

# Magnetic Properties of Bis(imidazolato)copper(II)

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In a preceding paper,<sup>1)</sup> we have reported that bis(imidazolato)copper(II) forms three modifications differing in their magnetic moments: a blue modification (1.57 Bohr magnetons), a green modification (1.62 B. M.), and a brown modification (1.46 B. M.). The subnormal magnetic moments suggest the existence of spin interaction between copper atoms in these modifications. In order to obtain further information, we have determined the temperature dependence of magnetic susceptibilities of these compounds.

The magnetic susceptibilities and the moments are shown in Figs. 1 and 2, respectively, as functions of temperature. The susceptibility of the blue modification obeys the Curie-Weiss law over a temperature range of 80–300°K. The Curie constant is 0.491 e. m. u. °K/mol. and the Weiss constant is –171°K. The magnetic behavior of the green modification conforms to the Curie-Weiss law above 170°K with a Curie constant of 0.460 and a Weiss constant of –118°K, but shows an appreciable deviation below 170°K. The broken curve in Fig. 1 was calculated assuming the validity of the Curie-Weiss law with the aforementioned parameters. The large Weiss constants indicate the existence of strong interaction between copper atoms through imidazole rings.

The brown modification definitely differs from other modifications in the magnetic behavior. Its magnetic susceptibility curve resembles the theoretical curve of isolated clusters,<sup>2)</sup> but does not agree with Bleaney-Bowers' expression.<sup>3)</sup> This

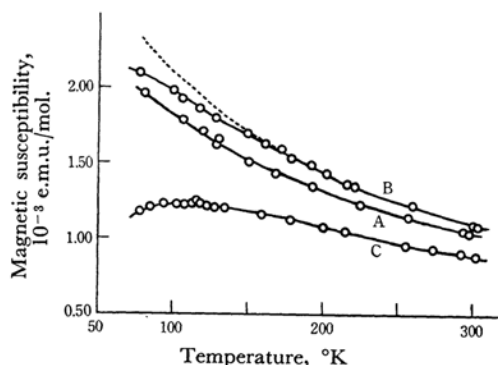


Fig. 1. Temperature dependence of the magnetic susceptibilities of bis(imidazolato)copper(II). A: Blue modification. B: Green modification. C: Brown modification.

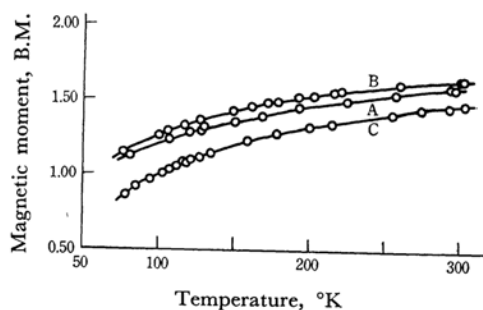


Fig. 2. Magnetic moments of bis(imidazolato)copper(II).

A: Blue modification. B: Green modification. C: Brown modification.

1) M. Inoue, M. Kishita and M. Kubo, *Inorg. Chem.*, **4**, 626 (1965).

2) J. S. Smart, "Magnetism III," Ed. by G. T. Rado and H. Shul, Academic Press, New York (1963); V. L. Ginsburg and V. M. Fain, *Soviet Phys.-JETP*, **15**, 131 (1962).

3) B. Bleaney and K. D. Bowers, *Proc. Roy. Soc.*, **A214**, 451 (1952); B. N. Figgis and R. L. Martin, *J. Chem. Soc.*, **1956**, 3837.

fact suggests that in this modification a polymeric structure is involved rather than a binuclear structure.