

가

가

가

(
97 - 164510

93 - 301917 ,
89 - 009206)

94 - 136047

(syndiotactic)

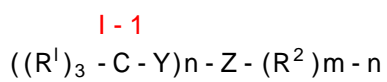
2가

1

1. (A)

(B)

(C) I - 1 :



(,
 R^1 6 30 , 1 30 , 6 30 , R^1
 1 30 , 6 30 R^1 ;
 Y 16 ;
 Z 2 13 ;
 R^2 ;
 m Z 가 ;
 n 1 (m - 1)),

(D)

2. (C) , Y가 Z가 1 .
3. (C) $(R^1)_3 - C - OR^3$ $Z(R^2)m$ 1
 :

(,
 R^1 6 30 , 1 30 , 6 30 , R^1
 1 30 , 6 30 R^1 ;
 R^3 , , 1 30 , 6 30 ,
 1 30 , 6 30 , 6 30 ;
 Z 2 13 ;
 m Z 가 ;
 R^2).

4. (A) ,

(B) ,

(C1) $(R^1)_3 - C - OR^3$:

(,

R^1 6 30, 1 30, 6 30, R^1 ; R^1

R^3 1 30, 6 30, 1 30, 6 30, 6 30,

(C2) $Z(R^2)m$:

(, Z^2 13 ;

m Z 가 ;

R^2),

(D)

5.3 R^1 6 30 1 4

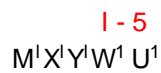
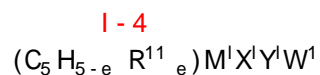
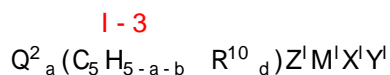
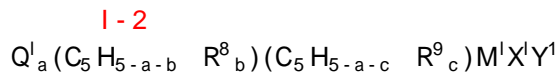
6.3 R^1 가 6 30 1 4

7.3 R^1 가 1 4

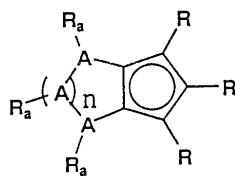
8. R^2 가 2 1 7

9. Z 가 3 8

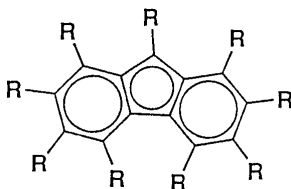
10. (A)가 I-2 I-6 1 9



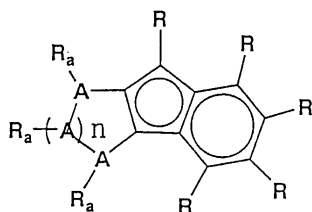
I-6



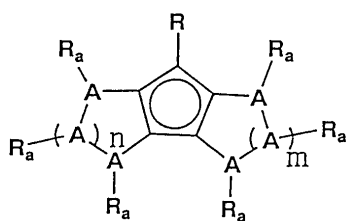
IV



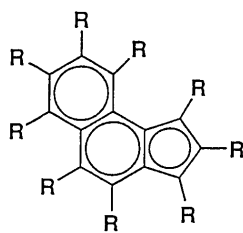
V



VI



VII



(,

A 13, 14, 15 16

A

;

R^1 30, 6 30, 3 30, 6 30, R

a 0, 1 2 ;

n m 1).

12. 1 11

2

1. (A)

(B)

(C) II - 1 :

II - 1

$$((R^{31})_3 - X^{20} - Y^{20})n - Z^{20} - (R^{32})m - n$$

(

R^{31} 1 30, 6 30, R^{31} 1 30, 6 30, R

X^{20} 14 ;

Y^{20} 16 ;

Z^{20} 2 13 ;

R^{32} ;

m Z 가 ;

n 1 (m - 1),

(D)

2. (C) , Y^{20} Z^{20} 1 .

3. (C) $(R^{31})_3 - C - OR^{33}$ $Z^{20} (R^{32})_m$
 1 :

(
 R^{31} 1 30 , , 6 1 30 , , 6 30 , , 6 30 , , R³¹ , R
 31 ;

Z^{20} 2 13 ;

R^{32} ;

R^{33} 1 30 , , 6 1 30 , , 1 30 6 30 , , 6 30 , , ;

m Z^{20} 가 ;

n 1 (m - 1)),

4. (A) ,

(B) ,

(C1) $(R^{31})_3 - C - OR^{33}$:

(
 R^{31} 1 30 , , 6 1 30 , , 6 30 , , 6 30 , , R³¹ ,
 R^{31} ;

R^{33} 1 30 , , 6 1 30 , , 1 30 6 30 , , 6 30 , ,),

(C2) $Z^{20} (R^{32})_m$:

(,

Z^{20} 2 13 ;

m Z^{20} 가 ;

R^{32}),

(D)

