

CENTIMETER-WAVE SPECTROSCOPY OF SEVERAL NEW SILICON-BEARING CARBON CHAINS

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The rotational spectra of several new silicon-bearing carbon chains were detected by means of Fourier-transform microwave spectroscopy in a supersonic jet source equipped with an electrical discharge. The newly detected species are HSiCCH, H₂C₃Si, and the SiC₅H radical. Precise rotational constants have been determined for all three, and as have fine and hyperfine constants for SiC₅H. Using samples enriched in carbon-13 and D, it has also been possible to detect several rare isotopic species and in turn derive an experimental structure for HSiCCH. Isotopic spectroscopy also provides clues as to the formation pathways that may be operative in our discharge. Finally, because these chains are both polar and closely related in structure and composition to other small Si-bearing chains and rings that have been detected in the circumstellar envelope of the evolved carbon star IRC+10216, they may be of astronomical interest.