

بسم الله الرحمن الرحيم



HOSSAM MAGHRABY



شبكة المعلومات الجامعية التوثيق الالكتروني والميكرو فيلم



HOSSAM MAGHRABY

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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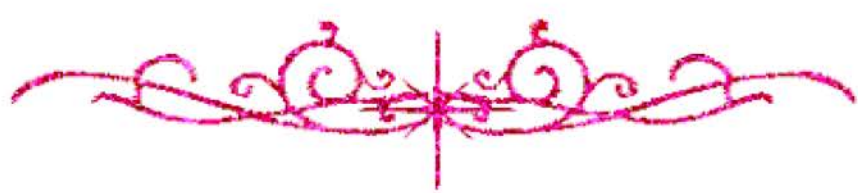
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لم ترد بالأصل



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Characterization of Gamma Irradiated Polymer Blends

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
الحمد لله الذي هدانا لهذا
الذي كنا لنهتدي لولا أن
هدانا الله

DEDICATION

I dedicate this work to my father and my mother, Gud pless their
souls. Also, I dedicate this work to my little kids and my husband. A
special dedication to my elder brother

YOURS ETERN

Note

Beside the work carried out in this thesis, the candidate has attended postgraduate courses in the following topics:

- (1) Hetero-cyclic Chemistry and Design
- (2) Physical Organic Chemistry and Elective Course
- (3) Spectroscopic Chemistry and Dyes
- (4) Polymers and Carbohydrates
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CONTENTS

Acknowledgment	
Aim of the Work	
Abstract	
List of Appreviations	
List of Tables	
List of Figures	

CHAPTER I

INTRODUCTION AND LITERATURE REVIEW

	Page
1.1. Polymer Blends	1
1.1.1. Types of Polymer Blends	1
1.1.1.1. Thermoplastic Polymer Blends	1
1.1.1.2. Thermo plastic-Rubber Blends	3
1.1.1.3. Elastomer-Elastomer Blends (Rubber Blend)	5
1.1.2. Miscibility of Polymer Blends	6
1.1.3. Compatibilization of polymer Blends	11
1.1.4. Applications and Properties of Polymer Blends	18
1.2. Effect of High Energy Radiation on Polymeric Materials	22
1.2.1. Chemical and Physical Changes	24
1.2.2. Effects on Polymer Blends	27

CHAPTER II

MATERIALS AND EXPERIMENTAL TECHNIQUES

2.1. Materials	30
2.1.1. Homopolymers	30
2.1.2. Solvents	30
2.2. Technical Procedures	30
2.2.1. Preparation of PVA/PAM Blends	30
2.2.2. Preparation of PVAc PMMA Blends	31
2.3. Gamma Irradiation	31
2.4. Analysis and Measurements	31
2.4.1. IR Spectroscopic Analysis	31

CHARACTIRIZATION OF GAMMA IRRADIATED POLYMER BLENDS

2.4.2. Thermogravimetric Analysis	31
2.4.3. Differential Scanning Calorimetry (DSC)	32
2.4.4. Scanning Electron Microscopy (SEM)	32
2.4.5. Tensile Mechanical Measurements	32
2.4.6. Colour Strength Measurements	33

CHAPTER III

RESULTS AND DISCUSION

3.1. Effect of Gamma Radiation on the Structural Properties of Poly (vinyl- alcohol/Polyacrylamide) Blends (PVA/PAM)	34
3.1.1. Miscibility of PVA/PAM Polymer Blends	36
3.1.2. IR Spectroscopic Analysis	36
3.1.3. Differential Scanning Calorimetry (DSC)	44
3.1.4. Thermal Decomposition Behaviour	49
3.1.5. Structure Morphology	60
3.1.6. Mechanical Properties	62
3.2. Effect of Gamma Radiation on the Chemical and Physical Properties of Poly (vinyl acetate)/ Poly (methyl methacrylate) (PVAc/PMMA) Blends	64
3.2.1. IR Spectroscopic Analysis	65
3.2.2. Glass and Melting Transitions	73
3.2.3. Thermal Decomposition Behaviour	76
3.2.3.1. Initial TGA Thermograms and Weight Loss	77
3.2.3.2. Temperature of Maximum Rate of Reaction	80
3.2.3.3. Kinetic Parameters of Thermal Decomposition Reaction	85
3.2.4. Tensile Mechanical Properties	95
3.2.4.1. Yield Properties	96
3.2.4.2. Break Properties	98
References	101
Conclusions	
English Summary	
Arabic Summary	

