

Dipole Moment of Thionitrosylchloride

A. GUARNIERI *

Abteilung Chemische Physik
im Institut für Physikalische Chemie der Universität Kiel
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The microwave spectrum of Thionitrosylchloride, NSCl, has been investigated by BEPPU, HIROTA, and MORINO¹ who determined the rotational constants, the structure and the force constants.

In the present work the dipole moment is determined. A sample of $N_3S_3Cl_3$ was kindly given to me by Dr. J. WEGENER of the University of Göttingen: NSCl is than obtained by heating the $N_3S_3Cl_3$ to 50 °C under high vacuum. The measurement has been made with a conventional 100 kHz Stark modulated spectrometer with automatic frequency markers²⁻⁴; frequency measurements are believed to be accurate within ± 0.03 MHz.

The electric field was calibrated by means of the $J=1 \rightarrow J'=2$ transition of OCS using the value of $0.7152^5 D$ for the dipole moment.

The measurements have been performed on the $J=0_{00} \rightarrow J'=1_{11}$ line at 45,460.22 MHz in the high field approximation and further on the $F=7/2 \rightarrow F'=7/2$ hyperfine line at 38,360.62 MHz of the $J=2_{02} \rightarrow J'=2_{11}$ transition and the $F=9/2 \rightarrow F'=9/2$ hyperfine line at

Table 1. Measured and calculated slopes $\Delta\nu/E^2$ in MHz/(V/cm)².

$J_{k-1,k_1} \rightarrow J'_{k'-1,k'_1}$	$F \rightarrow F'$	$\Delta\nu/E^2$	
		obs.	calc.
$2_{0,2} \rightarrow 2_{1,1}$	$7/2 \rightarrow 7/2$	2.212 ± 0.05	2.218
$3_{0,3} \rightarrow 3_{1,2}$	$9/2 \rightarrow 9/2$	1.688 ± 0.020	1.684
$M_J, M_I \rightarrow M'_J, M'_I$			
$0_{0,0} \rightarrow 1_{1,1}^a$	$0,3/2 \rightarrow 0,3/2 \}$ $0,1/2 \rightarrow 0,1/2 \}$	1.527 ± 0.015	1.532

^a Measured in high field condition.

$ \mu_a $	$= 0.57 \pm 0.03$
$ \mu_b $	$= 1.77 \pm 0.02$
$ \mu_{tot} $	$= 1.87 \pm 0.02$

Table 2. Values for the two components and for the total electric dipole moment in Debye.

38,933.92 MHz of the $J=3_{03} \rightarrow J'=3_{12}$ transition whose Stark Effect is independent of the quadrupole energy. In Table 1 the measured and calculated slopes for these lines are given, and in Table 2 the dipole moment components along the two principal axes of inertia and the total dipole moment are listed.

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Reprints request to Dr. A. GUARNIERI, Institut für Physikalische Chemie der Universität Kiel, Abt. Chemische Physik, D-2300 Kiel, Olshausensstraße 40/60.

* On leave: Istituto di Chimica Fisica, Università di Padova, Italy.

¹ T. BEPPU, E. HIROTA, and Y. MORINO, J. Mol. Spectr. **36**, 386 [1970].

² H. D. RUDOLPH, Z. Angew. Phys. **13**, 401 [1961].

³ H. D. RUDOLPH and H. SEILER, Z. Naturforsch. **20 a**, 1682 [1965].

⁴ U. ANDRESEN and H. DREIZLER, Z. Angew. Phys. **30**, 207 [1970].

⁵ J. S. MUENTER, J. Chem. Phys. **48**, 4544 [1968].

BERICHTIGUNG

Erratum. B. D. HANSON, M. MAHNIG, and LOUIS E. TOTH, Low Temperature Heat Capacities of Transition Metal Borides, Z. Naturforsch. **26 a**, 739 [1971].

P. 739, column 2, line 13 ff from bottom should read: There is, however, little general agreement on the number of electrons transferred per boron atom ...;

p. 743, Table 3, line 3: $(Mn_9Fe_{11})_2B$, line 6: $(Mn_{11}Fe_9)_2B$, line 13: $(Co_9Ni_{11})_2B$;
p. 743, Table 6, line 2: $Co_{98}B_{02}$.

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