

(,), , .

, ,
가 . 2 가

, , 가 ,
. , 가 ,
, . 가

6 6,6 ,
974340 2 / / 가 ,
3 가

3,901,853 , 4,001,189 4,001,190

, , 가 3,901,853 , 4,001,189 4,001,190
, 3 2,2,6,6

3,867,478 3
, 가
3,867,478 3

47 - 32184

가

가

3

2
(Samuelson)

4,145,473

가

가

- (

)

5,068,283

가

가

가

가

5,322,923

, - (

)

가 0.5 %

가

3,932,126

1

가

가

, 가

가

, ()

(a)

(b)

2

2

(a)

; (b)

(i) 2

2

()

(ii) 1

()

가

1

(a)

; (b)

- 1,6 -

"

"

가 " , "

" , "

(blend)

,

X %

X %

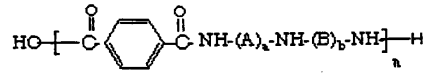
,

X %

1

X %

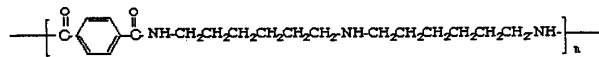
0.5 %, 1 %, 가
 2 %, 2 10 %, ,가 5 % 2 15 %
 가



A B

가 n 3, n 15 10 n 30 20
 a 1 , 12 3 ,가 5 a
 20 , 12
 b 1 , 12 3 ,가 5 b
 20 , 12
 가 0-3 , A B , 0-20
 () 가 (, 2)
 , (,)

(6,6' - -)



, n 3 , n 30 .

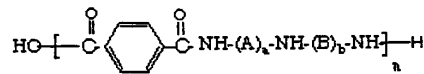
, 1 2 ,

(6,6' - - 가) 가
 가

, (2) , (1) ()
 , 1 . 2 ()

(ii) 1 (a) ; (b) (i) 2 () 2 ()
 () 가
 , (a) ; (b) - - - , - -1,6

가 ,



A B, n, a b .

(1) 0.5 % - 15 % , 가 2 (2
), (2) 가
 가 , (3)

15 % , 가 2 50 99.5 % , 0.5 % -
 .) 2 . (.
 . 2 가 가 , 0.5 % - 15 %
 . 2
 0.5 % , 1 % , 가 2 % .
 2 15 % ,
 5 % .

, 가 가 1:1
 , 가 2 .

2 $H_2N(CH_2)_mNH(CH_2)_nNH_2$, , 2, , 4, 10 , 8 m n . 2 , ,

() (m=n=6) ,

1:1 가

- 80% , 30% - 80% , 60%

: (1) 가 2 ; (2) 가

, (3) , 가

" " 가 , () 가 , 70%, 가 80%, 가 , 90% 가 90%

" " , , (,)

가 가 , (" 3GT" " PTT") , (" 2GT"), (" 4GT")가

3 가 , " " , , , 가 4 - 12 , , 1,4 -) ; (8 - 12 , , 2,6 -) ; 3 - 8 , , 1,3 - , 1,2 - , 1,4 - , 3 - - 1, 5 - , 2,2 - - 1,3 - , 2 - - 1,3 - 1,4 -) ; 4 - 10 , , (2 -) , 4 (,)) ()

)가 , , , 1,3- 1,4- 0.5 - 15 %

1,3- ()가 ()
(2-8) 1,3-

() ()
2 5- - 0.2-5 % 3가

2 가 .가
() 가 가 (i) 2
(ii) 1 ()

2 , 2 가 가 ()가 .
() 가 ()가

3 , 2 .
2 2

, 2 0.5 %, 1 %
.2 15 % , 10 % ,가 5 %

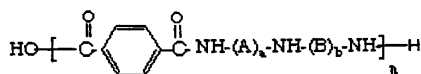
가 (i) 2 (ii) 1 ()
() (i) 2 (ii) 1 ()
1:1 . 1 가 (end capping)
(i) 1 %-10 % 가
(ii) 1 ()

가 (i) 2 (ii) 1 ()
가 1:1 , 0.5 %- 15 % .
(i) - (ii)

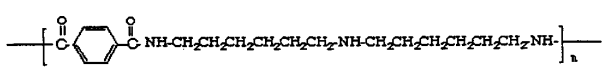
2 (i) (ii)
가 .
(a) () ; (b) (i) 2 2 ()
(ii) 1 () 가

(a) ; (b)

