



**Synthesis and Study of Some Prepared
Polyester Nanocomposites**

A Thesis

Submitted for

Ph.D. Degree of Science

In

Organic Chemistry

To

Chemistry Department

Faculty of Women for Art, Science and

Education, Ain Shams University

By

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M.Sc. in Organic Chemistry

Faculty of Science, Tanta University

2016



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To My Father Soul



Diagram

Acknowledgment

Contents	page no.
List of publications	i
List of Table	ii
List of Figure	iii
List of Abbreviations	iv
Summary	v
I. Introduction	1
I.1. Composites	1
I.1.1. History of Composites	1
I.1.2. Composite Materials	2
I.1.3. Classification of Composite Materials	2
I.1.4. The Reason for Consumption of Composites	3
I.1.5. Composites of Clay	3
I.1.6. Composites of Carbon Black	4
I. 2. Nanocomposites	6
I. 2.1. The Classification of Nanocomposites	6
I.3. Polymer nanocomposites	7
I.3.1. Organoclay	8
I.3.2. Preparation of polymer-clay nanocomposites	11
I.3.2.1. Melt blending synthesis	11
I.3.2.2 Solvent based synthesis	12

I.3.2.3 In-situ polymerization	12
I.3.3. Types of polymer-clay nanocomposites	12
I.3.4. Properties of polymer-clay nanocomposite	14
I.4. Carbon Nanocomposites	15
I.4.1. Carbon Nanoparticles Nanocomposites (CNP)	15
I.4.2. Carbon Nanotubes (CNTs)	17
I.4.2.1. Carbon Nanotubes (CNTs) with different matrices	17
I.4.2.2. Some applications of carbon nanotubes (CNTs)	20
I.5. Polyester	21
I.5.1 What is meant by polyester?	21
I.5.2. Polyester Historical Outline	22
I. 5.3. Polyester Manufacturing Techniques	25
I.5.3.1. Direct Polycondensation Esterification	25
I.5.3.2. Melt Transesterification	26
I.5.3.3. Acylation:	28
I.5.4. Interfacial polycondensation	28
I.5.5. Ring-opening polymerization	28
I.6. Polyester Categories	29
I.6.1. Thermoplastic polyester PETs	29
I.6.1.1. Aliphatic polyesters	30
I.6.1. 2. Partially Aromatic Polyesters	30
I.6.1.3. Fully Aromatic Polyesters	31
I.6.2. Thermosetting polyester	32
I.6.2.1. Unsaturated polyester	32

I.7. Unsaturated polyester components	36
I.7.1. Glycols	36
I.7.2. Unsaturated acids	37
I.7.3. Saturated modified acids	37
I.8. Synthesis of Unsaturated Polyester Resin (UPR-1)	38
I.8. 1. Unsaturated Polyester Resin for Specialty Applications	41
I.8.1.1. Fire resistance formulation and composite preparation.	41
I.8.1.1.a. Fillers for fire resistance formulation	41
I.8.1.1.b. Hydroxyapatite	41
I.8.1.1.c. Zinc borate	41
I.8.1.1.d. Fly ash	42
1.9. Unsaturated Polyester Composites	44
I.10. Unsaturated Polyester Nanocomposites	45
<i>Chapter II, Experimental Part</i>	
II.1. Materials used and its Characteristics	55
II.2. Preparation of unsaturated polyester types	57
II.2.1. Preparation of Dimethyl terephthalate	57
II.2.1.1. Dimethyl Terephthalate (DMT) production through Direct Esterification	57
II.2.2. Synthesis of unsaturated polyester based on malice anhydride (UP)	58
II.2.3. Synthesis of modified unsaturated polyester UP/EG	59
II.3. Modification of Egyptian Bentonite (EB) Clay	61
II.3.1. Determination of Cation Exchange Capacity CEC	62

II.4. Preparation of unsaturated polyester composites	63
II.4.1. Preparation of unsaturated polyester and Egyptian bentonite composites (UP/EB)	63
II.4.2. Preparation of modified unsaturated polyester and Egyptian Bentonite Composites (UP-EG/EB).	63
II.4.3. Preparation of unsaturated polyester and carbon black composites (UP/CB)	64
II.4.4. Preparation of modified unsaturated polyester and carbon black composites (UP-EG/CB)	64
II.5. Preparation of unsaturated polyester and organo Egyptian bentonite nanocomposites (UP/OB)	69
II.5.1. Preparation of organo Egyptian bentonite (OB)	69
II.5.2. Preparation of modified unsaturated polyester and organo Egyptian bentonite Nanocomposites (UP-EG/OB)	69
II.5.3. Preparation of unsaturated polyester and multiwall carbon nanotubes nanocomposites (UP/MWCNT)	71
II.5.4. Preparation of modified unsaturated polyester and multiwall carbon nanotubes nanocomposites (UP-EG/MWCNT)	71
II.5.5. Preparation of unsaturated polyester carbon nanoparticles nanocomposites (UP/CNP)	72
II.5.6. Preparation of modified unsaturated polyester and carbon nanoparticles nanocomposites (UP-EG/CNP)	72
II.6. Characterization of the Materials	75
II.6.1. Fourier-Transform Infrared Analysis (FTIR)	75
II.6.2. Gel Permeation Chromatography (GPC)	75
II.6.3. X-Ray Diffraction (XRD):	75
II.6.4. Transmission Electron Microscope (TEM)	76

