Crystal Structure and Magnetic Properties of a Linear Trinuclear Ni(II) Complex

E. Kavlakoglu[a], A. Elmali[a], Y. Elerman[a], R. Werner[b], I. Svoboda[c], and H. Fuess[c]

[a] Department of Engineering Physics, Faculty of Sciences, University of Ankara, 06100 Besevler-Ankara, Turkey

[b] Institute of Physical Chemistry, Condensed Matter Group, Darmstadt University of Technology, Petersenstraße 20, D-64287 Darmstadt, Germany

[c] Materials Science Department, Structural Research Division, Darmstadt University of Technology, Petersenstraße 23, D-64287 Darmstadt, Germany

Reprint requests to Dr. A. Elmali. E-mail: elmali@science.ankara.edu.tr

Z. Naturforsch. **56 b,** 43–48 (2001); received July 4, 2000

Linear Trinuclear Nickel(II) Complex, Super-Exchange Interactions, Antiferromagnetic Coupling

$[Ni_3(C_2H_3O_2)_2(CH_3OH)_2L_2]$ [L = 1,3-bis(5-chlorosalicylideneamino)propan-2-ol dianion, $(C_2H_3O_2)^-$ = acetate, (CH_3OH) = methanol] was synthesized and its crystal structure was determined. It crystallizes in the monoclinic space group $P2_1/n$ with $a = 12.694(2)$, $b = 13.281(4)$, $c = 15.420(3)$ Å, $\beta = 111.25(2)°$, V = 2422.9(9) Å^3, $Z = 2$. The molecule is a "linear" trinuclear complex with nearly octahedral coordination of each nickel ion. Adjacent nickel(II) ions are bridged by the phenolic oxygen atoms of the ligands and the oxygen atoms of the acetato ligands. The coordination sphere of the terminal nickel(II) ions is completed by the oxygen atom of the methanol. Adjacent nickel(II) centers are separated by 3.043(1) Å and weakly antiferromagnetically coupled ($J_1 = -3.4$ cm^{-1}). The terminal nickel(II) centers are separated by 6.086(1) Å and very weakly antiferromagnetically coupled ($J_2 = -0.3$ cm^{-1}) which follows from temperature-dependent magnetic susceptibility measurements in the temperature range 4.5 to 318 K. The magnetic moment rises from 2.99 μ_B at 4.5 K to 5.42 μ_B at 318 K. In the χ(T) curve no characteristic maximum was observed.