- 1,6 -



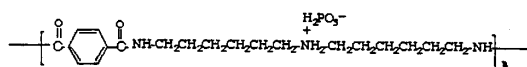
A B n 3, 10 . n 30 , 20 . 가 n 15 a 1, 3, 가 5 . a 20 12 . b 1, 3, 5 . b 20 , 12 . a 1, 3, 가 5 . a 20 , b 20 , 12 . b 3, 가 5 . a 20 , b 20 , 12 . A B 0-20 0-3 () 가 2 . () . 가 (6,6' - -) :



(6,6' - -) 3, 30 . 가 (DMT) , (TPA) 2 가 가 ; , () 2 230 - 270 , 가 260 .

가 (,), 가
 가 가 . (, (DMT) 가
) () .
 가 . H₂N-
 (CH₂)_n - NH₂ (, n 2 , 12 , 2-6 , 가
 6) .
 가 , : 가 7:3, 4:1,
 가 9:1 . 가 , 2 ,
 2 :() 1:1 .
 , (HMD) () (BHMT) (6,6' -
 - -) (PBHMT/PHMT) . DM
 T, BHMT HMD , .

가 (, (6,6' - ()) (6,6' - -
 - -))
 . 가 가
 . 가 가 , 가
 , . IV , (6,6'
 - () .



(,) Mn 10,000,
 20,000 , 40,000 , 25,000 Mn
 .
 가 (Mn) 1,000, 3,000, 가
 4,000 , 10,000 , 7000 , 가
 5000 .
 , Mn 5,000, 10,000
 , 30,000 , 20,000 .
 , 가 .

2 가 .

5,015,789 , 5,276,201 , 5,284,979 , 5,334,778 , 5,364,984 , 5,364,98
 7 , 5,391,263 , 5,434,239 , 5,510,454 , 5,504,122 , 5,532,333 , 5,532,404 ,
 5,540,868 , 5,633,018 , 5,633,362 , 5,677,415 , 5,686,276 , 5,710,315 , 5,
 714,262 , 5,730,913 , 5,763,104 , 5,774,074 , 5,786,443 , 5,811,496 , 5,821,

092 , 5,830,982 , 5,840,957 , 5,856,423 , 5,962,745 5,990,265 ,
 998 440 , WO 00/14041 WO 98/57913 , . . . (H. L. Traub) [" Synthese
 und textilchemische Eigenschaften des Poly - Trimethyleneterephthalats" , Dissertation Universitat Stuttg
 art(1994)] . (S. Schauhoff) [" New Developments in the Production of Polytrimethyl
 ene Terephthalate(PTT)" , Man - Made Fiber Year Book(1996 9)] 가
 . . . (. . .) (. . .)
 . . . (E. I. du Pont de Nemours and Company, . . .) Sor
 ona

가 DMT . DMT BHMT가 (230) ,
 0.2 - 1mmHg ,
 30 - 1
 TPA , BHMT TPA , 220psig
 200 가

가
 . . . 가 2 . 가
 가 , 가 , 가 가
 가 , 가 가 가
 , 가 가

가 가 () 200 - 270
 , 가 250 - 260 , 가 가

가 , 가 (, 1) 가 가 가
 . 2 , 2 가
 가 .

() . 가
 . , , , . . .

가 , 2.0g/d

30 - 80%,

60 - 80%

가

가 가 가 가 가 ()

가 가

가

가

가

0.5 % - 5 %

Nylon 6

가

Nylon 6 - 6

가

0.5 % - 5 %

가

가

가

(Tanikella)

4,001,190

TiO₂가

가

(

3,671,379

5,798,433

5,340,909

EP 699 700

847 960

WO 00/26

301

).

" " 1 ("

), 2

5,645,782

5,662,980

5,885,90

9 5,782,935 , WO 99/06399 , WO 99/27168 , WO 99/39041 , WO 00/22210 , WO 00/26301 , WO 00/29653 , WO 00/29654 , WO 00/39374 WO 00/47507 , 745 711 , 1 016 741 , 1 016 692 , 1 006 220 1 033 422 , 1 254 826 , 11 - 100721 , 11 - 107036 , 11 - 107038 , 11 - 107081 , 11 - 189920 11 - 189938 [" Synthese und textilchemische Eigenschaften des Poly - Trimethyleneterephthalats" , Dissertation Universitat Stuttgart(1994),

[" Dyeing properties of Poly(trimethylene terephthalate) fibres" , Melliand (1995)],

