Komponenten wird durch die Komponenten des Lu 175 verdeckt, so daß im allgemeinen nur ein bis drei Komponenten des Lu 176 an einer Linie vermeßbar sind; 3. Intensität und Lage der Lu 176-Komponenten können durch die benachbarten etwa 40mal stärkeren Komponenten des Lu 175 erheblich verfälscht werden; 4. bei großen I-Werten hängen Intensitäts- und Abstandsverhältnisse nur schwach von I ab. Nach allen Erfahrungen ist aus diesen Gründen auf photographischem Wege keine genauere Bestimmung der Kerndrehimpulsquantenzahl des Lu 176 möglich. Deshalb wurde für eine erneute Untersuchung der Hfs. des Lu ein photoelektrisches Fabry-Perot-Spektrometer nach JACQUINOT und DUFOUR[3]) verwandt, das gestattet, Intensitätsmessungen mit wesentlich höherer Genauigkeit durchzuführen, als es auf der photographischen Platte möglich ist[4]). Ferner konnte durch die Verwendung dielektrischer Vielfachschichten für die Fabry-Perot-Verspiegelungen ein beträchtlicher Intensitätsgewinn erzielt werden[5]).

Intensitätsmessungen, die mit dem natürlichen Isotopengemisch ausgeführt wurden, ergaben an vier Lu I-Linien (4815 Å, 4905 Å, 4942 Å, 5403 Å) und an einer Lu II-Linie (6463 Å) für die Kerndrehimpulsquantenzahl des Lu 176

$$I^{176} = 6,$$

bei sehr vorsichtiger Wahl der Fehlergrenzen lassen sich allerdings $I^{176} = 5$ und $I^{176} = 7$ nicht mit Sicherheit ausschließen. Abstandsmessungen der Lu 176-Komponenten von zwei Lu I- und zwei Lu II-Linien bestätigten dieses Ergebnis. Für das Verhältnis der magnetischen Kerndipolmomente und der elektrischen Kernquadrupolmomente der beiden Lu-Isotope wurde (mit $I^{176} = 6$)

$$\mu_I^{175}/\mu_I^{176} = 0{,}7174 \pm 0{,}0015, \quad Q^{175}/Q^{176} = 0{,}70 \pm 0{,}04$$

gefunden. (Die Kerndrehimpulsquantenzahl des Lu 175, $I = 7/2$, ist aus der Untersuchung von SCHÜLER und SCHMIDT[6]) bekannt.) Die Neuvermessung der Hfs. des Lu 175 ergab

$$\mu_I^{175} = (2{,}0 \pm 0{,}2)\ \text{K.M.} \quad Q^{175} = (5{,}6 \pm 0{,}5) \cdot 10^{-24}\ \text{cm}^2.$$

Die großen Fehler in der Absolutbestimmung von μ_I und Q sind dadurch bedingt, daß die Terme des Lu I- und Lu II-Spektrums mehr oder weniger große Störungen aufweisen. Bei der Berechnung von Q wurde die Sternheimer-Korrektur nicht berücksichtigt. Eine ausführliche Veröffentlichung soll nach Abschluß der Messungen in der Zeitschrift für Physik erfolgen.

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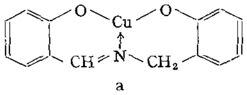
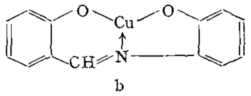
Subnormal Magnetic Moments of some Copper Chelates

