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THESIS TITLE

**Synthesis and evaluation of new surfactants for
enhancing simultaneous saccharification and fermentation
of natural cellulosic materials to bioethanol.**

Submitted by

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For

The Partial Fulfillment of the Master Degree in Chemistry

Chemistry Department

Faculty of Science

Cairo University

2010

APPROVAL SHEET FOR SUBMISSION

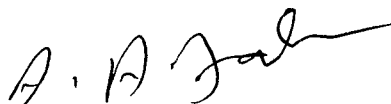
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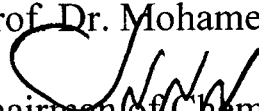


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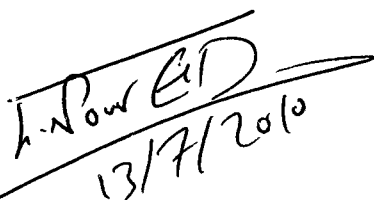
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Addendum

Beside the work carried out in this thesis, the candidate **Marian Riad Mahrous Gerges** has attended Post-graduate courses during the academic year 2006-2007 in the following topics:

- Biochemistry
- New Trends in Analytical Chemistry
- Carbohydrate Chemistry
- Chemistry of Natural Products
- Designing in Organic Chemistry
- Applied Organic Chemistry
- Organic Photochemistry
- Polymer Chemistry
- Quantum Chemistry
- Organic Microanalysis
- Heterocyclic Chemistry
- Techniques of Molecular Structure Determination
- German language
- Selected Topics

She has also passed successfully an examination in the above mentioned topics.



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Acknowledgment

I would like to express my deepest thanks and gratitude to my supervisor *Prof. Dr. AbdElgawad Ali Fahmi* , Professor of organic chemistry, Faculty of Science ,Cairo University, for his effective supervision, great efforts, faithful encouragement, and constant help throughout the course of this study.

Prof. Dr. Abd Elfatah Mohsen Badawi, Professor of applied organic chemistry in Egyptian Petroleum Research Institute, for his supervision, continuous advice, talented, and valuable criticism during the progress of the work.

Prof. Dr. Karima Abdelhafez Mohamed, Professor of genetics in National Research Center thanks for her interest, support, constructive criticism and fruitful discussion throughout this work.

Also, I would like to express my thanks to all the members of the Applications Department in *E.P.R.I* and to all members in *N.R.C* for their kindness and help.

Marian Rjad

ABSTRACT

Student Name: Marian Riad Mahrous.

Title of the thesis: Synthesis and evaluation of new surfactants for enhancing simultaneous saccharification and fermentation of natural cellulosic materials to bioethanol.

Degree: The Master of Science (Chemistry)

Sorbitan monolaurate (Span 20) was ethoxylated by four different molar ratios of ethylene oxide (20, 40, 60, and 80) and named E (20), E (40), E (60), and E (80). The structure of the prepared nonionic surfactants was elucidated using; FT-IR and ^1H NMR spectroscopies. The surface tension measurements were recorded. The effect of the prepared nonionic surfactants on the simultaneous saccharification and fermentation (SSF) of microwave/alkali pretreated rice and wheat straws to produce ethanol were investigated. From the obtained data, it was found that the addition of the nonionic surfactants at 2.5 g/l had positive effect on SSF. The maximum ethanol yield (82 and 76 %) was obtained after 72 h at 42 °C using *Kluyveromyces marxianus* for wheat and rice straws , respectively, while *Saccharomyces cerevisiae* exhibited a maximum ethanol yield (61 and 55 %) at 37 °C and 72 h for wheat and rice straws , respectively. The ethanol yield increases with increasing the Hydrophile-Lipophile Balance (HLB) of the prepared nonionic surfactants by increasing ethylene oxide units.

Keywords: Span 20 - ethylene oxide — nonionic surfactants - SSF - rice straw – wheat straw - ethanol - *Kluyveromyces marxianus* - *Saccharomyces cerevisiae* - HLB.

Supervisors:

1- Prof. Dr. Abdelgawad Ali Fahmi.

