شبكة المعلومات الجامعية

# بسم الله الرحمن الرحيم


HOSSAM MAGHRABY


شبكة المعلومات الجامعية


# شبكة المعلومات الجامعية

# التوثيق الالكتروني والميكروفيلم

HOSSAM MAGHRABY

شبكة المعلومات الجامعية

# جامعة عين شمس

## التوثيق الإلكتروني والميكروفيلم

## قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

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تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

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# بالرسالة صفحات

# لم ترد بالأصل

HOSSAM MAGHRABY

Cairo University

Faculty of Science
Department of Chemistry



# SYNTHESIS OF SOME NEW AZOLE AND AZINE DERIVATIVES

*A Thesis*
**Submitted in**

**Partial Fulfillment of the Requirements for M. Sc. Degree in Organic Chemistry**

***By***

***Amel Moustafa Abdel Wahab***

**(B. Sc. Cairo university, 1999)**

**Department of Chemistry**
**Faculty of Science**
**Cairo University**
**Giza, Egypt**

**2007**

# APPROVAL SHEET FOR SUBMISSION

Title of the (M. Sc) Thesis:

**SYNTHESIS OF SOME NEW AZOLE AND AZINE DERIVATIVES**

Name of Candidate: **Amel Moustafa Abdel Wahab**

This Thesis has been approved for submission by Supervisors:

SUPERVISORS *Signature*

1. **Prof. Dr. Ahmad Mahmoud Farag**
   Faculty of Science-Cairo University
2. ***Prof. Dr. Laila Ibrahim Ibrahim***
   *National Organization for Drug Control and Research (NODCAR)*
3. **Dr. *Eman Ali Ragab***
   Faculty of Science-Cairo University

**Prof. Dr.**

*Chairman of Chemistry Department*

*Faculty of Science, Cairo University*

# ABSTRACT

*Title of the M.Sc. Thesis:*

## Synthesis of Some Azole and Azine Derivatives

***Name of Candidate:*** Amel Moustafa Abdel Wahab

***Degree*:** (M.Sc.) Thesis, Faculty of Science, Cairo University, 2007/2008.

This work has been carried out to investigate the utility of (*E*)-1-(benzofuran-2-yl)-3-(dimethylamino)prop-2-en-1-one and (*E*)-1-(benzofuran-2-yl)-3-phenylprop-2-en-1-one for the synthesis of a variety of new polysubstituted heterocyclic compounds such as pyrimidin derivative, pyrazole derivatives, pyrazolo[3,4-*d*]pyridazine derivatives, pyrazolo[1,5-*a*]pyrimidine derivatives, 1,2,4-triazolo[1,5-*a*]pyrimidine derivatives, pyrimido[1,2-*a*]benzimidazole derivatives, pyrido[1,2-*a*]benzimidazole derivative, pyrido[2,3-*d*]pyrimidine derivatives, and pyrazolo[5,1-*c*][1,2,4]triazin derivative, naphtho[1,2-*b*]furan derivative, pyranone derivative, 2-oxo-pyridine derivative, and 2-thioxopyridine derivative of expected potential biological activity.

**Key Words:** enaminone, chalcon, pyrazole, pyrazolo[3,4-*d*] pyridazine, pyrazolo[1,5-*a*]pyrimidine, triazolo-[1,5-*a*] pyrimidine, pyrimido[1,2-*a*]benzimidazole, pyrido[2,3-*d*]-pyrimidine, oxo-pyridine, thioxopyridine.

## SUPERVISORS

**1. Prof. Dr. Ahmad M. Farag** A.M. Farag

**2. Prof. Dr. Laila I. Ibrahim** Laila Ibrahim

**3. Dr. Eman A. Ragab** Eman Ragab

**Prof. Dr. Rifaat H. Hilal**

*Chairman of Chemistry Department*
*Faculty of Science, Cairo University*

# ACKNOWLEDGMENT

*I wish to express my most sincere thanks and full gratitude to* **Prof. Dr. Ahmad M. Farag,** *Professor of Organic Chemistry, Faculty of Science, Cairo University, for his kind advices, for suggesting and directing the research project, useful discussion, reviewing the dissertation and encouragement throughout this work.*

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*I would like to express my sincere gratitude to* **Dr. Eman A. Ragab** , *Lecture of Organic Chemistry, Faculty of Science, Cairo University, for her kind advices, for suggesting and directing the research project, useful discussion, reviewing the dissertation and encouragement throughout this work.*

*Finally, I would like to express my appreciation to all people who helped me in completing the work in its final form.*

*Amel Moustafa Abdel Wahab*

*NOTE*

Beside the work carried out in this thesis, the candidate had attended and successfully passed a final examination of M. Sc. Courses (2002) in organic chemistry covering the following topics:

1- Spectroscopy.