5.3 R³¹ 6 30 1 4

6.3 R³¹ 가 6 30 1 4

7.3 R³¹ 가 1 4

8. R³² 가 2 1 7

9. Z가 3 8

10. (A)가 II - 2 II - 6 1 9

II - 2

Q²¹_a(C₅H_{5-a-b} R³⁸_b)(C₅H_{5-a-c} R³⁹_c)M²¹ X²¹ Y²¹

II - 3

Q²¹_a(C₅H_{5-a-6} R⁴⁰_d)Z²¹ M²¹ X²¹ Y²¹

II - 4

(C₅H_{5-e} R⁴¹_e)M²¹ X²¹ Y²¹ W²¹

II - 5

M²¹ X²¹ Y²¹ W²¹ U²¹

II - 6

L²¹ L²² M²² X²¹ Y²¹

(,

Q²¹ 2 5 (C₅H_{5-a-b} R³⁸_b) (C₅H_{5-a-c} R³⁹_c) 가 ;

Q²² 5 (C₅H_{5-a-b} R⁴⁰_d) Z²¹ 가 ;

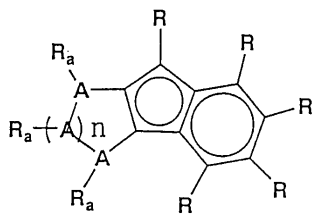
R³⁸, R³⁹, R⁴⁰ R⁴¹ , , , , , ;

a 0, 1 2 ;

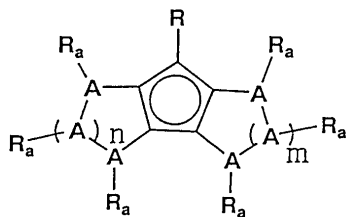
b, c d a가 0 0 5 , a가 1 0 4 a가 2 0 3 ;

e 0 5 ;

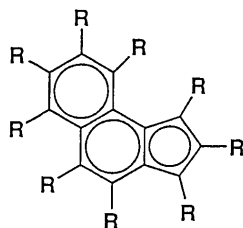
V



VI



VII



(,

A 13, 14, 15 16 A ;

R 1 30 , , 6 30 1 30 , 6 30 , 6 30 , 3 30 30 , 6 30 ,

R , , , , ;

a 0, 1 2 ;

n m 1).

12. 1 11

1 2

[1]

, 1 " "

I. :

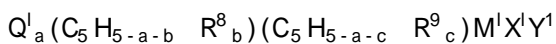
1. :

I (A) , (B) , (C) (D) .

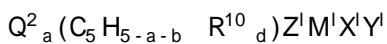
(1)(A) :

I-2 I-5 (A) 가 , 4 6 , 8 10 , I-6 ,

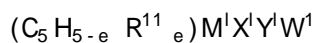
I-2



I-3



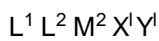
I-4



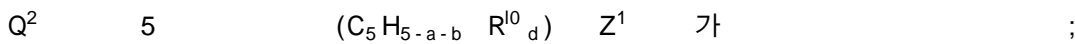
I-5



I-6



(,



R^8, R^9, R^{10}, R^{11} , , , , , , , , ;

a 0, 1 2 ;

I-5, M¹ 4 6, X¹ Y¹
 W¹ X¹ Y¹, W¹
 1 20, 1 10, 1 20, 1 10
 1 20, 1 12 (), 1 20,
 20, 1 12 (,) 1 20,
 1 12 (, B(C₆H₅)₄, BF₄)
 가 . X¹, Y¹ W¹

I-5, M¹ 4 6, X¹, Y¹ W¹
 U¹ X¹, Y¹ W¹, U¹
 1 20, 1 10, 1 20, 1 10
 1 20, 1 12 (,) 1 20,
 1 12 (, B(C₆H₅)₄, BF₄)
 가 . X¹, Y¹, W¹ U¹

(I) I-2 I-3

(1) () () () ()
 () () (n-
) () () ()
) () () ()
 , () () () ()
 , () () () ()
 가)() 2 5 , () ()

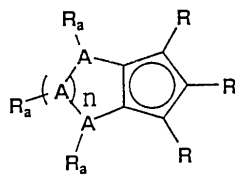
(2) () () ()
 , () () ()
) () (4,5,6,7-)
 , (2-) (2,4-)
 (2- -4-) (2,4- -5,6,7-)
 , (2,4-) (3',5'-)
 (2- -4-t-) (3'-t- -5'-)
 (2,3,5-) (2',4',5'-)
 (2-) () (2,)
 4-) (2,4-) (3',5'-)
) (2- -4-t-) (3'-t- -5'-)
 () (3,4-)
 (3,4-) (3,4-) (3,4-)
 , () () ()
 () () () (3,4-

) , () (2,3,4,5 -)
)() (3-) ()
 , (2,5-) (3,4-)
 (2,5-) () (3,5-)
 5-) () (2,5-) (2,)
 () (3,4-)
)() (2,5-) (3',4' -)
) 가 2 5