II.6.5. Chemical resistance of prepared resins	76
II.6.6. Differential scanning calorimetry (DSC)	76
II.6.7. Thermo gravimetric Analysis (TGA)	77
II.6.8. Mechanical Properties Measurements	77
II.6.9. Dielectric measurements	78
<i>Chapter III, RESULTS and DISCUSSIONS</i>	
Part A. Matrices of unsaturated Polyester	79
III.A. Studies on the prepared unsaturated polyester matrices	80
III.A.1. Preparation of Dimethyl terephthalate	80
III.A.1.a. FTIR Structural Analysis	80
III.A.2. Studied of the prepared unsaturated polyester (UP)	81
III.A.2.a Gel Permeation Chromatography (GPC)	81
III.A.2.b. FTIR Structural Analyses of prepolymer UP	83
III.A.2.c. Chemical resistance of unsaturated polyester (UP).	84
III.A.3 Studied of the prepared modified unsaturated polyester (UP/EG)	85
III.A.3.a. Gel Permeation Chromatography (GPC)	85
III.A.3.b. FTIR Structural Analysis of UP/EG	86
III.A.3.c. Chemical resistance of unsaturated polyester (UP/EG)	86
III.A.3.d Thermal properties of the prepared resin.	94
III.A.3.e. Mechanical properties of the prepared resin.	94
Part B. Unsaturated polyester composites	96
III.B. Characterization and properties of composites	97

III.B.1. Characterization of Egyptian Bentonite (EB)	97
III.B.1.a. Elemental Analysis of EB:	97
III.B.1.b. FTIR Analysis of EB:	98
III.B.1.c. X-Ray Diffraction of EB:	99
III.B.1.d. Transmission Electron Microscope TEM of EB:	100
III.B.1.e. Thermal Gravimetric Analysis TGA of EB	101
III.B.2. Characterization and Properties of UP/EB composites	102
III.B.2.a. FTIR Structural Analyses of UP/EB	103
III.B.2.b. Chemical resistance measurements of UP/EB	103
III.B.2.c. Thermal properties of UP/EB composites	109
III.B.2.d. Mechanical properties of UP/EB composites	112
III.B.3. Characterization and Properties of UP-EG/EB composites	118
III.B.3.a. FTIR Structural Analyses of UP-EG/EB	118
III.B.3.b. Chemical resistance measurements of UP-EG/EB	118
III.B.3.c. Thermal properties of UP-EG/EB composites	119
III.B.3.d. Mechanical properties of UP-EG/EB composites	119
III.B.4. Characterization and Properties of UP/CB composites	131
III.B.4.a. FTIR Structural Analyses of UP/CB	132
III.B.4.b. Chemical resistance measurements of UP/CB	132
III.B.4.c. Thermal Properties of UP/ CB Composites.	133
III.B.4.d. Mechanical Properties of UP/ CB Composites	134
III.B.5. Characterization and Properties of UP-EG/CB	146

composites	
III.B.5.a. FTIR Structural Analyses of UP-EG/CB	146
III.B.5.b. Chemical Resistance of UP-EG/CB	146
III.B.5.c. Thermal Properties of UP-EG/Carbon Black (CB) Composites.	147
III.B.5.d. Mechanical Properties of UP/Carbon Black (CB) Composites	148
Part C. Unsaturated polyester nanocomposites	160
III.C. Unsaturated Polyester Nanocomposites	161
III.C.1. Modification of Bentonite to Nano Bentonite (Organo Bentonite):	162
III.C.1.a. FTIR-Analysis of organo clay	162
III.C.1.b. X-ray Diffraction	163
III.C.1.c. Transmission Electron Microscope TEM:	164
III.C.1.d. Thermal Gravimetric Analysis TGA of organo clay	167
III.C.2. Characterization and Properties of unsaturated polyester organo clay nanocomposites	168
III.C.2.a. FTIR-Analysis of UP/OB & UP-EG/OB	169
III.C.2.b. X-ray Diffraction of UP/OB & UP-EG/OB	169
III.C.2.c. Transmission Electron Microscope TEM of UP/OB & UP-EG/OB	173
III.C.2.d. Chemical Resistance of UP/OB & UP-EG/OB Composites	175
III.C.2.e. Thermal Analysis of UP/OB & UP-EG/OB	177
III.C.2.f. Mechanical Analysis of UP/OB & UP-EG/OB	186
III.C.3. Preparation and Characterization of UP/ Carbon Nanocomposites	196
III.C.3.a. FTIR of UP/Carbon nanocomposites	196
III.C.3.b. X-ray Diffraction of UP/Carbon nanocomposites	197

