MAGNETIC SUSCEPTIBILITY MEASUREMENTS ON THE COPPER COMPLEXES OF O,O′ DIHYDROXY SCHIFF BASES

by

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Özet

Birinci sıra geçiş elementlerinden birisi olan bakır, bilhassa kükürt ve azot ihtiva eden organik ligandlarla gayet sağlam koordinasyon bileşikleri verir. Bu bileşikler gerek teori ve gerkse pratik bakımından büyük ehemmiyet arzeder.

Bunlara ilâveten, bakırın bazı enzimler ve kan hücrelerinde bulunuşu ehemmiyetini bir kat daha artırmaktadır. Hattâ vücutta hemoglobin yapımında katalizör olarak rol oynadığına muhakkak nazarile bakılmaktadır. Koordinasyon ve biokimyasında ehemmiyeti büyük olan bu elementin yeni komplekslerinin çalışılması ümit vaadedici olduğundan, koordinasyon sayısı acaip bazı yeni kompleksleri magnetokimya bakımından incelendi. Bunlardan bazıları gene beklenmedik neticeler, 1 B. M. civarında degerlerle beklenenin yaklaşık yarısını verdiler.

Abstract

One of the interesting elements of the first raw transition elements is copper. It is very prone to form stable complexes with compounds containing nitrogen and sulfur ligands. These complexes are of great interest either in terms of theory or industry.

In addition to these, it is found in the structure of some enzymes and also in blood cells, as cuprein. Today, it is considered that it plays very important part as a catalyst in the formation of the hemoglobin. Since, it is interesting in the coordination chemistry and biochemistry, it is very promising to study new complexes of it. So in this study some odd complexes of it have been prepared and studied in terms of the magnetochemistry. Some of these strange compounds gave unexpected magnetic susceptibilities, round about 1B. M. which is the half of the expected.

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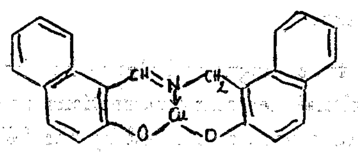
Introduction

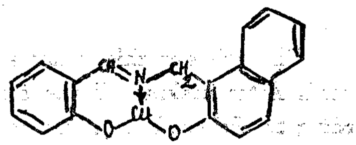
One of the very interesting elements of the transition series is copper. It forms very stable compounds with most complexing agents, especially those containing oxygen, nitrogen and sulfur ligands. They are not only important in terms of theory but also in industry [1], [2], [3], [4]. It is also greatly involved in biochemistry. It is known that copper ion takes a very important part in the activation of certain enzymes [5], such as ascorbic acid oxidase, phenol oxidase. It has also been shown that copper is found in the blood cells [6], as hemocuprein. The function of the hemocuprein is not exactly known, but it may well be thought that it is involved in the synthesis of hemoglobin. It is again an experimental result that the administration of iron does not aid an anemic animal in order to produce hemoglobin in the body unless it is accompanied by copper [7], [8].

Moreover it has been shown that any other metal ion cannot replace the copper ion in this vital process. So it is very promising to study copper complexes for the theoritical interest as well as the practical.

In this study some odd copper complexes have been chosen and examined the magnetic susceptibilities of them. These complexes are:



I



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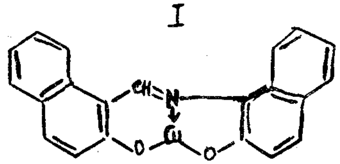
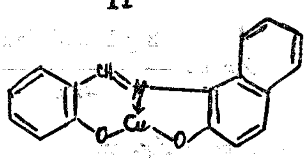


III



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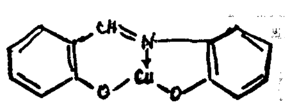
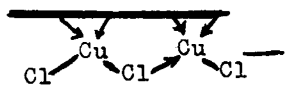


V

As it is noticed in these complexes cupric ion has a coordination number three in contrast of the usual four. Numbers I and II showed 0.99 B.M. and 1.13 B.M. respectively. The numbers III, IV and V showed 1.75 B. M., 1.82 b. M. and 1.54 B.M. respectively. The latter results are easily plausible that the copper-II has shown very nearly its theoritical magnetic moment. As for, numbers I and II, the magnetic susceptibilities that they showed, are rather difficult to interpret. In literature, there are some examples for the lower magnetic moment of the copper-II, but there are also reasonable explainations for those structures [9], [10]. In those studies there are good grounds that some amount of spin-pairing can occur through the bridge of chlorine, VI and of hydrazine skeleton, VII.



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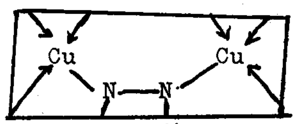

VII

In our cases there is not such possibilities, so they need being explained in another way.

Experimental

Through out this study a gouy type magnetic balance has been used. After making all the constitutional necessary corrections according to Selwood [11], the results have been calculated by the following equations:

$$Xg = \frac{2\ g\ 1\ \text{pull (push)}}{H^2W}$$

$$Xm = Xg.\ m$$

$$Xa = Xm + k$$

$$\mu = 2.84 \sqrt{Xa.\ T}$$

$$\mu = \sqrt{n\ (n-2)}$$

Samples have been used in dry state.

I – β – **Hydroxy – α – Naphthaldehyde – β – Hydroxy – α – Naphthylmethyl–imine–Copper**

1 = 5.4 Cm.

t = 22 °C

pull = 0.00045 g

weight = 0.1576 g w

H^2 = 43.5 10^6 $Gaus^2$ (Standard)

μ = 0.99 B. M.

II – **β–Hydroxy–α–Naphthaldehyde–o–Hydroxy–Benzylimine–Copper.**

1 = 6.1 Cm.

t = 24 °C

pull = 0.00070 g

weight = 0.1439 g

μ = 1.13 B. M.

III – **β–Hydroxy–α–Naphthaldehyde–β–Hydroxy–α–Naphthylimine–Copper**

1 = 5.8 Cm

t = 22° C

pull = 0.00135 g

Weight = 0.1100 g,

μ = 1.75 B. M.

IV, **Salicylaldehyde-β–Hydroxy–α–Naphtyl– imine–Copper**

1 = 6.0 Cm

t = 24 °C

pull = 0.00140 g

weight = 0.1250 g

μ = 1.82 B. M

V – **Salicylaldehyde–o–Hydroxy–Phenyl–imine–Copper**

I = 6.0 Cm

t = 25 °C

pull = 0.00100 g

weight = 0.1064 g

μ = 1.54 B. M.

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