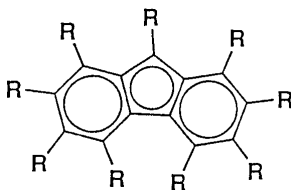
(3) () , (4,5,6,7 -)
 , (2-) (2,4-) (3',5' -)
 () , (4,5,6,7 -)
 (3',5' -) (2,4-) (2,4-)
 5' -) (2,3,5-) (2',4' ,)
 , (2,4-) ()
 , (2-) ()
) () (3-) ()
) () () (3,4-)
)() () (3,4-)
 () () () ()
 () () (2,7- -t-) () ()
) () (2-) ()
)(2-) (2,5-) (2,5-)
 () (2,5-) (2-) (2',7' - -t-)
 (2-) (2,5-) (2',7' - -t-)
)(2,7- -t-) () ()
 , () ()
) () ()
) () 2 가 5

(4) () , () ()
 () () ()
 , () ()
 , () ()
 가 2 5

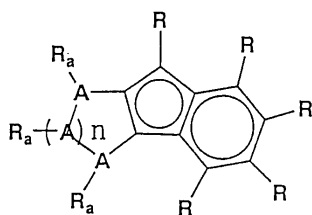
III



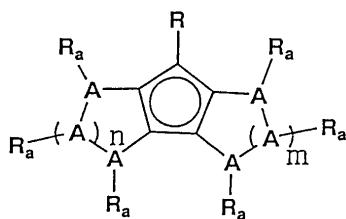
IV



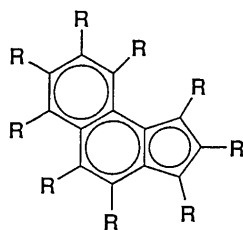
V



VI



VII



A 13, 14, 15 16

A

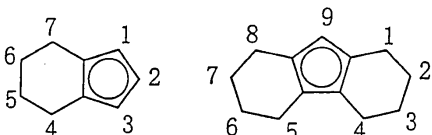
;

R , , 1 30 , 6 30 , 1 30 , 6 30 , R
 1 30 , 6 30 , 1 30 , 6 30 , R
 , 3 30 , R

a 0, 1 2 ;

n m 1 .

(C₅H_{5-e}R^{II}_e) 가 .



가 :

(C₅H_{5-e}R^{II}_e) , , , 1,2-
 , 1,3- , 1,2,3- , 1,3,4- ,
 , 1,3- , 1,2,3- , 1,2-
 , 1,3- , 1,2,3- , 1,3,4- , 1,2-
 , 1- -3- , 1,2,3- , 2- , 1- , 1- -2-
 , 1- -2- , 1- -2- , 1,2- , 1,3- , 1,2,3-
 -4,5,6,7- , 1,2- -4,5,6,7- , 4,5,6,7- , 1,3-
 -4,5,6,7- , 1,2,3- -4,5,6,7- , 2- -4,5,6,7-
 , 1- -4,5,6,7- , 1- -2- -4,5,6,7-
 , 1- -3- -4,5,6,7- , 1- -2,3- -4,5,6,7- ,
 1,2- -4,5,6,7- , 1,2- -3- -4,5,6,7- , 1,3-
 -4,5,6,7- , 1,3- -2- -4,5,6,7- , 1,2,3- -4,
 5,6,7- , 2- -4,5,6,7- , 1- -2- -4,5,6,7-
 , 1,3- -2- -4,5,6,7- , 9- , 9- , 9-
 , 1,2,3,4- , 9- -1,2,3,4- , 9- -1,2,
 3,4- , 1,2,3,4,5,6,7,8- , 9- -1,2,3,4,5,6,7,8-
 , 9- -1,2,3,4,5,6,7,8- .

I-4

가 .

4,5,6,7- , 1,2,3- -4,5,6,7- , 2- -
 -4,5,6,7- , 2- -4,5,6,7- , 2-
 1- -2- -4,5,6,7- , 1- -2- -4,5,6,7- , 1- -2- -
 4,5,6,7- , 1,3- -2- -4,5,6,7- , 1,3- -2- -4,5,6,7-
 , 1,3- -2- -4,5,6,7- , 1,3- -2- -4,5,6,7-
 2,3,4- , 1,2,3,4- , 1,2,3,4- , 1,2,3,4-
 4- , 1,2,3,4- , 9- -1,2,3,4- , 9- -1,2,3,4-
 2,3,4- , 9- -1,2,3,4- , 9- -1,2,3,4-
 9- -1,2,3,4- , 9- -1,2,3,4- , 9- -1,2,3,4-
 , 9- -1,2,3,4- , 9- -1,2,3,4-
 , 1,2,3,4,5,6,7,8- , 1,2,3,4,5,6,7,8- , 1,2,3,4,5,6,7,8-
 6,7,8- , 1,2,3,4,5,6,7,8- , 1,2,3,4,5,6,7,8- , 1,2,3,4,5,6,7,8-
 2,3,4,5,6,7,8- , 9- -1,2,3,4,5,6,7,8- , 9- -1,2,3,4,5,6,7,8-
 , 9- -1,2,3,4,5,6,7,8- , 9- -1,2,3,4,5,6,7,8-
 -1,2,3,4,5,6,7,8- , 9- -1,2,3,4,5,6,7,8- , 9- -1,2,3,4,5,6,7,8-
 , 9- -1,2,3,4,5,6,7,8- , 9- -1,2,3,4,5,6,7,8-