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Aim of The Work

In the present work we concerned with preparation of different miscible polymer blends from a common solvent by the solution casting technique. In this regard the polymers poly(vinyl alcohol) (PVA)/polyacrylamide (PAM), poly(vinyl acetate) (PVAc)/polymethylmethacrylate (PMMA) have been chosen to form polymer blends based on the fact that each of their polymers constitute a wide range of different functional groups. As the effect of high energy radiation is one of our interest, the effect of gamma radiation on the structure property relationship of PVA/PAM and PVAc/PMMA polymer blends was investigated. These polymer blends may find a promising industrial applications. Polymer blends based on PVA/PAM are highly hydrophilic can be used in the field of absorbing wastes from wastewater such as toxic heavy metals and dye wastes. On the other hand, polymer blends based on PVAc/PMMA can be used in manufacturing medical containers and devices due to the flexible PVAc and the high transparent PMMA.

Abstract

Films of miscible polymer blends based on poly vinyl alcohol (PVA) /polyacrylamide (PAM) and poly(vinyl acetate) (PVAc)/poly(methyl methacrylate) (PMMA) were prepared by the solution casting technique using water and benzene as common solvents, respectively. The thermal, mechanical and morphological properties of these blends before and after exposure to various doses of gamma radiation have been investigated. The visual observation and colour reflectance measurements showed that PVA/PAM blends are compatible over a wide range of composition. Moreover, the DSC thermograms showed the appearance of a single glass transition temperature (T_g) not that of PVA or PAM homopolymers giving further supports to the complete compatibility of such blends and the occurrence of crosslinking. These findings were demonstrated by the SEM micrographs of the fracture surfaces and the tensile mechanical properties. The TGA thermograms showed that the unirradiated PVA possesses higher thermal stability than PAM homopolymer or their blends and this stability was slightly improved after exposure to gamma radiation. Thermogravimetric analysis (TGA) of PVAc/PMMA blends showed that the rate of reaction (T_{max}) occurs and the kinetic parameters of the thermal decomposition. The rate of reaction curves of the individual homopolymers or their blends, before or after γ -irradiation, displayed similar trends, in which the T_{max} corresponding to all the polymers was found to exist in the same position but with different values. These findings and the visual observations of the blend solutions and the transparency of the films give supports to the complete miscibility of these blends. In conclusion, γ -irradiation improved the thermal stability of PVAc/PMMA blends even though PMMA polymer is a γ -irradiation degradable. Also the IR spectra confirmed miscibility of PVAc/PMMA blends and that the absorption bands of the different functional groups were affected. Also, the DSC scans of the pure PVAc and pure PMMA and their blends at different compositions. showed the appearance of single glass transition temperature, which is not for either pure PVAc or pure PMMA polymers. .

LIST OF APPREVIATIONS

number	Scientific Terms	Appreviation
1	Differential Scanning Calorimetry	DSC
2	Thermogravemetric Analysis	TGA
3	Scanning Electron Microscopy	SEM
4	Temperature	T
5	Glass Transition Temperature	T _g
6	Melting Temperature	T _m
7	Heat of Fusion	H _f
8	Rate of Reaction	dw/dt
9	Weight Loss	w
10	Activation Energy	E*
12	Gas Constant	R
13	Order of Reaction	n
14	Poly Vinyl Alcohol	PVA
15	Poly Acrylamide	PAM
16	Poly Vinyl Acetate	PVAc
17	Poly Methyl Methacrylate	PMMA