

**Study the stability of some metal ion of complexes
in aqueous solution.**

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Abstract

Measurements of stability constant of complexes formed by interaction of potassium 5-mercapto-1,3,4-oxadiazol-2-ylcarbamo dithioate (K^+TC^-) with (Ag^+ , Ca^{+2} , Mn^{+2} , Co^{+2} , Ni^{+2} , Zn^{+2} , Cd^{+2} , and Pb^{+2} , Cr^{+3} , Fe^{+3} , La^{+3} ,) ions, have been performed. The bidentate ligand (K^+TCS^-) has a hardness parameter (α) of (0.350) and a softness (β) parameter of (0.05). Bonding in these complexes occur most probably through sulfur atom of carbonate group and lone pair electrons of the isomethine nitrogen atom for oxadiazole ring.

الخلاصة

في هذا البحث تم تعيين ثوابت استقرارية معقدات الليكاند بوتاسيوم-(2-ميركبتو-1,3,4-اوكسادايازول)-5-امينو-ثنائي ثايو كارباميت (TCS^-K^+) مع ايونات (الفضة الاحادية - المنغنيز-الكوبلت-النيكل-النحاس-الزنك-الرصاص-الكاديوم الثنائية -الكروم و الحديد الثلاثية- وايون الانثيوم الثلاثي من عناصر الانتانات) في درجة 25 م⁰. ثم دراسة طبيعة اليكيند مع الايونات المنتقاة ووجد انه يتناسق ثنائي السن عن طريقة كبريت مجموعة الثايوكارباميت و نتروجين حلقة الاوكسادايازول. ثم حساب صلادة و ليونة الليكاند ووجد ان معامل الصلادة (α) هو (0.350) و معامل الليونة (β) يساوي (0.05).

Introduction

1,3,4-Oxadiazole is the most thermally stable isomer which has attracted special attention; this is primarily due to the large number of uses in many diverse areas, including drugs, Scintillation materials, dyes⁽¹⁾ and surface active agents⁽²⁾.

The derivatives of oxadiazole have been used as complexing reagents with various metal ions⁽³⁻⁸⁾. Therefore determination of stability constants of oxadiazole complex is highly encouraging. A number of measurements of stability constants of M(II), M(I) and M(III) with these derivatives especially having more than one active for coordination, have been reported by potentiometric technique such as 2-salicyldimino-1,3,4-oxadiazole and 2-amino-5-mercapto-1,3,4-oxadiazole with La^{+3} , Ca^{+3} , Pr^{+3} , Nd^{+3} , Sn^{+3} , Zr^{+4} & Y^{+3} by Tewari and Shrivastara⁽⁹⁾, Shiff, Mannich, & carboxylate derivatives with Co(II), Mn(III), & Cu(II)⁽¹⁰⁻¹²⁾ have been reported.

In this paper we are interested mainly in measuring the stability constants (K_{st}) of complexes in aqueous solution of dithiocarbonate-1,3,4-oxadiazole, also to apply Pearson's hard-soft-acid-base postulate (HSAB) to explain the behaviour of this ligand in terms of Mesonon parameters⁽¹³⁾.

EXPERIMENTAL

1- Apparatus and Procedure:

pH-measurements were carried out with Philips pH-meter. The pH-meter was standardized before each run against buffer solution of known complexes, it is necessary to find out the acid dissociation constant of the ligand (HL) by titrating the ligand with standard alkali, then titrating mixtures of the ligand and metal ions following the procedure given in previous paper⁽¹⁵⁾. Furthermore the Ostwald-dilution method⁽¹⁶⁾ have been followed to evaluate the molar conductance (Λ_m), (Λ_o) of the electrolytic complexes in aqueous solution to compare the values of (α) and (β), and K_d, K_f .

2- Reagent:

2-Amino-5-mercapto-1,3,4-oxadiazole[1] were prepared according to procedure established in literature⁽¹⁴⁾. The ligand Potassium -(2-mercapto-1,3,4-oxadiazole) 5-amino-dithiocarbonate have been prepared by mixing (0.011 mole, 2.59 g of [1] compound) in 50ml. absolute ethanol with (0.010 mole, 5.5ml.) of CS_2 . The mixture was stirred on water bath for 2hrs. The yellowish precipitate of ligand was filtered, washed several times with petroleum ether and chloroform.