



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكرو فيلم

# بسم الله الرحمن الرحيم



**HANAA ALY**



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكروفيلم



# شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



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التوثيق الإلكتروني والميكروفيلم

# جامعة عين شمس

## التوثيق الإلكتروني والميكروفيلم

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**HANAA ALY**



Faculty of Women for Arts,  
Science and Education  
Ain Shams University

# **Preparation and Characterization of New Hydrogels for Different Applications**

*A Thesis Submitted for Degree of M.Sc. in  
Organic Chemistry*

**By**

**Taghreed Hassan Ahmed Abdalla**  
(B.Sc. 2015)

**To**

**Chemistry Department**  
**Faculty for Women for Arts, Science and Education**  
**Ain Shams University**  
*Cairo, Egypt*

## **Supervisors**

**Prof. Dr. Nadia G. Kandile**  
Professor of Applied Organic Chemistry  
Faculty of Women for Arts, Science and Education  
Ain Shams University

**Assis. Prof. Dr. Abir S. Nasr**  
Assistant Professor of Organic Chemistry  
Faculty of Women for Arts, Science and Education  
Ain Shams University

**Prof. Dr. David R K Harding**  
Professor of Chemistry  
Institute of Fundamental Science, Massey University,  
New Zealand

**(2021)**



**Faculty of Women for Arts,  
Science and Education  
Ain Shams University**

## **Approval Sheet**

### **Preparation and characterization of new hydrogels for different applications**

**By**

**Taghreed Hassan Ahmed Abdalla**

**Thesis Supervisors**

**Approved**

**Prof. Dr. Nadia G. Kandile**

.....

**Assis. Prof. Dr. Abir S. Nasr**

.....

**Prof. Dr. David R K Harding**

.....

**Head of Chemistry of Department**

**Prof. Dr. Omaina A. Mustafa**

.....

**(2021)**



**Faculty of Women for Arts,  
Science and Education  
Ain Shams University**

### **QUALIFICATION**

<i><b>Student Name</b></i>	<b>: Taghreed Hassan Ahmed Abdalla</b>
<i><b>Scientific Degree</b></i>	<b>: Bachelor Degree</b>
<i><b>Department</b></i>	<b>: Chemistry</b>
<i><b>College</b></i>	<b>: Faculty of Women for Arts, Science and Education</b>
<i><b>University</b></i>	<b>: Ain Shams University</b>
<i><b>B. Sc. Graduation Date</b></i>	<b>:2015</b>
<i><b>M. Sc. Graduation Year</b></i>	<b>:2021</b>

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# ***DEDICATION***

*This work was dedicated to my lovely parents.*

*My sincere thanks and appreciation to my family for  
supporting me and giving me enough encouragement to  
reach for my dearms. I have to thank Allah for choosing  
them to be my family.*



وحدة النشر العلمي  
مجلة البحث العلمي في العلوم  
مجلة علمية محكمة



## قبول بحث للنشر

Taghreed H. Abdalla<sup>1\*</sup>, Abir S. Nasr<sup>1</sup>, Ghada Bassiuni<sup>2</sup>, David R. Harding<sup>3</sup>, Nadia G. Kandile<sup>1</sup>

1 Chemistry Department, Faculty of Women for Art, Science and Education, Ain Shams University, Heliopolis Post Cod. No. 11757, Cairo, Egypt.

2 Chemistry Department, Faculty of Engineering, Ain Shams University, Cairo, Egypt.

3 Chemistry Institute of Fundamental Science, Chemistry, Massey University, New Zealand.

نحيطكم علماً أن بحثكم المعنون بـ

## "New modified chitosan composites and nanocomposites for different applications"

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لادب والعلوم والتربية



ORIGINAL ARTICLE

# Fabrication of sustainable hydrogels-based chitosan Schiff base and their potential applications



Taghreed H. Abdalla<sup>a</sup>, Abir S. Nasr<sup>a</sup>, Ghada Bassioni<sup>b</sup>, David R. Harding<sup>c</sup>,  
Nadia G. Kandile<sup>a,\*</sup>

<sup>a</sup> Chemistry Department, Faculty of Women for Art, Science and Education, Ain Shams University, Heliopolis Post Cod. No. 11757, Cairo, Egypt

<sup>b</sup> Chemistry Department, Faculty of Engineering, Ain Shams University, Cairo, Egypt

<sup>c</sup> Chemistry Institute of Fundamental Science, Chemistry, Massey University, New Zealand

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Biological activity;  
Metal removal;  
Ionotropic gelation

**Abstract** Chemical modifications of chitosan were of interest to scientific researchers for its wide applications. Chitosan has been widely used for synthesis of unique compounds with potential biological activity and also effective for wastewater treatment. In the current study fabrication of new chitosan-based Schiff base hydrogels were fabricated through modification of chitosan with isonicotinic aldehyde to give hydrogel **I** or with epichlorohydrin or sodium tripolyphosphate via ionotropic gelation processes under the same reaction conditions to give hydrogels **II**, and nanohydrogels **II**, **III** respectively. FTIR, XRD, TGA, DSC, SEM, and TEM tools were used for characterization of the fabricated hydrogels **I**, **II**, and **III** respectively. The swelling behavior of the fabricated hydrogels in different solvents were determined. Evaluation of the hydrogels for leaching metal ions and biological activity towards different Gram-positive and Gram-negative of microorganisms were studied. The results showed that the highest efficiency for adsorption of cobalt and mercuric ions was revealed for hydrogels **II**, **III** (91.3%, 95.9%) and (92.5%, 95.9%) respectively. However, hydrogel **III** showed remarkable MIC and MBC towards Gram-positive (*B. subtilis*) (19.5, 38) µg/ml compared to the standard antibiotic Ciprofloxacin (19, 38) µg/ml respectively.

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\* Corresponding author at: Chemistry Department, Faculty of Women for Art, Science and Education, Ain Shams University, Heliopolis, Post Cod. No. 11757, Cairo, Egypt.

E-mail address: [nadiahk@women.asu.edu.eg](mailto:nadiahk@women.asu.edu.eg) (N.G. Kandile).

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## 1. Introduction

Water is the most important substance to humans and all living organisms. However, some harmful chemical compounds cause water pollution that gives negative effects on species living in water and also on the widely biological community (Ciao et al., 2015). There are many industries released metal ions in water (Chen et al., 2010).

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