

AND
MODIFICATION OF PHYSICAL/CHEMICAL
PROPERTIES OF POLYPROPYLENE FILMS VIA
RADIATION PROCESSING

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Presented by
Hossam Mohamed said
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**MODIFICATION OF PHYSICAL AND CHEMICAL
PROPERTIES OF POLYPROPYLENE FILMS
VIA RADIATION PROCESSING**

Thesis Advisors

Approved

Prof. Dr. Abo El-Kair B. Mostafa

Prof. Dr. Abd El-Hamid Hussein Zahran

ASS.Prof.Dr. Abd El-Wahab M-Khalil

[Signature]
[Signature]
A. H. El. Naggar

Prof. Dr. M.A. Wassef

Head of Chemistry Department

College For Women

Ain Shams University

Marguerite A. Wassef



بسم الله الرحمن الرحيم

Grace to God.

Grace to my wife Safaa, for her good care to me.

Hoping that God will help me to make

her happy

ABSTRACT

The radiation -induced graft copolymerization of acrylic acid (AAc) and styrene (Sty) onto polypropylene films (PP) was carried out for the modification of its physical and chemical properties. The influence of reaction conditions on the grafting yield was determined. Characterization and some properties of grafted polypropylene with poly(acrylic acid) and poly(styrene) copolymers were also studied. The thermal behaviour, electrical conductivity and dyeability for such modified materials were also investigated.

Key Words

PP : Polypropylene.

PE : Polyethylene.

AAc : Acrylic acid.

Sty. : Styrene.

P Sty. : Polystyrene.

PAAc : Poly acrylic acid.

DTA : Differential Thermal Analysis.

IR : Infrared.

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Aim OF THE WORK

Polypropylene has become the largest and fastest growing plastic because of its versatility, wide applicability and is inexpensive if compared to other polymers. However, it has no reactive functional groups, poor hygroscopicity, high crystallinity and has no affinity for normal dyestuffs, which excludes its industrial applications.

The aim of the present work was undertaken with a view to modify some of these properties via radiation grafting of mixtures of some vinyl monomers onto the backbone of the polymer chains without affecting the original properties. A comonomer mixture of acrylic acid and styrene is grafted using the direct radiation technique. The study of the different factors that may affect the grafting reaction of such comonomer mixture is a principle purpose. These factors include; mineral salts used to suppress homopolymer formation and thus enhance grafting reaction, solvent composition, comonomer mixture and radiation dose and dose rate. The characterization of the obtained degree of grafting in terms of poly(acrylic acid) and poly(styrene) fractions by reactivity ratio, elemental analysis is another purpose of the present study. The work was further extended to investigate the properties imparted by grafting of such comonomer mixture. It covers the dye affinity for different dyestuffs as basic, disperse and acid dyes, mechanical properties, thermal and electrical properties for such modified grafted PP films.

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