[" Mechanical Properties of fibers made of polytrimethylene terephthalate" , Chemical Fibers International(CFI) Vol. 45, 110 - 111(1995)], (W. Oppermann) [" Fibers Made of Poly(trimethylene terephthalate)" , Dornbirn(1995)], (H.S. Brown),

(H.H. Chuah) [" Texturing of Textile Filament Yarns Based on Poly(trimethylene terephthalate)" , Chemical Fibers International, 47:1, 1997, pp. 72 - 74] (S. Schauhoff) [" New Developments in the Production of Polytrimethylene Terephthalate(PTT)" , Man - Made Fiber Year Book(1996

9)]

2

() () () ()

2

2 가

가

2

가 , 가 ; ()
2) 가 ()
() 0.5
15 %

가
C.I. Acid Blue 25(C.I. 62055), C.I. Acid Red 4(C.I. 14710), C.I. Acid Yellow
40(C.I. 18950), C.I. Acid Green 25(C.I. 61570), Tectilon Yellow 2G, Tectilon Red 2B, Tectilon Blue 4R,
Lanaset Yellow 2R, Lanaset Red 2B, Lanaset Blue 2R Irganox 1010 (Ciba Specialty Chemicals Corporation),
(Ciba). 3.5 p
H , 4.5 6.5 pH가 , pH , 3.0

(IV) ASTM D 5225 - 92 19 50/50 %
/ 0.4g/dl Viscotek Forced Flow Viscometer Y900
(Viscotek Corporation),)
IV ASTM D4603 - 96 60/40 % /1,1,2,2 - IV
가

Tectilon , Tectilon ,
as - . 5g 2 % Merial - HCS () 1
% 72 20 . 1 % Tectilon yellow 2G,
Tectilon red 2B Tectilon blue 4R 0.5% Tanalox HIW (Sybron Chemicals),
) 100ml pH3 . 100 90 가 .
4% Erional PA (,) pH 4.5 - 5.0, 82 20
가

Tectilon

Lanaset , Lanaset ,

as - . 5g 2% Merpol - HCS 1%

72 20 2% Lanaset Yellow 2R, Lanaset Red 2B Lanaset Blue 2R

100ml pH3 100 90 가 . 4% Er

ional PA pH 4.5 - 5.0, 82 20 .

가

70 (21), 65% Instron . 3 6

3.6 / 5

1 1

(6,6' - -) (PBHMT) 가 3

. 1 (194.19g) (140 - 142) 1.02 (220g) (33 - 36 ,

) (BHMT)((95 %) BHMT (33 - 36 ,

163 - 165 /4mm)) 1.8 (32.4g) . 2

10 - 230 40 가 . 0.2 - 0.5mmHg 1 .

Willey 1/8" () .

(PTT) , 2

1,3 - (Tyzor TPT,) 가

210 . 1 (10.2kg/cm²)

250 . 1.3 .

212 .

PBHMT 2 PTT PBHMT(230g) 20 (9

080g) PTT 1.5 % BHMT 255 10mil 34 3 - 5

m/ , 60 - 90 1500 / 3X . 500

34 1 2 3 PTT 255 10mil

500m/ 2 , 60 - 90 , 1500m/ 3X

1.5 % BHMT PTT 1 .

PTT 2 .

2 2

459g PBHMT 20 (9080g) PTT 1

3.0 % BHMT . 2 1

3 3

690g PBHMT 20 (9080g) PTT
4.5 % BHMT

1

1

1

2

, % BHMT 2

%

[1]

BHMT				
		BHMT (%)	% Lanaset	
Yellow 2R		Red 2B	Blue 2R	
	-	4.8	0	0
1	1.5	77.7	34.6	11.2
2	3.0	83.1	43.7	16.7
3	4.5	86.1	56.8	31.7
		BHMT (%)	% Tectilon	
Yellow 2G		Red 2B	Blue 4R	
	-	0	0	1.5
1	1.5	16.0	19.0	13.4
2	3.0	26.4	20.3	21.9
3	4.5	70.3	47.7	53.1
		BHMT (%)	% Tectilon	
Yellow 2G		Red 2B	Blue 4R	
	-	0	0	1.5
1	1.5	20.2	24.9	23.9
2	3.0	29.9	35.6	31.1
3	4.5	85.4	71.6	55.4

[2]

BHMT					
	BHMT (%)	IV	(g/d)	(g/d)	(%)
	0	0.82	2.6	23	64
1	1.5	0.80	2.3	23	62
2	3.0	0.70	1.8	23	66
3	4.5	0.64	1.7	19	62