(III) I-5
 ; () ; [Macromolecules, 1997, 30, 1562 - 1569], [Journals of Organometallic Chemistry, 514 (1996), 213 - 217] ; [Macromolecules, 1996, 29, 5241 - 5243], [Organometallics, 1997, 16, 1491 - 1496]
 ; 가 .

(IV) I-6 , M² 8 10 , L¹ L²
 ; X¹ Y¹
 X¹ Y¹ , 1 20, 1 10 , 1
 20, 1 10 , 1 20, 1 12
 () , 1 20, 1 12 ()
 B(C₆H₅)₄, BF₄ 가 . X¹ Y¹
 . L¹ L² , 1,2- , 1,3-
 , 1,1'- , ,

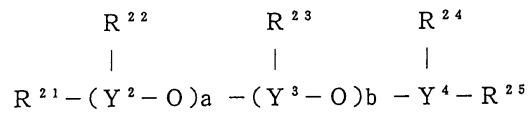
L¹, L², X¹ Y¹
 8 10 : 가 , , I-7

3- (1,2-) , (1,1'-) ,
 (1,2-) , (1,2-) , (2-) ,
 -1-) , ,
 , (1,2-) ,
 (2,2'-)) , ,
 , (1,2-) ,
 (2,2'-)) 가

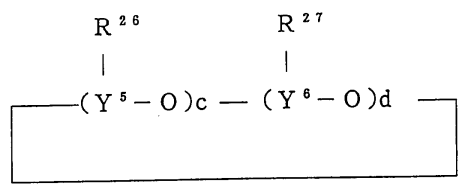
(B) :

I-8 / I-9 :

I-8



I-9



I-8 I-9 , R²¹ R²⁷ 1 8 , ,
 , n- , 가 . R²¹ R²⁷ ;

R²⁶ R²⁷

Y² Y⁶ 13 B, Al, Ga, In Tl , B
 Al Y² Y⁴ , Y⁵ Y⁶ . a d
 0 50 , (a+b) (c+d) 1 . a d 1 20,
 1 10, 1 5 .

(C) :

I-1 :

I - 1

$((R^1)_3 - C - Y)n - Z - (R^2)m - n$

,
 R^1 6 30, 1 30, 6 30, R¹ ;

Y 16 ;

Z 2 13 ;

R² ;

m Z 가 ;

n 1 (m - 1) .

: (1) Y가 , Z가 ; (2) 3 R¹ ; (3) 3 R¹ 가 1 ; (4) 3 R¹ 가 4 30 ; (5) 3 R¹ 가 6 30 ; (6) R² 2 .
 , R¹ , Y가 , Z가 , n 1 , R²가

(C)
 1 > $(R^1)_3 - C - OR_3$, < 1 > $(R^1)_3 - C - OR_3, R^4 - CO - R^5$ R⁶ - CO - OR⁷ , <
 < 2 > Z(R²)m
 30 , R¹ 6 30, 1 30, 6 30, 1 30, 6
 , R¹ , R¹ ;

R³, R⁴, R⁵, R⁶ R⁷ , 1 30, 6 30, 1 30, 6 30
 6 30, R³, R⁴, R⁵, R⁶ R⁷ ;

Z 2 13 ;

m Z 가 ;

R² .

; (1) $(R^1)_3$ 3 R^1 가 1 ; (2) $(R^1)_3$ 3 R^1 가 30 ; (3) $(R^1)_3$ 3 R^1 가 4 ; (4) $(R^1)_3$ 3 R^1 가 6 30 ; (5) R^2 가 2 , R^1 , R^2 가 가 .

<1> <2> :
 , <1> :<2> 1:0.1 1:10, 1:0.5 1:2,
 1:0.8 1:1.2 . - 80 300 , - 10 50

(C) , (C1) (C2) (A)
 , (B) 가 , (C1) (C2) (D) .

(C1) $(R^1)_3 - C - OR^3$, $(R^1)_3 - C - OR^3, R^4 - CO - R^5$ $R^6 - CO - OR^7$
 ; (C2) $Z(R^2)_m$.

, R^1 6 30 , 1 30 , 6 30 ;
 , R^1 1 30 , 6 30 , R^1 ;
 R^3, R^4, R^5, R^6, R^7 , 1 30 , 6 30 , 1 30 ,
 6 30 , , R^3, R^4, R^5, R^6, R^7 ;

Z 2 13 ;
 m Z 가 ;
 R^2 .

