

Polypropylene

1.

Polypropylene 가

가 가

가

가

가 가 High Level

가

Polypropylene 가

? “ ”

1965 Polypropylene 3,500 Pound 1970

1 5 2 Pound

가 10 Pound

Polyamide Polyester

가 가 가

Polypropylene Polymer가 Large Volume Plastic

Melting Point가 가

가

가 가

2.

가

가

가

Polypropylene Fibre

가

가

○ Physical Properties of Polypropylene

Melting Point	350
Stick Temperature	290~300
Meolecular Weight	100,000~1,000,000
Crystallinity	Ca 60%
Specific Gravity	0.91

○ Fibre Property of Polypropylene

Tenacity	2.5g/den	H ₂ O Regain	0.1%(Natural)
Elongation	15-80%	Chemical Resistance	Excellent
Stiffness(av)	18~28g/den		

가

Wet Tensile Strength Dry State가

Tensile Strength가

Flex Resistance가

Thoughness가

Cellulose Fibre Blending

Specific Density가 가

Rope

가

Ion

Functional Finishing Agents, Resin, Polymer Coatings, Pigments, Adhesives

Resistance가

Heat, Light Stabilizer 가

Softening Point Melting Point가

Finishing Agents

Alkali Scouring 300

100~200

Fade Ometer Exposure

75~100%Tensile-Strength

Propylene

Reactive Monomer

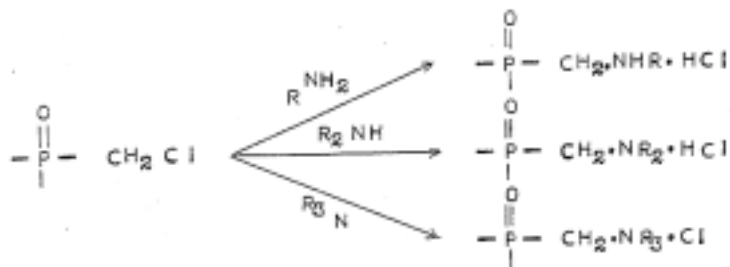
Chromium, Nickel, Aluminum Compound Adding

Polypropylene Chemical Modfying

○ GRC/FM Process

Dyes, Finishes, Coatings			Functional
Group	Polypropylene	Fibre	.
Functional Group			
Carboxyl(-COOH),			
Sulfonic(-SO ₃ H)			
O			
Phosphonic(- P -OH),			
R			
O			
Phosphoric(- P – OH)			
OR			
Amphoteric(-NH · CH ₂ · CH ₂ ,COOH)			
Chloromethyl(-CH ₂ Cl), Diamine{NH ₂ (CH ₂) _n NH ₂ }			Basic Nitrogen Group
.			
Modification	Thermal Diffusion		Polymer
.			
Polypropylene Fibre	Modifying	가	Carboxyl,
Sulfonic, Phosphonic, Phosphoric Acid Group			Process .
Acid Group	Acrylic Fibre	Cationic, Basic dye	
Basic Nitrogen Group	가 .		
Phosphonic Acid	Chloromethyl	Modyfy	Functional & Ionic
group	가	. , Phosphonic Acid Group	
Amine Salt			
Primary, Secondary, Tertiary Amine			

Chloromethyl Group Alkylate



Modified Polypropylene

가

Modification

Secondary Crosslinking Reaction

, Modified Polypropylene Fibre Crosslinking Poly Valent metal

Salt Diepoxide, Polyepoxide, Di or Tri Arziridiny compound

Alkali washing

300

Fade-Ometer Exposure

360

Oven Exposure

Tensile Strength

Loss

Polypropylene Fibre

3. Polypropylene

가

300

가

Polypropylene

Dye

Receptor Site

Polar Group

Driving

Force가

Binding Force가

Polar

Group

Polypropylene

1) Dyeing Unmodified Fibre

2) Additives

3) Copolymers, Especially Grafts

4) Chemical Modification

5) Combinations of Additives with post-treatment

5가

1) Dyeing Unmodified Fibre

Unmodified Fibre

Swelling Agent

Dyeing Assistant

, Polypropylene

가 Modified

Dye

2) Additives

가

가

가

Type

가

가

a) Metallic compounds

b) Polymers

c) Low Molecular weight Organic and inorganic compounds

Compounds

(Attachment)

