



مَلِكِ يَوْمِ الدِّينِ

سورة العلق الآية (٥)



**Synthesis and Characterization of Lanthanum, Neodymium and Erbium
Complexes with Schiff Bases Derived from Benzopyran-4-one**

ATHESIS SUBMITTED

TO

FACULTY OF SCIENCE

CAIRO UNIVERSITY

BY

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B. Sc. (Hons.) 2002, M. Sc. 2006

FOR

THE DEGREE OF DOCTOR OF PHILOSOPHY

IN

INORGANIC CHEMISTRY

2009



جامعة القاهرة

تخصير وتوصيف مترجمات الأنتانم والنيم كميوم والإريوم مع قواعد شيفت مشتقة من بنزوبيران-٤-أون

رسالة مقدمة

إلى

كلية العلوم- جامعة القاهرة

من

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بكالوريوس العلوم (جيد جدا مع مرتبة الشرف) جامعة القاهرة (٢٠٠٢)

ماجستير العلوم (كيمياء غير عضوية) جامعة القاهرة (٢٠٠٦)

للحصول على

درجة دكتوراه الفلسفة في العلوم

(الكيمياء غير العضوية)

APPROVAL SHEET FOR SUBMISSION

Title of the Ph. D. Thesis:

Synthesis and characterization of lanthanum, neodymium and erbium complexes with Schiff bases derived from benzopyran-4-one

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ABSTRACT

Name: **Nora Saeed Morsy Abdel-Kader**

Title of thesis:

Synthesis and characterization of lanthanum, neodymium and erbium complexes with Schiff bases derived from benzopyran-4-one

Degree: **(Ph. D.)** Faculty of Science, Cairo University, 2009.

This work has been carried out to characterize the structure of metal complexes of $\text{La}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$, $\text{Nd}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$ and $\text{Er}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$ with Schiff bases derived from condensation of ethylenediamine (I), trimethylenediamine (II), o-phenylenediamine (III), p-phenylenediamine (IV) and 2-aminopyridine (V) with 6-formyl-7-hydroxy-5-methoxy-2-methylbenzopyran-4-one (a) and 5,7-dihydroxy-6-formyl-2-methylbenzopyran-4-one (b) by using different techniques such as elemental analyses, spectral measurements (IR, ^1H -NMR, UV-Vis), thermal analysis and conductometric measurements. Ternary complexes of La(III), Nd(III), Er(III) ions with Schiff bases (IVa and Va) and 8-hydroxyquinoline were prepared to increase the ligating properties of Schiff bases IVa and Va. Different techniques (mentioned above) are applied to identify the molecular structure of these complexes. The fluorescence properties of the prepared Schiff bases and their complexes with Nd(III) and Er(III) ions in dimethylformamide (DMF) were investigated. Under the excitation of UV-Vis light, the complexes exhibit characteristic fluorescence of erbium and neodymium ions only but lanthanum complexes are non fluorescent. The Schiff bases were assayed by the disc diffusion method for antibacterial activity against *Staphylococcus aureus* and *Escherichia coli*. Among the compounds tested, IIa and Va exhibited good antibacterial activity, almost equal to that of Tetracycline used as standard. The antifungal activity of the compounds was also evaluated against the fungi *Aspergillus flavus* and *Candida albicans* and Amphotericin B was used as standard. The Schiff bases had antifungal activity very close to that of the standard are IIa, Va and Vb.

Key words: Schiff bases, lanthanides, benzopyran-4-one, ethylenediamine, trimethylenediamine, o-phenylenediamine, p-phenylenediamine, 2-aminopyridine, mixed ligand complexes, IR, ^1H -NMR, thermal analysis, fluorescence and antimicrobial activity.

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Dedication

To My Lovely Parents

ACKNOWLEDGEMENT

Thanks and gratitude is due to Almighty God for giving me life, hope, unlimited and continuous blessing on me and helped me in concluding this work.