, (C1) , , ; (C2) , ,
 : (1) $(R^1)_3$ 3 R^1 가 1 6 30 ; (2) $(R^1)_3$ 3
 R^1 가 1 ; (3) $(R^1)_3$ 3 R^1 가 4 30 ; (4) $(R^1)_3$ 3 R^1 가 6 30 ; (5) R^2
 ; (6) $(R^1)_3$ 3 R^1 가 2 , (C1) (C2)
 가 .

(D) :
 , , 가 I - 12 , I - 13
 , I - 14 :

(D) (ii) .

(2) :

<1> (A) (B) , (B) 가
 , (A) (B) (B) 1:1 1:10,0
 00, 1:10 1:1,000 .

<2> (A) (C) , (C) 가 .
 , (A) (C) (C) 1:0.5 1:1,000,
 1:0.8 1:100, 1:1 1:100 . (A) (D)
 , (A) (D) (D) (D)
 1:0.5 1:1,000, 1:1 1:100 .

<3> 가 (C) (C1) (C2) , (C1) (C2) 1:
 0.1 1:50, 1:0.1 1:10, 1:0.5 1:20, 1:0.8 1:10, 1:0.5 1:2 1:0.8
 1:1.2, 가 1:0.8 1:10 .

(A) (C2) , (C2) 가 .
 (A) (C2) (C2) 1:0.5 1:1,000, 1
 :1 1:100 . (D) , <2> 가 <3>

(3) :

, 가
 , -30 200 . (4)
 , (B) .
 , 가 SiO₂, A
 I₂O₃, TiO₂, Fe₂O₃, B₂O₃, CaO, ZnO, BaO, ThO₂, - , ,
 , SiO₂ Al₂O₃가 .
 200μm, 20 100μm , 1 300μm, 10

II. :

1. :

, (,) .
 , 2 20 - .

4- -1- , 3,3- , 1- , 3- -1- , 4- -1- , 4- -1- , 1- , 3- -1- ,
 4- -1- , 3,3- -1- , 3,4- -1- , 4,4- -1- , 1- , 4- -1- , 5

[mmmm] : 1,2,4 -
 (90:10,) , ¹³C - NMR(JEOL LA - 500) 130 (prot
 on complete decoupling method) 가 . (signal)
 [mmmm] (A. Zambelli) [Macromolecules, 6, 925 (1973)]
] , ¹³C
 (isotactic) [mmmm] . ¹³C
 [Macromolecules, 8, 687 (1975)]

(Mw; molecular weight) (Mw/Mn; molecular weight distribution)
 GPC .

[I - 1]

(1) (C) :

455mg(1.75mmol) 0.875Mℓ 2M - 78 가
 24 . (C) 0.1mol/ .

¹H - NMR , (C) .

(2) :

27.1g SiO₂ [(Fuji Silica) P - 10] 500Mℓ (Schlenk) 200 4
 . 25.9g SiO₂ / - 78
 400Mℓ . 145.5Mℓ / (1.5mol/)
 , 1 . 4 , 6 - 78
 20 가 4 가 , 1 20 80 가
 4 80 ,
 60 60 400Mℓ 2 .
 4 60 가 23.12 % 33.69g
 . n - 가 500Mℓ가
 O.27mol/ 가 .

(3) :

5 , 400Mℓ 1 , 0.5mm
 ol , 50 μ mol (1) (C) , 0.25mmol
 (2) 가 1 μ mol 가 (2 - - 4,5 -)
 cm²G)가 . 가 0.785MPaG(8.0kg/
 , 70 60 .
 33.2g (1
 35), [] 1.2 , (Mw) 1,070,000 ; (Mw/Mn) 2.07 ;
 97.2% .

[I - 1]

(1) :

I - 1(2) .

(2) :
 I-1(3) 가 , I-1 , I-1(1) (C)

16.0g (Mw) 1,100,000 ; (Mw/Mn) 2.04 ; 135), [] 1.3 ; 96.8% .

[I-2]

(1) (C) :

1.75mmol -78 가 24 [(Across)] 0.875Mℓ 2M (C) 0.1mol/ .
¹H - NMR , (C)

(2) :

5mmol I (2- -4,5-) 5 , 400Mℓ 1 (C) , 0.25mmo
 , 50 μ mol I-1(2) 1 μ mol 가
 0.785MPaG(8.0kg/cm²G)가 가
 0 60 (Mw) 1,190,000 ; (Mw/Mn) 2.04 ; 28.4g
 97.1% .

[I-3]

(1) - 1 - :

360Mℓ (C) , 40Mℓ 1- , 0.5Mℓ 1M , 50 μ mol I-1(1)
 0.25mmol I-1(2) 1.6 , 70 가
 0.785MPaG(8.0kg/cm²G)가 , 20Mℓ
 1.0 μ mol (t -) (- 5 -) -
 0.785MPaG(8.0kg/cm²G)가 60 가
 , - 1 - 60 4 , 33.8g
 (Mw/Mn) 2.24 (Mw) 61,000 ;
 1 - 18.4mol% .

