

5 70 %

95 30 %

가

(粉末狀難燃劑)

(phosphazen)

(同族體)

(粘稠狀)

가 98%

가

가

5 70 %

95 30 %

「 25 가 0.3mPa · s 10Pa · s
 」 25 가 10Pa · s

(固化)가 (粉塵) (粒度)가

가

1

((Flaming)) 가 , UL - 94

(Test for Flammability of Plastic Materials for Parts in Devices and Appliances UL - 94, Fourth Editio

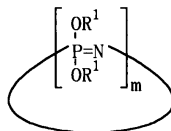
n) V - 0 (halogen - free)

, James E.Mark, Harry R.Allcock, Robert West , " Inorganic Polymers" (Prentice - Hal
 I International, Inc.,1992) 61 140

(1) (4)

(1) 1

1



[, m 3 25
 1

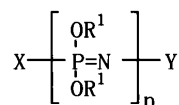
. 2 R¹ ,

1 6

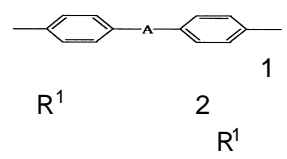
(環狀)

(2) 2

2

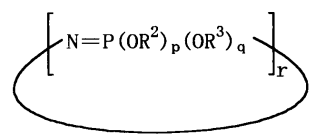


[, n 3 1000 . R¹ . X -N="P(OR¹)₃ -N="P(O)OR¹ .
 Y -P(OR¹)₄ -P(O)(OR¹)₂ .]

(3) (1) (2)
 (biphenylene)  [, A -SO₂- , -S- , -O- , p- ,
 .] 가 가 가 가 가 가 가 R¹ (1)
 (2) 가 50 99.9% .

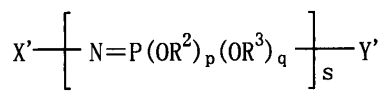
(4) 3

3



[, R² . R³ , 1 18 6 10 ,
 1 10 , R³ 1 가 . R³가 2
 , r 3 25 . p q , p > 0, q 0 , p + q = "2" 4
 .]

4



[, R², R³, p q . s 3 1000 . X' -P(OR²)₄, -P(OR²)₃(OR³),
 -P(OR²)₂(OR³)₂, -P(OR²)(OR³)₃, -P(OR³)₄, -P(O)(OR²)₂, -P(O)(OR²)(OR³) -P(O)(OR³)₂
 , Y' -N="P(OR²)₃, -N="P(OR²)₂(OR³), -N="P(OR²)(OR³)₂, -N="P(OR³)₃, -N="P(O)OR²
 2 -N="P(O)OR³ .] 1

1

2

(1) (2) , ,
 5 120 130 / 가 ;
 / , ,
 , , ,
 가 (220 250) (開環) /

1 2

가

60 - 11223 , 60 - 5529 , 3 - 51657 , 58 - 12235 ,
 58 - 34410 , 61 - 210000 , 4 - 76956 ,
 7 - 96480 , () 8 - 319199 , 9 - 4
 0840 , 56 - 109811 , 1 - 4999 ,
 57 - 17499 , 59 - 45638 , 62 - 250225 , 2 - 221198 ,
 7 - 173000

(aspect ratio)가 10 6 가 가
 10 가 10 /
 0.05 2.0 μ m 가 1 50
 0 μ m

pH 6.0 8.5 , pH , pH
 1.0 % () 10 , pH가 8.5 , pH
 , pH가 6.0 가 , 가 ,

5 70 % 95 30 % , 80 40 % ,
 70 50 % , 20 60 % , 30 50 % , , 30 %
 (粉體)가 , 가
 , 5 % 70 %

(cyanurate),

2

가 100 가 0.01 30
 0.5 20 가
 가 가 0.01
 , 30

(sheet extrusion),

(blow)

%

1: (1)