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Contents

Summary	i
Aim of the work	1
Chapter I: Introduction	2
Literature Survey	4
World Energy Consumption	4
Renewable Energy	4
Ethanol as Alternative Fuel	5
Ethanol	5
Manufacture of Industrial Alcohol	6
Ethanol Fermentation	7
Sugars	7
Starches	7
Lignocellulosic Materials	8
○ Carbohydrates	8
1.Cellulose	9
2.Hemicellulose	10
○ Lignin	11
○ Inorganics	12
○ Extractives	12
Lignocellulosic Ethanol Production	12
Pretreatment	13
Physical Treatment	14
Ball milling	15
Microwave Treatment	15
Chemical Treatment	15
Alkali Pretreatment	16
Enzymatic Hydrolysis	16
Addition of surfactant to, enzymatic hydrolysis of lignocelluloses	18

Effect of Surfactant Structure	22
Fermentation	22
Separate Hydrolysis and Fermentation (SHF)	23
Simultaneous Saccharification and Fermentation (SSF)	23
Rice Straw	25
Wheat Straw	26
Surfactants "Surface active agents"	26
Classification of Surfactants	26
1. Anionic	27
2. Cationic	27
3. Zwitterionic	27
4. Nonionic	28
Condensation of Ethylene Oxide with Long Chain Fatty Alcohols	29
Critical Micelle Concentration (CMC)	29
Factors influencing the Critical Micelle Concentration (CMC)	30
1. Structure of the Surfactant	30
2. Counter ions	31
3. Additives	31
4. Temperature	31
CMC Measurement	32
Hydrophile - Lipophile Balance (HLB)	32
Adsorption of Surface Active Agents	34
Mechanism of Adsorption	34
Chapter II: Experimental	36
Materials and Reagents	36
Ethoxylation of Nonionic Surfactant (Span-20)	38
Confirmation of the Structure of the Prepared surfactants	38
Evaluation of Some Surface Active Properties of the Prepared Compounds	39

○ Surface Tension Measurements (γ)	39
○ Critical Micelle Concentration (CMC)	39
○ Surface Excess Concentration (Γ_{\max})	40
○ Minimum Surface Area per Molecule (A_{\min})	40
○ Effectiveness (π_{CMC})	40
Thermodynamic Parameters of Micellization	41
Thermodynamic Parameters of Adsorption	41
Calculation of HLB for prepared Nonionic Surfactants	41
Chemical Analysis of Agricultural Residues	42
○ Holocellulose Preparation	42
○ α - Cellulose	42
○ Lignin Determination	43
○ Pentosan Estimation	44
○ Ash Content	45
Application of Prepared Surfactants in SSF and Ethanol Production	46
Substrates	46
Microwave/alkali Pretreatment for Agricultural Residues	46
Microorganisms	46
Preparation of Yeast Inoculums	46
Enzymes	47
Enzymatic Hydrolysis of Pretreated Agricultural Residues	47
Simultaneous Saccharification and Fermentation (SSF)	47
Analytical methods	48
A: Reducing sugar	48
B: Ethanol content	48
Chapter III: Results and Discussion	50
Structure Confirmation of the Prepared Nonionic Surfactants	50

○ FT-IR Spectroscopic Analysis	50
○ ¹ H NMR Spectroscopic Analysis	50
Surface Active and Thermodynamic Properties of the Prepared Surfactants	61
Chemical Analysis of Raw Materials	68
Effects of new Nonionic Surfactants on the Enzymatic Hydrolysis and SSF of Lignocellulosic Biomass to Ethanol	68
Enhancement of the Enzymatic Hydrolysis	69
Effect of the prepared Nonionic Surfactants on the SSF of Lignocellulosic Biomass to Ethanol	74
SSF of the Microwave/alkali pretreated Wheat straw using the Prepared Nonionic Surfactants	75
SSF of Microwave /alkali pretreated Rice straw using the Prepared Nonionic Surfactants	78
Comparison of the SSF processes of two different Lignocellulosic Substrates to Ethanol	81
Conclusion	83
References	84
Arabic Summary	