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**New Dinuclear Transition Metal Complexes With
Supramolecular Ligand: Preparation, Characterization And
Biological Activity**

A Thesis Submitted In Fulfillment Of The Requirements For The
Degree Of Master Of Science In Applied Chemistry

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Abstract:

The aim of this work is synthesis of novel macrocyclic ligand LDQO and five binuclear homo-metallic complexes Co(II), Ni(II), Cu(II), Fe(III) and Zn(II) and characterized by using Fourier transform infrared method, elemental analysis (computed) and UV-Vis spectroscopy. The results showed that the coordination environment around the metal ions is then completed Octahedral geometry for Co(II), Fe(III), Zn(II) and Ni(II) and distorted Octahedral geometry for Cu(II) complex are proposed by four nitrogen donor atoms from the azomethine & oxime nitrogen in C=N group.

The *in vitro* biological activity of the macrocyclic ligand and the binuclear complexes was assessed against bacteria *Staphylococcus aureus* and *Escherichia coli* to ascertain their antibacterial properties. The ligands and their metal complexes were tested for antibacterial activities by agar disc diffusion method. Except for ligand in Gram-positive, all complexes showed considerable activity almost equal to the activity of Ceftriaxone. The Zn (II) complex exhibits a higher activity than the other metal complexes.

We recommended that properties study of geometric shape of the new macrocyclic ligand.

المستخلص

الهدف من هذه الدراسة تخليق متصل حلقي ضخم LDQO و خمس معقد ثنائي متجانس النواة مع الكوبالت Co(II) ، النيكل Ni(II) ، النحاس Cu(II) ، الحديد Fe(III) و الزنك Zn(II) . وتوصيفهم باستخدام مطيافية الأشعة تحت الحمراء IR والأشعة فوق البنفسجية UV-VIS و تحليل العناصر المحسوبة ، اظهرت النتائج البيئة التناسقية حول الذرة المركزية مكتملة بشكل ثماني الاوجة لكل من الكوبالت Co(II) ،

, النيكل Ni(II) , الحديد Fe(III) و الزنك Zn(II) وشكل ثماني الاوجة مشوه لمعقد النحاس Cu(II) وذلك عن طريق ذرات النايتروجين الاربعة الموجودة في كل من الايزوميثين والاكزيم في مجموعة ال C=N .

تم اختبار الفعالية الاحيائية معملياً للمتصل الحلقي الضخم LDQO ومعقداته ثنائية النواة ضد البكتيريا الكروية العنقودية الذهبية و البكتيريا الإشريكية القولونية للتأكد من خواصها المضادة للبكتيريا , وتم ذلك عن باستخدام طريقة انتشار ديسك , باستتار المتصل على البكتيريا موجبة الغرام كانت كل للمعقدات فعالية مساوية تقريباً للسفتراكسون , اما معقد الزنك Zn(II) كان اعلى فعالية من المعقدات الاخرى .

نوصى بدراسة خصائص الشكل الهندسي لمتصل حلقي ضخم جديد .

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5-1 Conclusions:

The newly synthesized macrocyclic ligand and its binuclear metal complexes were characterized by various physicochemical techniques (IR and UV-Visible). The data obtained from various studies are in good agreement with proposed structure of the macrocyclic ligand and its metal complexes. Octahedral geometry of Co(II), Ni(II), Fe(III) and Zn(II) complexes, destroyed Octahedral Cu (II) was proved by their UV, visible spectra. In vitro antibacterial studies showed that the macrocyclic ligand and its binuclear metal complexes were biologically active. The Zn(II) complex showed the best activity against the studied bacterial .

5-2 Recommendation:

In this research we recommend:

- Geometry study of the properties of the new macro-cyclic ligand.
- Further study and in *vivo* experiment of complexes on cell line.
- Synthesis and characterize of hetero-dinuclear metal complexes of new ligand.