I would like to express my thanks, appreciation and gratitude to **Prof. Dr. Aida Lotfy El-Ansary**; Professor of Inorganic Chemistry, Department of Chemistry, Faculty of Science, Cairo University for suggesting the problem of this work, her keen enthusiasm, sincere guidance, morale help and support, valuable suggestions and unrelenting efforts throughout each stage of this work. I would like also to express my deepest grateful to **Prof. Dr. Yousry Moustafa Issa**, Professor of Analytical Chemistry, Department of Chemistry, Faculty of Science, Cairo University for his interest, kind advice and continuous encouragement throughout the present work.

I would like to acknowledge **Dr. Tareq Youssef**, Head of the Laser Application in Metrology, Photochemistry and Agriculture (LAMP) Department, NILES, Cairo University for the facilities he furnished through the fluorescence measurements.

Finally, many thanks are due to **my family** especially **my father** for his continuous encouragement, compassion and the great assistance during this thesis.



مستخلص

الاسم: نوره سعيد مرسي عبد القادر

عنوان الرسالة:

تحضير وتوصيف متراكبات اللانثانم والنيودميوم و الأربيوم مع قواعد شيف مشتقه من بنزوبيران-٤-أون

الدرجة: دكتوراه الفلسفة في العلوم

ملخص البحث:

في الدراسة الحالية تم تحضير قواعد شيف عن طريق تكاثف إيثيلين ثنائي أمين (I) وثلاثي ميثيلين ثنائي أمين (II) و ١ و ٢-فينيلين ثنائي أمين (III) و ١ و ٤-فينيلين ثنائي أمين (IV) و ٢-أمينو بيريدين (V) مع ٦-فورميل-٧-هيدروكسي-٥-ميثوكسي-٢-ميثيل بنزوبيران-٤-أون (a) و ٥ و ٧-ثنائي هيدروكسي-٦-فورميل-٢-ميثيل بنزوبيران-٤-أون (b). تم توصيف قواعد شيف الجديدة (III-V) بواسطة طرق التحليل الكيميائية والطيفية مثل طيف الأشعة المرئية وفوق البنفسجية وتحت الحمراء والرنين النووي المغناطيسي ودراسة أطيف الكتلة. تم تعيين ثابت تأين قواعد شيف عن طريق أطيف الامتصاص الإلكتروني. تم اختبار فاعلية كل قواعد شيف المحضرة كمضادات لبعض أنواع الكتريا وبعض أنواع الفطريات. تم فصل متراكبات قواعد شيف المحضرة في الحالة الصلبة مع أملاح نترات اللانثانم والنيودميوم و الأربيوم. لم يتم تحضير متراكبات IVa و Va مباشرة لذلك تم تحضير المتراكبات التناسقية المختلطة لهاتين القاعدتين مع مركب ٨-هيدروكسي كوينولين. تم توصيف المتراكبات المحضرة باستخدام التقنيات التالية: التحليل العنصري والتحليل الطيفية وفيها يستخدم طيف الأشعة المرئية وفوق البنفسجية وتحت الحمراء والرنين النووي المغناطيسي والتحليل الحراري وتعيين نسب تكوين المتراكبات المحضرة في المحلول باستخدام المعايرة التوصيلية الكهربائية. تم أيضاً دراسة طيف الانبعاث الفلورسيني لقواعد شيف المحضرة ومتراكباتها. بينت الدراسة أن متراكبات اللانثانم ليس لها أنبعاث فلورسيني. وقد تبين زيادة الانبعاث الفلورسيني لهذه القواعد نتيجة تكون متراكبات النيودميوم والأربيوم. تم اقتراح الصيغة الجزيئية للمتراكبات المحضرة بناء على ما تم التوصل إليه من الدراسات السابقة.

الكلمات الدالة : قواعد شيف وبنزوبيران-٤-أون وإيثيلين ثنائي أمين وثلاثي ميثيلين ثنائي أمين و ١ و ٢-فينيلين ثنائي أمين و ١ و ٤-فينيلين ثنائي أمين و ٢-أمينو بيريدين والمتراكبات التناسقية المختلطة والأشعة تحت الحمراء والرنين النووي المغناطيسي و التحليل الحراري و الانبعاث الفلورسيني والفاعلية ضد الميكروبات

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