

THE ROTATIONAL AND ROTATION VIBRATIONAL SPECTRUM OF C₃OS IN HIGHLY EXCITED STATES OF THE LOWEST-LYING BENDING MODE ν_7

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The rotational spectrum of tricarbon oxide sulphide C₃OS has been recorded in the 2 mm region between 118 GHz and 179 GHz with a new BWO-based millimeter wave synthesizer. Around 12 000 rotational transitions could be observed, including transitions of the isotopomers OCCC³³S, OCCC³⁴S, OCC¹³CS, OC¹³CCS and O¹³CCCS in natural abundance. The data was analyzed together with hitherto unassigned rotational transitions from previous measurements between 78 GHz and 118 GHz^a.

Our analysis led to the characterisation of various new vibrational states, especially higher excited states of the lowest-lying bending mode ν_7 in the main isotopomer: So far, highly excited bending states had been known up to $\nu_7 = 7$ from microwave measurements below 40 GHz^b. Lately, rotation vibrational TuFIR measurements near 2.4 THz had provided precise term values for the first to the fourth excited state of the bending mode ν_7^a . Our new rotational data now allowed us to characterize bending states up to $\nu_7 = 10$ and higher. Besides the determination of spectroscopic constants for new states, our data also enabled us to improve spectroscopic constants that had been determined from older measurements. Both together extended our knowledge of the structure and the internal dynamics of the linear heterocumulene C₃OS.

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