III.C.3.c. Transmission Electron Microscope TEM of UP/Carbon nanocomposites	198
III.C.3.d. Chemical Resistance of UP/Carbon nanocomposites	198
III.C.3.e. Thermal Analysis of UP/Carbon nanocomposites	199
III.C.3.f. Mechanical Analysis of UP/Carbon nanocomposites	201
III.C.3.g. Dielectrical measurements of UP/Carbon Nanocomposites	203
III.C.4. Preparation and Characterization of UP-EG/Carbon nanocomposites	234
III.C.4.a. FTIR of UP-EG/Carbon nanocomposites	234
III.C.4.b. X-ray Diffraction of UP-EG/Carbon nanocomposites	235
III.C.4.c. Transmission Electron Microscope TEM of UP-EG/Carbon nanocomposites	236
III.C.4.d. Chemical Resistance of UP-EG/Carbon nanocomposites	236
III.C.4.e. Thermal properties of UP-EG/Carbon nanocomposites	237
III.C.4.f. Mechanical properties of UP-EG/Carbon nanocomposites	239
III.C.4.g. Dielectrical properties of UP-EG/Carbon nanocomposites	240
References	272
Arabic summary	1

Acknowledgment

Firstly, and foremost, my deep gratefulness, thankful and indebtedness as to the merciful "**ALLAH**" who gave me everything I have and ability and patient for accomplishing this work.

I wish to express my sincere appreciation to **Prof. Dr. NadiaGharib Kandile**, professor of organic chemistry, faculty of Girls for Art, Science and Education, Ain Shams University about his helpful cooperation and support.

I wish to express my sincere, deep gratitude to **Prof. Dr. Ahmed Magdy Motawie**, professor of polymer chemistry, Egyptian petroleum research institute (EPRI), for suggestion the subject of study and for his interest and following up the progress in the work, guidance, valuable proposal, suggestion the subject of application, constrictive criticism, encouragement, continues support, suggesting the problems, revising the work and presenting this thesis in reached its present form.

I wish to express my thanks and respect to **Prof.Dr., ElhamMostafa Sadek**, professor of polymer chemistry, Petrochemical Department, Egyptian petroleum research institute (EPRI), who give me the help, guidance and encouragement.

I wish to express my thanks and respect to **Dr., Nahla AhmedMansour**, Assistance professor of chemistry, Petrochemical Department, Egyptian petroleum research institute (EPRI), who give me the help, guidance and encouragement.

Finally, I would like to extend thanks to all members of chemistry departments, Faculty of Girls for Art, Science and Education, Ain Shams University, and all members of petrochemical department, Egyptian petroleum research institute (EPRI), for their sincere help during the course of this work.

SalwaEl-mesallamy

Aim of the Work

Synthesis and Study of Some Prepared Polyester Nanocomposites

Unsaturated polyester (UP) resin of the most polymeric materials using in the present time in a wide range of automotive and aerospace applications, and for shipbuilding or electronic devices because of the low cost, characterization of high performance and operating at a fast rate. However, because the polymer matrix must withstand high mechanical and tribological loads, it is usually reinforced with nanofillers. These nanofillers can be chosen as sheets (e.g. exfoliated clay stacks), carbon nanotubes or spherical particle (e.g. carbon nanoparticles).

This work aims to prepare unsaturated polyester (UP) composed of dimethyl Terephthalate, ethylene glycol and malic anhydride. The prepared unsaturated polyester will be modified by excess of ethylene glycol. The two matrices of unsaturated polyester and modified unsaturated polyester will be evaluated by FTIR, GPC, thermal gravimetric analysis and mechanical properties such as nanoindentation and microhardness.

Some polymeric composites with weight % (3, 5, 7, 10, 20, 30, 40, 50 and 60) will be prepared of both Egyptian bentonite (EB) and carbon black (CB) with two the matrices.

Then nanocomposites based on unsaturated polyester and modified as matrices with nano material fillers such as organo clay (OB) wt % (3, 5, 7 and 10) carbon nanoparticles (CNP), and multiwall carbon nanotube (MWCNT) wt % (0.01, 0.02, 0.03, 0.04 and 0.05%) as reinforcement materials will be prepared. Study the effect of concentration of micro and nano reinforcement materials on properties of the prepared unsaturated polyester composites and nanocomposites.

Comparative study between the properties of the prepared unsaturated polyester nanocomposites and the unsaturated polyester composites based on the same traditional type of fillers (e.g. clay and carbon black).

Study the physical properties of the best prepared polymeric composite samples, such as electrical, thermal, and mechanical properties as soon as chemical resistance. Study the morphology structure of some chosen prepared composites samples by Electron Microscope. Evaluation of prepared unsaturated polyester nanocomposites according to Egyptian and universal standards specifications.