

**Ain Shams University**  
**Faculty of Science**  
**Chemistry Department**



**Preparation, characterization and biological activity study on polydentate Schiff  
base ligands and their chelates with some transition metals and their applications  
in the determination of Fe(III) in the natural water samples**

**Thesis Submitted**

**By**

**Ahmed Badr Kamel Mohamed Gad**

**(B.Sc., Chemistry, 2006)**

**(M.Sc., Inorganic Chemistry, 2010)**

**To**

**Chemistry Department**

**Faculty of Science**

**Ain Shams University**

**For**

**The Degree Of**

**Ph.D., Inorganic and Analytical Chemistry**

**(2012)**



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**Thesis Advisors**

**Prof. Dr: Mustafa H. Khalil**

**Prof. of Inorganic and Analytical Chemistry, Chemistry Department,  
Faculty of Science, Ain Shams University.**

**Prof. Dr. Gehad G. Mohamed**

**Prof. of Inorganic and Analytical Chemistry, Chemistry Department, Faculty of  
Science, Cairo University.**

**Dr: Eman H. Ismail**

**Associate of Inorganic Chemistry, Chemistry Department,  
Faculty of Science, Ain shams University.**

**Dr: Ehab. M. Zayed**

**Microanalysis Laboratory, National Research Center.**

**(2012)**







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**Faculty of Science**  
**Chemistry Department**



## **Approval sheet for submission**

**Name of candidate: Ahmed Badr Kamel Mohamed Gad.**

**Degree: Ph.D., Inorganic and Analytical Chemistry**

**Thesis Title: "Preparation, characterization and biological activity study on polydentate Schiff base ligands and their chelates with some transition metals and their applications in the determination of Fe(III) in the natural water samples."**

**The thesis has been approved for submission by the supervisors:**

**Supervisors**

- |                                       |              |
|---------------------------------------|--------------|
| <b>1-Prof. Dr. Mostafa H. Khalil,</b> | <b>.....</b> |
| <b>2-Prof. Dr. Gehad G. Mohamed,</b>  | <b>.....</b> |
| <b>3- Dr: Eman H. Ismail,</b>         | <b>.....</b> |
| <b>4- Dr: Ehab. M. Zayed.</b>         | <b>.....</b> |

**Prof. Dr. Maged Shafiek Antonious**

**Chairman of Chemistry Department**  
**Faculty of Science, Ain Shams University.**





**Ain Shams University**  
**Faculty of Science**  
**Chemistry Department**



## **Qualification**

**Student name: Ahmed Badr Kamel Mohamed Gad.**

**Scientific degree: M.SC.**

**Department: Chemistry Department**

**Name of Faculty: Faculty of Science.**

**University: Ain Shams.**

**Bachelor degree: 2006**

**M.SC. degree: 2010**

**Prof. Dr. Maged Shafiek Antonious**

**Head of Chemistry Department**  
**Faculty of Science, Ain Shams University.**



## **ABSTRACT**

**Name:** Ahmed Badr Kamel Mohamed Gad.

**Title of Thesis:** "Preparation, characterization and biological activity study on polydentate Schiff base ligands and their chelates with some transition metals and their applications in the determination of Fe(III) in the natural water samples."

**Degree:** Ph.D of Science in Inorganic and Analytical Chemistry, Faculty of Science, Ain Shams University, (2012).

This work had been carried out to investigate the coordination behaviour of bisaldehyde organic ligand and three Schiff bases derived from it with different coordination sites, towards some bi- and trivalent metal ions like Ni(II), Co(II), Cu(II) Zn(II), Cr(III) and Fe(III). The solid chelates of  $L^1$ ,  $L^2$ ,  $H_2L^3$  and  $H_2L^4$  were prepared and subjected to many analytical techniques such as elemental analyses, IR,  $^1H$  NMR and solid reflectance spectra, magnetic moment, molar conductance, X-Ray powder diffraction (XRD), thermal analyses and spectrophotometric techniques. The chelates were found to have octahedral geometry. The ligands ( $L^1$ ,  $L^2$ ,  $H_2L^3$  and  $H_2L^4$ ) and their binary chelates were subjected to thermal analyses (DTG and TG) and the different activation thermodynamic parameters, namely  $E^*$ ,  $\Delta H^*$ ,  $\Delta S^*$  and  $\Delta G^*$  were calculated from their corresponding DTG curves to throw more light on the nature of changes accompanying the thermal decomposition process of these complexes. The biological activity of the ligands and their complexes were also screened. The ligands are utilized for spectrophotometric determination of spiked Fe(III) in natural water samples under optimal experimental conditions applying the recovery calculations.

**Key Words:** Schiff base ligands complexes, Elemental analyses, Spectroscopy, Thermal analyses, XRD, Biological activity and Recovery calculations.

Supervisors: Prof. Dr. Mostafa H. Khalil,  
Prof. Dr. Gehad G. Mohamed,  
Dr: Eman H. Ismail,  
Dr: Ehab. M. Zayed.

Signatures:  
Signatures:  
Signatures:  
Signatures:

Prof. Dr. Maged Shafiek Antonious  
Chairman of Chemistry Department



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***Ahmed Badr***



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