2- Physical organic chemistry.

3- Heterocyclic chemistry.

4- Drug design.

5- Natural product.

6- Carbohydrates.

7- Dyes.

8- Photochemistry.

9- Biochemistry.

10- Polymer chemistry.

11- Quantum chemistry.

12- Advanced analytical chemistry.

13- Advanced organic chemistry.

14- Molecular structure.

15- German language.

**Prof. Dr. Rifaat H. Hilal**

*Chairman of Chemistry Department*

*Faculty of Science, Cairo University*

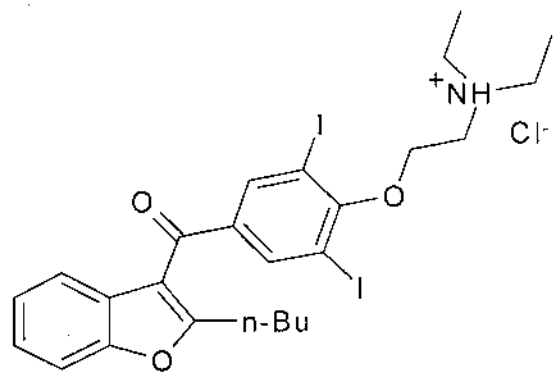
# *CONTENTS*

# AIM OF THE WORK

# I. AIM OF THE PRESENT WORK

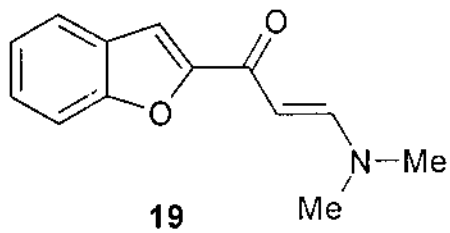
The benzofuran ring system is found as an integral part of various natural products.[1-3] Pharmacological properties have been associated with benzofuran derivatives,[4-8] Also, benzofuran derivatives are potentially active as antihyperglycemic,[4] antitumor,[9,10] cytotoxic,[11,12] antifungal,[13] antiaromatase,[13,5] antiinflammatory,[14] antihistaminic,[15] and antiallergic[16] agents. In addition to pesticidal and insecticidal agents.[17]

They were also found to be useful as anticonvulsant and antidepressant[18] agents and cardiac phosphodiesterase inhibitors.[19] For example; Amiodarone$^{R}$ which is benzofuran derivative is used as a drug in the treatment of arrhythmia and angina.




**Amiodarone**

From above observations and as a part of ongoing research program aimed at the synthesis of heterocyclic systems with expected pharmacological and biological activities, we report in this study the potential of both the enaminone derivative **19** and chalcone **17** as reactive starting materials in the synthesis of some new heterocycles attached to benzofuran moiety in C-2.

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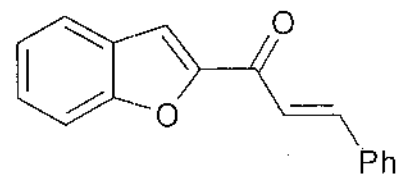