[I-2]

(C) 가 , I-3 , 18.
 3g - 1 - (Mw/Mn) 2.06 (Mw) 64,000 ;

1 - 18.3mol%

[I - 4]

(t-) (- 5 -) - I-3 2,2-t- -4,4-
 ; 29.3g - 1 - (Mw/Mn) 2.24 (Mw) 31,000 ;

1 - 18.4mol%

[I - 3]

(C) 가 , I-4 , 19.
 4g - 1 - (Mw/Mn) 2.06 (Mw) 34,000 ;

1 - 18.3mol%

[2]

, 2 가 " " . I. :

1. :

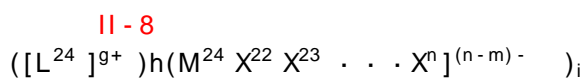
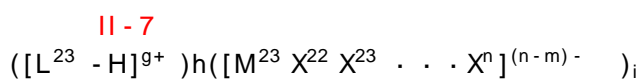
, (c) (A) , (B) II - 1 (D) .

(1)(A) :

, 1 .

(B) :

, , II - 7 II - 8 .



II-2 II-3 , (n-) , II-2
 () , (n-) () ,
) , N,N- () , ()
) II-3 , () ,
 () , () ,
 () , () , () , ,

, B(C₆F₅)₃, B(C₆HF₄)₃, B(H₂F₃)₃, B(C₆H₃F₂)₃, B(C₆H₄F)₃, B(C₆H₅)₃, BF₃, B
 [C₆(CF₃)F₄]₃, PF₅, P(C₆F₅)₅, Al(C₆HF₄)₃ .

(C) :

II-1 :

II-1

$$((R^{31})_3 - X^{20} - Y^{20})_n - Z^{20} - (R^{32})_{m-n}$$

R³¹ 1 30 , 6 30 , R³¹ 1 30 , 6 30 , R

X²⁰ 14 ;

Y²⁰ 16 ;

Z²⁰ 2 13 ;

R³² ;

m 가 ;

n 1 (m-1) .

: (1) X²⁰ , Y²⁰ 가 , Z²⁰ ; (2) 3 R³¹
 ; (4) 3 R³¹ 가 4 30 ; (3) 3 R³¹ 가 1
 ; (5) 3 R³¹ 가 6 30
 ; (6) R³² 가 2 .
 , R³¹ , X²⁰ , Y²⁰ , Z²⁰ , n 1 , R³² 가

(C) <1> $(R^{31})_3 - C - OR^{33}$ <1> $(R^{31})_3 - C - OR^{33}, R^{34} - CO - R^{35}$ $R^{36} - CO - OR^3$ 가 ,
 7 <2> $Z(R^{32})_m$
 6 30 , R³¹ 1 30 , 6 30 , 1 30 ,
 , 6 30 , , R³¹
 R³⁷ , R³¹ ; R³³, R³⁴, R³⁵, R³⁶
 1 30 , 6 30 , 6 30 ,
 ; Z²⁰ 2 13 ; m , R³³, R³⁴, R³⁵, R³⁶ R³⁷ , 6 30
 ; R³²

(2) 3 R³¹ 가 1 : (1) 3 R³¹ 6 30 ; (3) 3 R³¹ 가 4 30 ; (5) R³² 가
 ; (4) 3 R³¹ 가 6 30 , R³¹ , R³² 가
 2 가

<1> <2> :
 , <1> : <2> 1:0.1 1:10, 1:0.5 1:
 2, 1:0.8 1:1.2 , - 80 300 , - 10
 50 ; 0.1 50 , 0.1 3

(C) (C1) (C2) (A)
 , (B) , (C1) (C2) (D)

(C1) $(R^{31})_3 - C - OR^{33}$, $(R^{31})_3 - C - OR^{33}, R^{34} - CO - R^{35}$ $R^{36} - CO - OR^{37}$
 ; (C2) $Z(R^{32})_m$
 , R³¹ 1 30 , 6 30 , 6 30 , 1 30 ,
 6 30 , , 6 30 , R³¹
 , R³¹ ; R³³, R³⁴, R³⁵, R³⁶, R³⁷
 , 6 30 , 6 30 , 1 30
 , 6 30 , 1 30 , 6 30 , 6 30 ,
 3 ; m , R³³, R³⁴, R³⁵, R³⁶ R³⁷ ; Z²⁰ 2 1
 ; R³²

(C1) ; (C2)
 : (1) 3 R³¹ , 6 30 ; (2) 3 R³¹ 가 1
 ; (3) 3 R³¹ 가 4 30 ; (4) 3 R³¹ 가
 6 30 ; (5) R³² 가 2
 , (C1) (C2) 가

(D) : , 1

2. :

(1) : , 가 , 1

(2) :