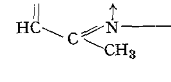
So-called tricoordinated copper complexes have been reported by several investigators[1]). From the method of synthesis, the chemical analysis of the complexes, and the tridentate nature of the ligand molecules, it has been presumed that the copper atoms of these chelates have an unusual coordination number three. We have prepared the following four chelates and their monopyridinates and carried out magnetochemical investigation on these compounds: salicylal-*o*-hydroxybenzylamine Cu(II) (a), salicylal-*o*-hydroxyanil Cu(II) b), acetylacetone-mono-(*o*-hydroxyanil) Cu(II) (c, $R = CH_3$), and benzoylacetone-mono-(*o*-hydroxyanil) Cu(II) (c, $R = C_6H_5$). They were prepared from suitable Schiff bases and copper acetate. The copper complexes were difficultly soluble in common organic solvents but readily soluble in pyridine. When water was added to the pyridine solution of one of the copper chelates, the pyridinate of the chelate precipitated. When the pyridinate was boiled in ethyl alcohol, a pyridine-free complex could be isolated. The results of quantitative determination of copper and nitrogen agreed with the calculated values.



a



b



c

The magnetic moments, μ, per one atom of copper were calculated from the gram susceptibilities, χ, measured at room temperature (14° C) and the diamagnetic contributions of the chelated groups.

Table 2

	$C_{14}H_{11}O_2NCu$	$C_{13}H_9O_2NCu$	$C_{11}H_{11}O_2NCu$	$C_{16}H_{13}O_2NCu$
$\chi \cdot 10^6$ . .	0·705	2·41	2·81	1·25
μ (B.M.) .	0·87	1·34	1·37	1·11

A divalent copper atom has one odd electron regardless of the type of linkage as well as of the configuration of ligands attached to it. The reason for this lies in the fact that the chemical formulas given above contain an odd number of atoms having an odd atomic number. The observed moments are smaller than the theoretical value (1·73 B.M.) for one odd electron. CALVIN and BARKELEW[2]) also found a subnormal moment of 1·57 B.M. for salicylal-*o*-hydroxyanil Cu(II).

A possible explantion for these low moments is afforded by the formation of binuclear complexes. The method of preparation and the results of chemical analysis, on which the present molecular formulas are based, do not exclude the possibility of dimer formation leading to the presence of some kind of electron pairing taking place between copper atoms in a molecule. This will recall the binuclear copper derivative of diphenylmethyl-arsine[3]), $Cu_2Cl_3(Ph_2MeAs)_3$, having a moment of 1·78 B.M. for a molecule. If the formation of a binuclear complex is disregarded, the moment per one copper atom would simulate an abnormally small moment of 1·26 ($= 1{\cdot}78/\sqrt{2}$) B.M. SELWOOD[4]) also gives an account of the fact that cupric acetate shows a subnormal moment due to exchange effects between adjacent copper ions, and that a substantial number of other organic derivatives of copper show somewhat similar effects. The X-ray analysis on cupric acetate monohydrate[5]) has revealed that the real unit composing the crystals is a dimeric molecule, in which the Cu—Cu distance is 2·64 Å. The decreasing susceptibility with lowering temperature found by FIGGIS and MARTIN[6]) as well as the decreasing intensity of the paramagnetic resonance absorption observed by BLEANEY and BOWERS[7]) can be correlated with this close proximity of copper atoms.

The moments of pyridinates (1·81 to 1·84 B.M.) were normal values expected for tetracoordinated cupric complexes.

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The Revelation of Dislocations in Metal Crystals by Evaporation

Following a theoretical prediction by FRANK[1]) and a subsequent experimental verification by several authors[2]),[3]),[4]) it is now generally accepted that crystal growth at low supersaturations proceeds by the wellknown spiral mechanism. That reverse of this mechanism on evaporation of several layers might occur seems reasonable and was confirmed for ionic crystals by one of us[5]). This technique has now been extended to metals and results for pure copper, as an example of a face-centered cubic metal, are seen in fig. 1 and fig. 2 where the surface obtained by heating a copper sample in a vacuum of 1 to 5×10^{-4} mm Hg is shown.

The spirals, or sometimes trenches, revealed by this technique have certain characteristic properties of which some of the most noteworthy are: 1. The morphology of the evaporation figures changes every time a grain boundary is