

**Sudan University of Science & Technology
College of Graduate Studies**

**USE OF PP AND PET WASTE IN CARPET
MANUFACTURE**

Submitted as Partial fulfillment of the requirements for the degree
of M.Sc. in (Textile Engineering)

By :

Enas Ibrahim Ali Mousa

**B.Sc (Honours), Textile Engineering, Sudan University of Science
and Technology, 2002.**

Supervisor

Dr. Hago Elfadil

April 2006

DEDICATION

To my,
Family
Teachers
& Friends

With gratitude and love

Acknowledgement

First , Thanks to God who enabled me to complete this work. I assign appropriate credit to all who have contribute in some way to make this study in its final shape.

Second I would like to express my thanks and gratitude to my supervisor Dr. Hago Elfadil for close supervisions and advice .

Also , thank to Omdurman plastic carpet factory – Administration, staff especially Administrator Engineer Rahamt Allah Elmadani & thanks are due to Dr. Ahmed Ibrahim for his valuable assistance.

Finally, I grant my thanks to all who enhanced me with help in this study.

II LIST OF CONTENTS

No	CONTENTS	Page No
	Dedication	I
	Acknowledgement	II
	List of Contents	III
	List of tables	V
	List of figure	VI
	Abstract (English)	1
	Abstract (Arabic)	2
	Chapter One : INTRODUCTION	
1.1	Definitions	3
1.2	Use of PP	3
1.3	Use of PET	4
1.4	Objectives	4
	Chapter Two : Literature Review	
2.1	History and development of plastics raw material	5
2.2	The Economic and environment impact of plastic waste	6
2.3	The plastics recycling	7
2.4	Consumption of plastic in packing application	8
2.5	The plastics recycling industry in Europe	9
2.5.1	Structure of the recycling industry –by country	9
	Chapter three : Material and Methods	
3.1	Polypropylene	13
3.1.1	Raw Materials of production PP	15
3.1.2	Polymerization of Propylene	17
3.1.3	PP Manufacturing	18
3.2	Polyester	20
3.2.1	Fiber-Forming and film- forming polyester	20
3.2.2	Raw Material for production polyethylene terephthalate	21
3.2.3	PET Manufacturing III	22
3.3	PP and PET Recycling	27
3.3.1	Spinning and Processing condition of PP	27
3.3.2	Spinning and Processing condition of PET	27
	Chapter Four : Result and Discussion	
4.1	Post use PP and PET in Sudan	28
4.2	Virgin PP and PET Carpet Manufacturing	29
4.3	Carpet Made from Recycle PP and PET	29
4.4	PP and PET recycle process	36
4.5	Discussion	36

4.6	Conclusion	36
4.7	Recommendation	37
	References	38

LIST OF TABLES

No	Tables	Page No
2.1	Quantification source reduction for select packing polymers, Western Europe "%"	8
2.2	ARA license fees for Plastics , valid from 1.1.2000	10
2.3	Phasing of UK Recovery and Recycling Targets	12
3.1	Analysis of propylene sufficiently pure for stereo specific polymerizations	17
3.2	Effect of percentage Stretch on tensile Properties of Polypropylene	20
4.1	Actual local consumption bottles in 2003	28
4.2	Estimated local consumption of PET bottles	28
4.3	Customs Report	28
4.4	Estimated Quantities of PET	29

LIST OF FIGURES

No	Figures	Page No
3.1	Different special arrangement in polypropylene	14
3.2	Steroblock polypropylene stress – strain diagram	16
3.3	Raw Material for Production PET	22
3.4	Continuous Polymerization	25
3.5	Continuous Production of PET from dimeihyl terephthalate	26
4.1	PP polymer	29
4.2	Mixing machine	30
4.3	Polymer mixed with colour	30
4.4	Extruder machine	31
4.5	PP yarn after extruder machine	31
4.6	Cooling device	31
4.7	Cuter device	32
4.8	Jacard machine	33
4.9	Pecking device	33
4.10	Warp yarn	34
4.11	Weaving operation	35
4.12	Carpet	35