



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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# جامعة عين شمس

## التوثيق الإلكتروني والميكروفيلم

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Cairo University

# **MANUFACTURING OF BIODEGRADABLE PLASTIC FROM BIOMASS**

By

**Nora Abd El-Waged Abd El-Gawad Moawad Zidan**

A Thesis Submitted to the  
Faculty of Engineering at Cairo University  
in Partial Fulfillment of the  
Requirements for the Degree of  
**MASTER OF SCIENCE**  
In  
**CHEMICAL ENGINEERING**

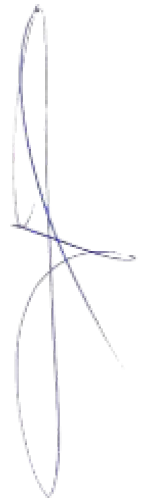
FACULTY OF ENGINEERING, CAIRO UNIVERSITY  
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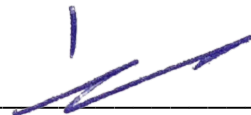
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**Title of Thesis:**

Manufacturing of Biodegradable Plastic from Biomass

**Key Words:**

Plastic Pollution; Biodegradable Plastics; Environment; Wastes; Potatoes Peels

**Summary:**

Plastic is a daily used material which cause serious environmental problems as their disposal methods are dangerous to both land and water. Plastics made of bio-based sources could be seen as a promising alternative to the conventional plastics as it tends to degrade safely and rapidly and hence helps in the safe environment management.

In this research, Potatoes peels together with acetic acid and glycerol were chosen as raw materials for the production of the biodegradable plastic. The objective of this research is finding the suitable raw material amounts and operating conditions which will give the nearest specifications to the conventional plastics.

Low reaction and drying temperatures were found to be the most suitable for physical appearance of the plastic. On the other hand, high acid amounts were recommended for rapid degradation and lower water absorption. Moreover, using high amounts of starch have enhanced the degradation properties and strength of the samples.

## **Disclaimer**

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Nora Abd El-Waged Zidan

Date:../../2020

Signature:



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# Nomenclature

A: Amylose  
AP: Amylopectin  
ASTM: American Society for Testing and Materials  
BP: Banana Peels  
BDB: Biodegradable Plastic  
CBP: Conventional Biodegradable Plastic  
CB: Commercial Bio based  
DP: Degradable Plastic  
FCI: Fixed Capital Investment  
FTIR: Fourier Transform Infrared  
HEPCA: Hurghada Environmental protection and conservation association  
IPC: Indirect Plant Cost  
MMUSD: Million Dollars  
PBAT: Polybutylene Adipate Co-Terephthalate  
PBSA: Aliphatic Polyester  
PCE: Physical Cost of Equipment  
PCL: Polycaprolactones  
PEA: Polyester Amides  
PET: Polyethylene Terephthalate  
PHA: Polyhydroxyalkanoates  
PLA: Polylactic Acid  
PP: Potatoes peels  
PPB: Potatoes Peel Biodegradable Plastic  
PPC: Physical Plant Cost  
PVA: Polyvinyl Alcohol  
ROI: Return on Investment  
RPP: Roasted Potatoes Peels  
RS: Rice Starch  
TCI: Total Capital Investment  
TPS: Thermo Plastic Starch  
WCI: Working Capital Investment