<1> (A) (B) , 가 , (A) (B) (B)
 (B) 1:1 1:10,000, 1:10 1:1,000

<2> (A) (C) , (C) 가 ,
 , (A) (C) (C) 1:0.5 1:1,000,
 1:0.8 1:100, 1:1 1:100 . (A) (D)
 , (D) 1:0.5 가 , (A) (D) (D)
 1:0.5 1:1,000, 1:1 1:100

<3> 가 (C) (C1) (C2) , (C1) (C2) 1:
 0.1 1:50, 1:0.1 1:10, 1:0.5 1:20, 1:0.8 1:10, 1:0.5 1:2 1:0.8
 1:1.2, 가 1:0.8 1:10 . (A) (C2)
 (C2) 가 , (A) (C2) (C2)
 1:0.5 1:1,000, 1:1 1:100 . (D)
 , <2> 가 <3>

(3) : , 가
 , - 30 200

(4) , (B) ,
 1 가

II. :

1. :
 , (,)

2 20 - 가

가 ()

2. :

가 , 1

, 1

1 (A) 0.1

100 μ mol, 0.5 25 μ mol

2000kg/cm²G(196MPaG)

50 250

[II - 1]

(1) 455mg(1.75mmol) 0.875Mℓ 2M - 78 가
24 (C) 0.1mol/

(2) 360Mℓ , 40Mℓ 1 - , 1.0Mℓ 1.0M , 0.1Mℓ N,N -
() (10mmo1/) 5Mℓ (1) (C)
1.6 , 70 가 ,
0.785MPaG(8kg/cm²G)가 , 20Mℓ 1.0 μ mol (t
(- 5 -) - 8kg/cm²G가

60 가 , 60 4 , 4

6.1g - 1 - . GPC
1,270,000 , 2.46 . ¹H - NMR , 1 -
18.4mol% .

[II - 1]

II - 1(1) (C) II - 1(2) 가 ,
II - 1 , 35.3g - 1 - . GPC
1,170,000 , 2.38 . ¹H
- NMR , 1 - 16.7mol% .

[II - 2]

400Mℓ , 1.0Mℓ 1.0M (10mmo1/) 5Mℓ II - 1(1) , 0.1Mℓ () , 70 가
 . , 1.0 μ mol (t -) (- 5 -) - , 20Mℓ
 0.785MPaG(8kg/cm²G)가 60 ,
 가 60 4 ,
 16.2g . GPC
 1,140,000 , 1.98 .

[II - 2]

II - 1(1) (C) 가 , II - 2
 . , 10.5g . GPC ,
 1,090,000 , 2.02 .

[II - 3]

(t -) (- 5 -) - , II - 2 , 5.
 4g . GPC , 1,090,00
 00 , 2.02 .

[II - 3]

(C) 가 , II - 3 , 3.7
 g . GPC , 1,090,00
 0 , 2.02 .

[II - 4]

(1) (C) :

0.875Mℓ 2M 1.75mmol () -78 가
 24 . (C) 0.1mol/ .
¹H - NMR , (C) .

(2) :

II - 1(1) (C) (1) (C)
 , II - 1 . , 8.7g . G
 PC , 1,100,000 , 2.05
 .

[II - 5]

(t -) (- 5 -) - , II - 2
 . , 34.1g . GPC ,
 1,050,000 , 2.03 .

[II - 4]

(C) 6.4g , II - 5 , 1
 000 , 2.04 . GPC , 980,

가

가 .

(57)

1.

(A) ,

(B) ,

(C) I - 1 ,

(D)

:

I - 1

$((R^1)_3 - C - Y)_n - Z - (R_2)_m - n$

,

R^1 6 30 , 1 30 , 6 30 , R^1 ; R^1
 1 30 , 6 30 ,

Y 16 ;

Z 2 13 ;

R^2 ;

m Z 가 ;

n 1 (m - 1) .

2.

1 ,

a 0, 1, 2 ;

b, c d a가 0 0 5 , a가 1 0 4 a가 2
 0 3 ;

e 0 5 ;

M¹ 4 6 ;

M² 8 10 ;

L¹ L² ;

X¹, Y¹, Z¹, W¹ U¹ ;

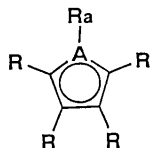
L¹, L², X¹, Y¹, Z¹, W¹ U¹ .

11.

