

VI. MICROWAVE SPECTROSCOPY

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A. GENERAL ORGANIC MOLECULES

Work has been started on the study of possible spectra of several organic molecules. A theoretical investigation of the intensities has been initiated as well as some preparatory experimental work.

B. V. Gokhale

B. AMMONIA

The microwave spectrum of partially deuterated ammonia has been investigated. Twenty-nine lines have been obtained and a general reduction of data has been completed. A full report will be forthcoming shortly.

M. T. Weiss

C. TECHNICAL REPORTS

A report on the work on arsine, phosphine and stibine is given in Technical Report No. 167, recently published. Two further reports on centrifugal distortion are being written.

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D. NUCLEAR MAGNETIC MOMENT OF S^{33}

The Zeeman effect of the hyperfine pattern of the OCS^{33} $J = 1 \rightarrow J = 2$ transition has been observed. The Zeeman components of most of the lines of the pattern have been resolved for the case of the magnetic field parallel to the electric field of the microwave radiation ($\Delta M_F = 0$, π transitions)*. These π -transition observations are a measure of $|g_N - g_{mol}|$, where g_N is the nuclear gyromagnetic ratio of the S^{33} nucleus and g_{mol} is the OCS molecular g -factor. The measurements on the several lines yield consistent results within the expected limits of accuracy.

The detection and resolvability of the Zeeman components were made possible by using a slow-sweep recording spectrograph developed in this Laboratory and a sample of OCS^{33} enriched to about 5.5 percent in the S^{33} isotope kindly supplied by Dr. C. K. Jen of Harvard.

Work is continuing so that a result for the S^{33} nuclear magnetic moment may be stated. At present the $\Delta M_F = \pm 1$ (σ transitions) are being studied.

Previous results on this problem, given in the Quarterly Progress Report, July 15, 1950, p. 42, are now considered inaccurate. The present method of measuring actual frequency splittings of resolved lines is much more direct and satisfactory than attempts to fit an unresolved pattern as was done in the previous measurements.

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* The splittings of the lines were measured as a function of magnetic field intensity.