F) 500ml 가 1 4 1.30 (123.0g) (TH
 , 61 68 6 , 25 7.6g , 1 61

7 3%, 8 , 0.5 (58g) (3 59%, 4 12%, 5 6 11%,
 , 25 15%) 20% 290g 2 4 , 71 73
 15

3 , 5% , 5% , 500ml 3 , 5% 108
 g . (98.5%)

GPC (Mw) 810 , TG/DTA
 (Tm) 103 , 5% (T₅) (Td) 330 347
 (Hy - Cl) 0.09% , CHN 가

1: [N="P(-O-Ph)_{2.00}]

, -Ph

2) 2: 4,4' - (S) 가 가 (

1.25 (118.0g) 0.033 (8.3g) S , 1 ,
 . (91.5%)

GPC (Mw) 820 , 5% (T₅)
 (Td) 342 357 , (Hy - Cl) 0.01% , CHN

2: [N="P(-O-Ph-SO₂-Ph-O-)0.05 (-O-Ph)_{1.90}]

, -Ph- p-

3: - () (3))

2 4 , 2,6- 1.92 (234.4g), 19.2g, 0.02 (1.4g) , 가
 가 120 가 1.0 (147.2 g) 2 가 .
 가 (scrubber) 가 , 180

, (resorcin) 0.53 (52.8g), 0.01 (1.4g) 가 가 ,
 180 2 , 200mmHg 2
 , 330g, 10% 33g 가

, 4% 99g .

3 (3 50%) 2,6- - tert - - p - 1.0g(3
 0.3%), 3% 132g 가 , 70 가 , 1 가 ,
 (oil phase) 132g 6% 70 , 4% 132g 90
 , 653g(3 50%) , ,
 3 . (99.2%)

3 :

[(2,6 - Me₂C₆H₃O)₂P(=O)OC₆H₄OP(=O)(2,6 - Me₂C₆H₃O)₂]

1

, 1 1,350g 130 1 가 ,
 (가 , 「SM - V - 20 」 , 20) , ((Otsuka) () ,
 「TISMO N - 102」 , 「TISMO」) 1,350g , 700rpm
 , 1 1,350g , 5 ,
 2 700rpm , .

2 3

1 , (() , 「 PGM 」 , 「WN」 가
) (() , 「 PGM 」 , 「 PGM 」 가)
 1 , .

4 5

1 , 1 2 3 1 ,

1 5

1 5 , 450g 1 5 ,

1 5 1 5 , 가

A () , B () , C

(mm) , (「 (Luzex) 」 , () (Nicole)

1 , ,

[1]

	()	()	(mm)		
	1	1(50)	TISMO(50)	1.5	A
	2	1(50)	WN(50)	1.5	A
	3	1(50)	PGM(50)	2.0	A
	4	2(50)	TISMO(50)	1.2	A
	5	3(50)	TISMO(50)	2.3	A
	1	1(71)	TISMO(29)	5.5	B
	2	2(71)	WN(29)	7.1	C
	3	3(71)	PGM(29)	6.0	C
	4	1(80)	TISMO(20)	4.9	B
	5	2(80)	WN(20)	5.7	C

1 , 1 5 , 1 5 , 가

1 13

1 5 1 5 , 2 가 (「 S1 - KRC, 25mm Kneader 」 , ()) , (pellet) , (「 MINIMAT - 26/15B 」 , ()) (試驗片)

가

PC/ABS: () , 「 (IUPILON) S - 2000 」 / () , 「 (SANTAC) UT - 61 」 = "3/1()"

PC/PBT: () , 「 S - 2000」/ (TORAY)() , 「PBT - 1 200 S」 = "7/3()" .

PPE/HIPS: () , 「 (XYRON) X - 9108」 .

, 가 가 .

1. : JIS - K7203.

2. : ASTM D - 648. 18.6 kgf/cm² .

3. (Izod) (IZ): JIS - K7110. 23 .

4. (Melt flow rate)(MFR): JIS - K7210. 240 10 kgf .