4 - 6 4 - 6

PTT/PBHMT , 1, 2 3 % BHMT

1

), PBHMT 가

가 3

1 3 (2

1 - 3

4 - 6

[3]

BHMT						
	BHMT %	IV	g/d	g/d	%	
	-	0.92	2.4	23	70	200
4	1.0	0.91	2.4	25	61	195
5	2.0	0.77	1.9	23	75	197
6	3.0	0.73	1.5	25	69	173

7 8 7 8

(DMT) 가 () (BHMT)
 (HMD) 가 (6,6' - -)
 - -) (PBHMT/PHMT) 1 .

7 , 242.7g(1.25) (DMT) 255.8g(1.188)
 (BHMT), 11.53g(0.069 , 10%) 69.3% (HMD) 40.5g(2.25)
 . 30 212 가 . 1.5mmHg
 10 , 1/8"
 Willey PBHMT/PHMT (DMT/BHMT/HMD)(1.0/0.
 95/0.05) 2 PTT PBHMT/PHMT (39.9g) 22
 70g PTT 가 1.0 % DMT/BHMT/HMD(1.0/0.95/0.05)
 1 .

8 , 42.7g(0.225) (DMT) 42.7g(0.197) (B
 HMT), 4.8g(0.031 , 10%) 75% (HMD) 7.3g(0.405) .
 34 228 가 . 0.15mmHg
 28 PBHMT/PHMT
 (DMT/BHMT/HMD)(1.0/0.875/0.125) 2 PTT . P
 BHMT/PHMT (42.8g) 2270g PTT 가 1.0 % DMT/BHMT/HMD(1.0/0.875/0.125)
 1 .

7 8 PBHMT (3) PBHMT 가 (4).

4 - 6

[4]

BHMT								
	가 DMT/BH MT/HMD -	BHMT/HMT %(3GT)	Yarn IV	g/d	g/d	%		
			0.92	2.4	23	70	200	
7	1/0.95/0.05	1.0	0.96	2.6	24	51	200	
8	1/0.875/0.12 5	1.0	0.98	2.8	25	53	198	

9 9

2 : 342g PBHMT/PHMT 20lb
 (8 - 0.75 BHMT/0.25HMD 가 1.3 IV , BHMT
 2 %) 2 230 . 120 16 ,
 , 255 - 265 2 , (C
 rystar() 4415,) 가 , 275 - 285 , PBH
 MT/PHMT . 34 , 2
 (50/50 v/v) 68 . (.
 3,671,379 4 .) 275 . 66
 14ft.sec 가 , , 842m/
 60 . 3200m/ 90 3.8X ,
 3200m/ 160 , 3200m/ , 34
 가 , , 2 . 5
 .
 1.5mg/ (1.35mg/dtex)
 . 100mg/den(90mg/dtex)
 , 90mg/dtex
 , 3 , 3 / 가 5 .
 , 가 2 .

[5]

3GT/2GT 2								
	가 DMT/BHM T/HMD	BHMT %	g/d	g/d	%	%		
		-	3.64	NA	18.74	66	73.6	
9	1.0/0.75/0.25	2.0	2.55	23.19	13.20	17	72.6	
9()	1.0/0.75/0.25	2.0	2.77	23.74	15.49	21	72.9	

가 2

가

10A 10B 10A 10B

(H₃PO₃) PBHMT/PHMT :

가 2 3 310.4g(1.6) (DM
T), 258.5g(1.2) () (BHMT), 60.4g(0.33) 69.7% (HMD)
50g(2.78) 98.4g(1.2) H₃PO₃ 40 - 60
210 - 230 가 1 0.2 - 0.5mmHg

PTT 220 2 4 BHMT % (10A 10B) , 260
6 8

11 11

() 가 DMT/BHMT/HMD/H₃PO₃ = 1/0.8/0.2/0.8 10
6 7 Lanaset
100

12 12

(H₃PO₄) PBHMT/PHMT ;

가 2 3 310.4g(1.6) (DM
T), 275.7g(1.28) () (BHMT), 55g(0.33) 69.7% (HMD)
147.6g(1.28) 85% H₃PO₄ 43.2g(2.4) 40 - 60
210 - 230 가 1 0.2 - 0.5mmHg

PTT 260 6
100 Lanaset 8

8

1 2 3GT(가)

[6]