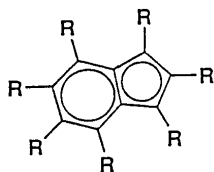
10 ,

I-4 (C₅H_{5-e} R¹¹ e) 가 I VII (A)
 :

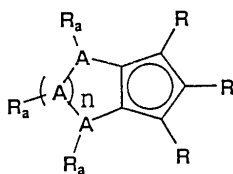
I



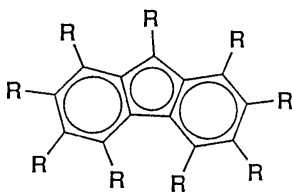
II



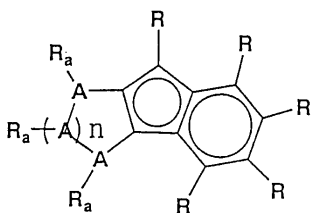
III



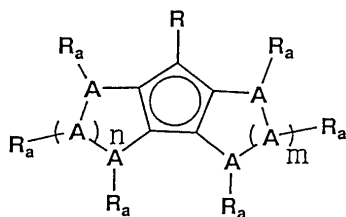
IV



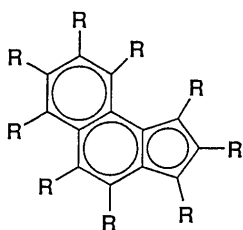
V



VI



VII



A 13, 14, 15 16 A ;
 R 1 30 , 6 30 , 1 30 , 6 30 , 3 30 , 1 30 , 6 30 , R
 ;

$a = 0, 1, 2$;

$n = m - 1$.

12.

1 11

13.

(A) ,

(B) ,

(C) II - 1 ,

(D)

:

II - 1

$$((R^{31})_3 - X^{20} - Y^{20})n - Z^{20} - (R^{32})m - n$$

R^{31} 1 30 , , 6 1 30 , , 6 30 , , 6 30 R^{31} , R R^{31} ;

X^{20} 14 ;

Y^{20} 16 ;

Z^{20} 2 13 ;

R^{32} ;

m Z 가 ;

$n = 1 - (m - 1)$.

14.

13 ,

19.

13 16 ,

3 R³¹ 가 .

20.

13 19 ,

R³² 가 2 .

21.

15 20 ,

Z가 .

22.

13 21 ,

(A)가 II - 2 II - 6 :

II - 2

Q²¹_a (C₅H_{5-a-b} R³⁸_b) (C₅H_{5-a-c} R³⁹_c) M²¹ X²¹ Y²¹

II - 3

Q²¹_a (C₅H_{5-a-6} R⁴⁰_d) Z²¹ M²¹ X²¹ Y²¹

II - 4

(C₅H_{5-e} R⁴¹_e) M²¹ X²¹ Y²¹ W²¹

II - 5

M²¹ X²¹ Y²¹ W²¹ U²¹

II - 6

L²¹ L²² M²² X²¹ Y²¹

,

Q²¹ 2 5 (C₅H_{5-a-b} R³⁸_b) (C₅H_{5-a-c} R³⁹_c) 가 ;

Q²² 5 (C₅H_{5-a-b} R⁴⁰_d) Z²¹ 가 ;

$R^{38}, R^{39}, R^{40}, R^{41}$;

a 0, 1, 2 ;

b, c, d a가 0 0 5 , a가 1 0 4 a가 2 0 3 ;

e 0 5 ;

M^{21} 4 6 ;

M^{22} 8 10 ;

L^{21}, L^{22} ;

$X^{21}, Y^{21}, Z^{21}, W^{21}, U^{21}$;

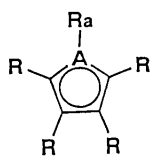
$L^{21}, L^{22}, X^{21}, Y^{21}, Z^{21}, W^{21}, U^{21}$.

23.

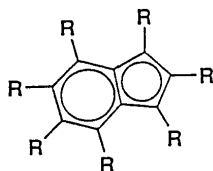
22 ,

II - 4 ($C_5H_{5-e} R^{41}_e$) 가 I VII (A)

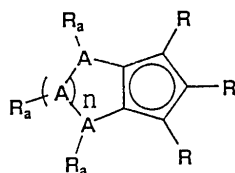
I



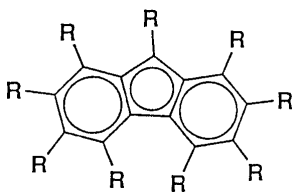
II



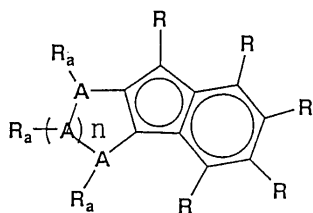
III



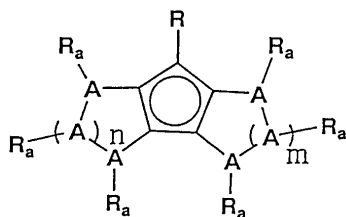
IV



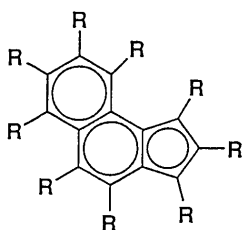
V



VI



VII



A 13, 14, 15 16 A ;
 R 1 30 , 6 30 , 1 30 , 6 30 , 3 30 , 1 30 , 6 30 , R
 , ;

a 0, 1 2 ;

n m 1 .

24.

13 23