5. : UL - 94 (Test for Flammability of Plastic Materials for Parts in Devices and Appliances UL - 94, Fourth Edition) , 1/16 , 5 , 0.5 가 . 가 .

V - 0: A E .

A; 1 5 Flaming() 10 ,

B; 1 5 2 , 10 Flaming 가 50 ,

C; 1 5 (clamp) Flaming ,

D; 1 5 305mm (cotton) Flaming ,

E; 1 5 , Glowing(, (赤熱)) 30 .

V - 1: A E .

A; 1 5 Flaming 30 ,

B; 1 5 2 , 10 Flaming 250 ,

C D; V - 0 ,

E; 1 5 , Glowing 60 .

V - 2: A E .

A, B, C E; V - 1 ,

D; 1 5 305mm (cotton) Flaming .

HB: 1 3 101.6mm .

6. : , Flaming () .

7. : () 「B」 , (1978 3 20 , 3 , ()) 1 - (1),
170 172 .

2 , 가

[2]

	가 ()	()
1	PC/ABS (100)	1 (30)
2	PC/ABS (100)	2 (30)
3	PC/ABS (100)	3 (30)
4	PC/ABS (100)	4 (30)
5	PC/ABS (100)	5 (30)
6	PC/PBT (100)	2 (30)
7	PPE/HIPS (100)	3 (30)
8	PPE/HIPS (100)	1 (30)
9	PC/ABS (100)	1 (20)
10	PC/ABS (100)	2 (20)
11	PC/ABS (100)	3 (20)
12	PC/PBT (100)	4 (25)
13	PPE/HIPS (100)	5 (25)

3 ,

[3]

	UL - 94		kgf/cm ²		Izkgf · cm/cm	MFRg/10min
1	V-0		2.4 × 10	101	67	35
2	V-0		2.4 × 10	99	73	33
3	V-0		2.4 × 10	120	78	60
4	V-0		2.4 × 10	110	54	54
5	V-0		2.4 × 10	103	65	40
6	V-0		2.4 × 10	120	78	60
7	V-0		2.3 × 10	98	61	41
8	V-0		2.3 × 10	98	55	38
9	V-2		2.4 × 10	128	78	60
10	V-2		2.4 × 10	110	54	54
11	V-2		2.4 × 10	103	65	40
12	V-2		2.3 × 10	98	61	41
13	V-2		2.3 × 10	98	55	38

3 , 1 10 , 1
5 , , 가

가

V - 0

가 , UL - 94
(halogen - free)

가

가 , PDA() , ECR() , OA (; kotatsu) 가 , TV, VTR, AV (relays), CD (分電盤), (表地) , (convertible tops), (rear package trays), 가 (hand straps), (overlying materials), (deck panels), (壁装材), (窓材) (buckets), 가

(57)

1.

5 70 %

95 30 %

2.

1 ,

가,

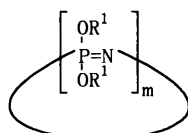
1 .

3.

2 ,

1

(1)



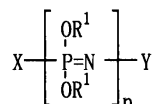
[, m 3 25 . 2 R¹ , 1 6 (環狀)

4.

2 ,

, 2

(2)



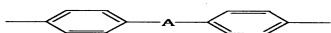
[, n 3 1000 . 2 R¹ , 1 6 . X -N="P(OR¹)₃ -N="P(O)OR¹

. Y -P(OR¹)₄ -P(O)(OR¹)₂ .]

5.

2 ,

, 1



[, A , o- , m- , p- , 2

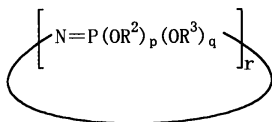
1 가 가 가 가 -SO₂ -, -S -, -O - -C(CH₃)₂ - .]

6.

2 ,

, 3

(3)



[, R² . R³ , 1 18 6 10 , R³가 2

1 10 , R³ , . p q , p > 0, q 0 , p + q = "2 " . R³가 2

. r 3 25 .] , 4