가	가 DM T/BHMT/HM D/H ₃ PO ₃ H ₃ PO ₄	BHMT %	IV	g/d	g/d	%		
#1		-	0.927	3.01	26.13	45.92	97.2	
10A	1.0/0.75/0.25 /0.75(H ₃ PO ₃)	2.0	0.840	2.44	25.64	46.88	97.6	
10B	1.0/0.75/0.25 /0.75(H ₃ PO ₃)	4.0	0.774	2.32	23.84	49.72	93.2	
#2	-	-	0.892	2.60	23.42	70.62	94.9	
11	1/0.80/0.20/0. 80(H ₃ PO ₃)	2.0	0.797	2.38	23.04	61.84	97.7	
12	1.0/1.0/100(H PO ₄)	2.0	0.854	2.37	24.06	69.29	183.9	

가 IV . 2 % , IV (10A) 0.8
 4 , (12) 0.85 , IV가 0.77
 (5) , , 가 가
 , 2.0g/d .

8 100 Lanaset .

110mm (integrating sphere) Varian Cary 5 uv/vis/nir (, Inc.(Varian, I
 nc.),) PTFE 100% 0%
 , xy , Varian Color Calculation 5.1 uv/vis .

, L , 100 , 0 ; b
 ; a ; " L" , " a" , " b" ; L calc, a calc b
 calc ; WI YI L, a, b

[7]

H ₃ PO ₃ /H ₃ PO ₄	H ₃ PO ₃ H ₃ P O ₄	" L"	" a"	" b"	L calc.	A calc.	b calc.	WI	YI
5		89.99	-2.61	11.65	91.5	-2.0	4.7	59.4	7.6
11	0.8 H ₃ PO ₃ BHMT	88.94	-0.68	4.54	90.5	-0.5	1.8	72.4	3.2
12	0.8 H ₃ PO ₄ BHMT	88.24	-0.60	3.46	90.71	0.6	3.5	60.8	5.5

3 2 % BHMT
 (WI) (YI)

[8]

BHMT/H ₃ PO ₃		H ₃ PO ₄		DMT/BHMT/HMDH		BHMT %		% Lanaset	
		가	가						
		₃ PO ₃	H ₃ PO ₄						
Yellow 2R			Red 2B			Blue 2R			
10A	1.0/0.75/0.25/0.75	2.0		82.1	42.4	22.7			
10B	1.0/0.75/0.25/0.75	4.0		89.3	54.2	30.5			
12	1.0/1.0/0.0/0.8	2.0		80.7	40.6	19.4			

10A
10B). %
12),
13 13

35 :
3,277.7g(19.73) TPA
1,294.0g(15.78)
3,398.9g(15.78) BHMT
459.0g(3.95) HMD
14,528g (TPA) 가

15RPM 230 250psi 가 230 , 1
가

(57)

1.
 - (a) (b) 2 2
2.
 - 1 , (a) ; (b) (i) 2 2 가 () (ii) 1
- 3.

1, (a) ; (b) - - - , - - 1,6

4.

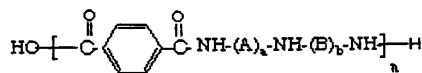
(a) ; (b) (i) 2 () 2 () (ii) 1 () 가 (blend).

5.

(a) ; (b) - - - , - - 1,6 -

6.

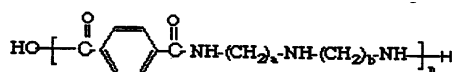
3 5 , 가



a 1-20 , b 1-20 . A B , n 3-30 ,

7.

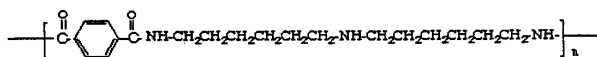
3 5 , 가



, n 3-30 , a 3-20 , b 3-20 .

8.

3 5 , 가 (6,6' - -)



, n 3-30 .

9.

1 3 6 8 , 가

10.

1 3 6 9 ,
0.5 %- 15 % 2 .

11.

1 3 6 10 , .

12.

11 , 2 .

13.

1 3 6 10 , .

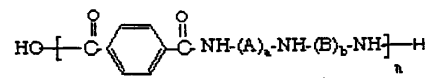
14.

1 3 6 10 .

15.

(a) 1 3 4 10 , (b)

16.



A B

a 3-20 , b 3-20 .

, n 3-30 ,

17.

(1) 2

가

,

, (2)

가

가

, (3)

1

3

4

10

.