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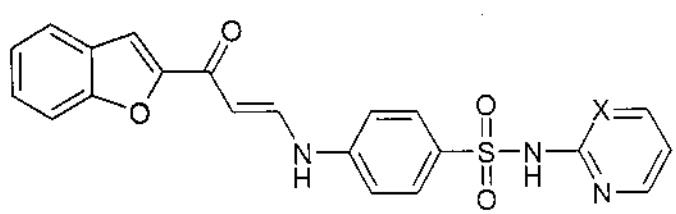
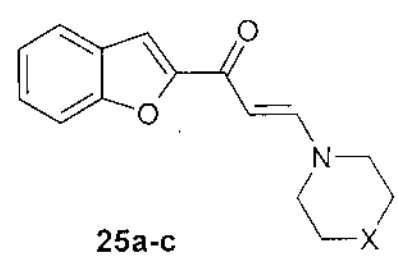
Examples of the target compounds which could posses interesting pharmacological properties are sulfonamides **22a,b**, tertiary amines **25a-c**, 2-amino-4-(1-benzofuran-2-yl)pyramidine **(28)**, substituted pyrazoles **31a-c** and **37a-c**, pyrazolo-[3,4-*d*]pyridazine **32a-c**, pyrazolo[1,5-*a*]pyrimidine **39a-e**, 7-(1-benzofuran-2-yl)-1,2,4-triazolo[1,5-*a*]pyrimidine **(42)**, 2-(1-benzofuran-2-yl)pyrimido[1,2-*a*]benzimidazole **(47)**, 3-(1-Benzofuran-2-yl)pyrido[1,2-*a*]benzimidazole-4-carbonitrile **(51)**, pyrido[2,3-*d*]pyrimidine **55a,b**, 1-(benzofuran-2-yl)carbonyl-7-phenylpyrazolo[5,1-*c*]-1,2,4-triazine **(58)**, 1-(benzofuran-2-yl)carbonyl-5-hydroxy-1-benzofuran **(62)**, 1-(benzofuran-2-yl)carbonyl-5-hydroxynaphtho[1,2-*b*]furan **(66)**, substituted pyran **70a,b**, 6-(benzofuran-2-yl)-1,2-dihydro-2-oxo-4-phenylpyridine-3-carbonitrile **(75a)**, 6-(benzofuran-2-yl)-1,2-dihydro-4-phenyl-2-thioxopyridine-3-carbonitrile **(75b)**, 6-(benzofuran-2-yl)-3-(4-chlorophenyl)-1,4-diphenyl-1*H*-pyrazolo[3,4-*b*]pyridine **(81)** and (benzofuran-2-yl)(4,5-dihydro-1,3,5-triphenyl-1*H*-pyrazol-4-yl)methanone **(93)**. The activity of some selected examples of the newly synthesized compounds was tested as antimicrobial and antitumor agents.



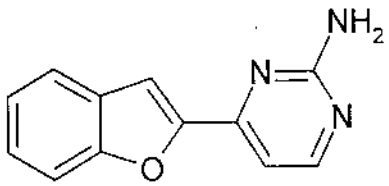

**22a-b**

a, X = CH2
b, X = N




**25a-c**

a, X = $CH_2$
b, X = O
c, X = NMe



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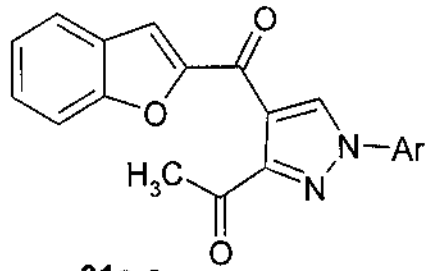
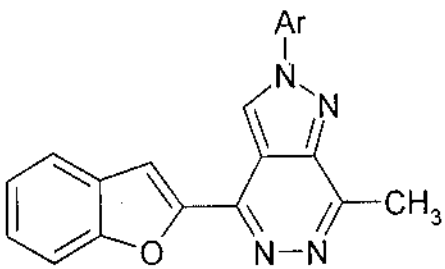


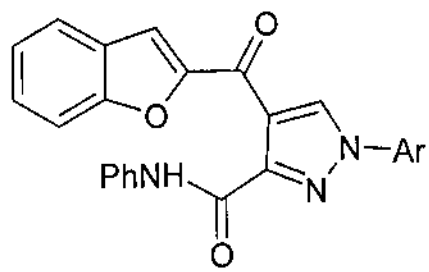
31a-c

a- Ar = Ph
b- Ar = 4-ClC$_6$H$_4$
c- Ar = 4-Me-C$_6$H$_4$



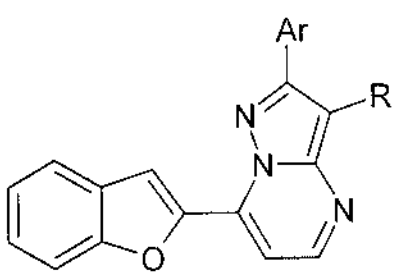
32a-c

a- Ar = Ph
b- Ar = 4-ClC6H4
c- Ar = 4-Me-C6H4



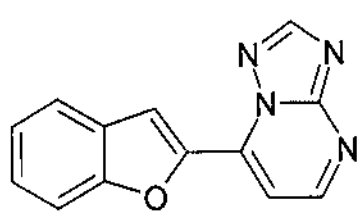
37a-c

a- Ar = Ph
b- Ar = 4-ClC$_6$H$_4$
c- Ar = 4-Me-C$_6$H$_4$



39a-e

a, Ar = Ph, R = H
b, Ar = Ph, R = $CH_3$
c, Ar = 4-ClC$_6$H$_4$, R = H
d, Ar = 4-$CH_3$C$_6$H$_4$, R = H
e, Ar = 4-$CH_3$OC$_6$H$_4$, R = H



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