. Polymer

Polystyrene

Acetal Resin,

Polyamine, Cellulose

Polymer Field가

. Low Molecular Weight Material

Salts, Alcohols,

Acid Amine

가 가

가

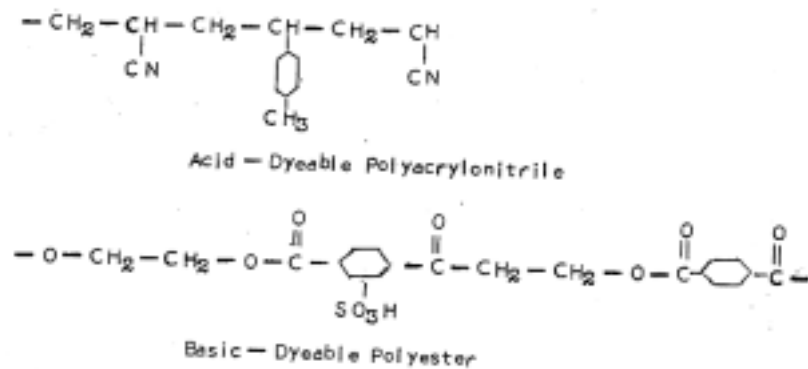
Limitation

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가

가 Distribution Fibre

3) Copolymer, Especially graft



< 1> Dye ability by Copolymeriztion

Fig.1 Copolymerization

Fig.1

Acrylic Fibre Main Chain Methylvinyl Pyridine Copolymerization

Acid Dyeability

Polyester Fibre 71 Sulfonic Acid Substituted Terephthalate Acid Basic

Dyeability

Fig.2

Alternative	Type	Copolymerization
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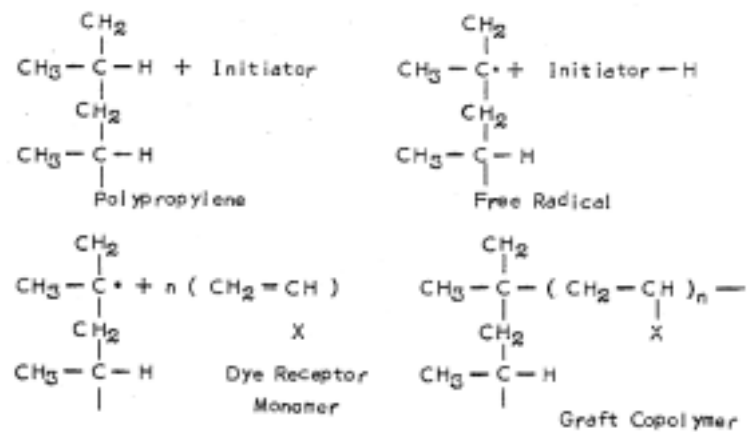
Polypropylene Chain	Dye Receptive Copolymer	Grafting
		

Step.	Light	Polypropylene
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Tertiary Hydrogen Atom 가 Initiator

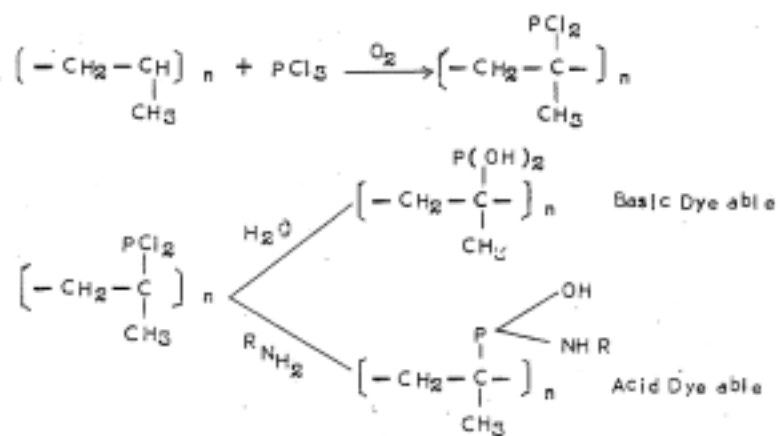
Initiator	Peroxide	Radiation
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Radical Dye Receptor Monomer 가 Polymer
 가 Monomer Chloromethylstyrene, Vinylpyridine Vinyl Esters
 가



< 2> Graft Copolymerization on Polypropylene

4) Chemical Modification



< 3> Phosphorylation of Polypropylene

가 Fig.3

Aliphatic Hydrocarbon Phosphorous Trichloride

Tertiary Hydrogen Chlorophosphate Group

Basic Dyeable Phosphonic Acid Amine Acid

Dyeable Phosphoramidate Site

Reagent Sulfuric, Nitric, Chromic, Chlorosulfonic,

Acid Organophosphorous Compound Silicon Halide

Grafting 가

5) Combinations of Additives with Post Treatment

Fibre 가

a) Fixation of a Basic Dye Receptor

Fibre Amine Amine

Phosphorous Oxy Chloride Reactive Material 가가

b) General of Receptor in Situ

Fixation Reaction Polymerization

a) Fibre Polyamine Resin

Diamine Alkyl Dihalide

c) Insolubilization of a Dye Receptor

Amine Resin Water Soluble Leachable Dye

Receptor Fix

Diisocyanate Bisepoxide Cross-linking Agent Amine

Polymer

b) Confer Permeability

Basic Dye Receptor 가 Post-Treatment가 Polypropylene

Polypropylene

4.

Continuous Filament, Bulked Continuous Filament, Tow, Staple Fibre

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(가) Industrial Application

Polypropylene fibre Acid Alkali Chemical Resistance가

a) Filtration Fabrics

b) Tire Liner Fabrics

c) Bag Sewing Thread

d) Laundry & Dye Bags

e) Cordage & Fish Nets

f) Channel Fabrics (Automotive & Building Material)

g) Paper Maker's Felts

() Home Furnishing

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a) Carpeting

b) Patio & Golf Felts

c) Carpet Backing Fabrics

d) Blankets

e) Upholstery

() Apparel Fabrics

Cellulose Fibre Blending

a) Ladies Hosiery

b) Knit Pile Fabric Baking Yarns

c) Men's Stocking

d) Dress Knitwear

e) Knit Sweater

f) Textured Knitwear

g) Cellulosic Blend

() Utilitarian Uses

Tough

- a) Sleeping Bags
- b) Mattress Pads
- c) Quilting
- d) Automotive Fabrics
- e) Knit Pile Boot Linings
- f) Shoe Ducks
- g) Automotive Carpeting(Tufted & flocked)
- () Conclusion

Polypropylene Fibre

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Original Propylene

Printing, Finishing

processing Cost

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Polypropylene Fibre

() References

1. American Dyestuff Reporter P.41~45, June 21, 1965
2. American Dyestuff reporter P.109~111, December 6, 1965
3. American Dyestuff Reporter P.42~47, March 15, 1965
4. American Dyestuff Reporter P.26~31, July 4, 1966