasi-planar in the ground vibrational state). The microwave spectra of these two isomers were investigated previously$^b$ however not exceeding frequencies of about 65 GHz.

In the present investigation, the pure rotational spectra of both species have been investigated at millimeter wavelengths. Vinyl mercaptan was produced in a radiofrequency discharge through a constant flow of ethanedithiol at low pressure. Both syn and anti rotamers were observed and new extensive sets of molecular parameters were obtained.

Owing to its close structural relationship to vinyl alcohol and the astronomical abundance of complex sulfur-bearing molecules, vinyl mercaptan is a plausible candidate for future radio astronomical searches.

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