

Magnetic Properties of Anhydrous Copper(II) Nitrate

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THE recent report¹ of the existence of two crystalline forms of anhydrous copper(II) nitrate prompts us to describe the temperature-dependence of the magnetic susceptibility of the blue-green compound prepared by the method of Addison and Hathaway.² The magnetic data in the range 80–350°K are given in figure 1. The room-temperature magnetic moment ($\mu_{\text{eff}} = 1.78$ B.M.) lies just above the spin-only value (1.73 B.M.) but decreases monotonically from 1.80 B.M. at 348.7° to 1.59 B.M. at 83.2°K.

Attention is drawn to the bonding potentialities of the NO_3^- anion, which like HCO_2^- and other alkanoate anions, can link pairs of Cu^{2+} ions, in one of the *syn-syn*, *anti-anti*, or *anti-syn* bridging conformations.³ In fact, the present measurements were originally undertaken⁴ to evaluate whether the volatile form of copper(II) nitrate is isotypic with binuclear copper(II) acetate through *syn-syn* nitrate bridging. Unfortunately, while the present magnetic data demonstrate that the anhydrous nitrate prepared by Addison and Hathaway's method is magnetically concentrated, they do not lead to the desired elucidation of its structure. However the similarity of the present magnetic behaviour to that of copper(II) formate tetrahydrate³ does suggest that the weak antiferromagnetic interactions are the result of superexchange operating *via* bridging nitrate groups in the structure.

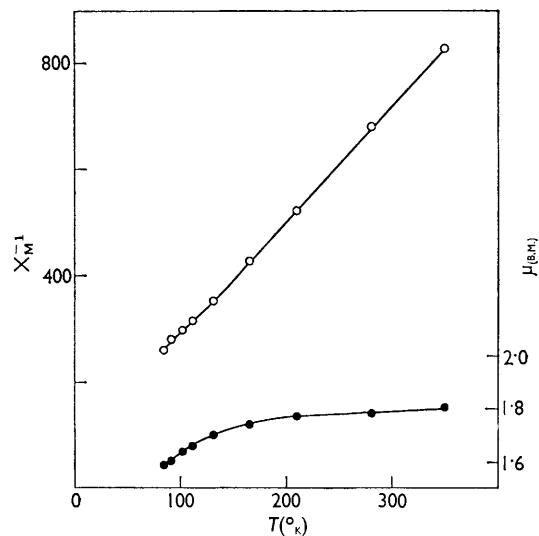


FIG. 1. Variation of χ_M^{-1} (unshaded circles) and μ (shaded circles) with absolute temperature.

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¹ N. Logan, W. B. Simpson, and S. C. Wallwork, *Proc. Chem. Soc.*, 1964, 341.

² C. C. Addison and B. J. Hathaway, *J. Chem. Soc.*, 1958, 3099.

³ R. L. Martin and H. Waterman, *J. Chem. Soc.*, 1959, 1359.

⁴ E. Kokot, Ph.D. Thesis, University of N.S.W., 1961.