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(71) -67056 - - 38

(72) ,
68159 12 7

,
67051 - - 41

,
67459 - 2

,
67343 4

,
67269 - - 12

,
64683 - . 1

,
67269 14

,
67227 - - 4

(74)

:

(54) (I P D A , 3 - - 3 , 5 , 5 -)

50 200

50 300

0.03 %
3- -3,5,5-

(

, IPN), NH₃ H₂ / 가 70/30 3- -3,5,5-
 (, IPDA) .
 Li, Na, K, Rb Cs . Na .
 / () 0.03
 %
 IPN, 3- -3,5,5- , , IPDN, 3- -3,5,5-
 , ,
 0.03 %
 3- -3,5,5- (, IPN), H₂ NH₃ /
 70/30 3- -3,5,5- (, IPDA)
 .
 IPDA (IPDI)
 IPDA , IP
 N . -IPDA -IPDA . DE-A 42 11 454 2가 가 40%
 , 가 60% IPDA 가 ,
 가 (pot life) 가 (70%) IPDA .
 IPDA / 75/25 .
 /
 DE-A 43 43 890 IPN IPDA 3 8 MPa,
 40 150 , 90 130 Co () Ru가
 IPN, . Ru C₁-C₃ , / (IPDA 81%), Co
 60/40 84/16 / (IPDA 87%). Ru Co
 Ru IPDA IPDA / Ru
 DE-A 43 43 891 Co, Ni (suspended-bed)
 (fixed-bed) 150 3 20 MPa IPN
 , IPDA . IPDA 91.9% /
 80/20 .
 EP-A 0 926 130 VIII ()
 . / IPDA 90% 70/30 . 2- .

EP-B 0 729 937

2 , , ()

. NaOH

2

1,3,3- -6- [3.2.1]

EP-A 0 742 045

55 98 % , 0.2 15 % , 0.2 15

% , 0.05 5 % , 가 0.1 3 % , 60 150 0.13 1 %

()

IPDA /

300 IPN

IPDA

HCN

()

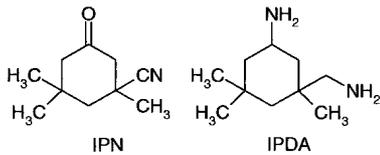
()

(IPDA)

50 200 50 300
(IPN), NH₃ H₂ / 가 70/30

0.03 %
3- -3,5,5-
-3,5,5-

60 160 , 80 130 100 250 , 200 25



Li, Na, K, Rb Cs

Na

IPDA

IPDA

10 % , (Ila I Ib).

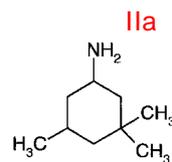
7 % , (IIIa IIIb)
IPDA

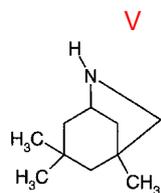
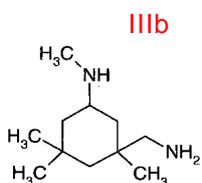
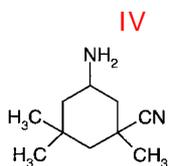
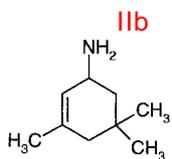
5 % . HCN
가 (IV)

IPDA 1,3,3-

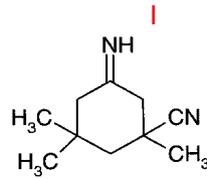
-6- [3.2.1] (V)가

IPDA





	/	70/30	,	73/27	,	75/25
	/	-IPDA	,	-IPDA	,	(GC)
IPDA		90%	,	93%	,	95%
99%	,	99.3%	,	99.7%	,	GC
98%	,					
IPN	IPDA	3-	-3,5,5-	-	(I)	
		20	150	30	130	50
50	300	100	250	200	250	100
	1	2	()	.	



2 2 () .

A) , IPN, NH₃ H₂ 20 150 50 300

B) A) 60 100 50 300

A) B) 2 .

A) 30 130 , 50 100 100 250 . A) 250

B) 가 가 .

()가 3

a) IPN , 20 150 50 300 (I) 1

b) 0 50 300 a) 2 60 10

c) 60 50 300 b) 3 110 1

3 .

a) 1 20 150 , 30 130 , 50 100 50 300 , 100 250 (I) 1 IPN 50 100 50 3- -3,5,5-

a) 가 가 .

() 가 .

kg, 0.1 5 kg . 1 kg 1 IPN 0.01 10 kg, 0.05 7 40 , 20 30 . IPN 1 NH₃ 5 50 , 10 IPN 가 .

가 (fixed bed) IPN NH₃ .

b)

a) 가 2 3 10000 ,
 4.5 100 .
 60 100 50 300 , 100 250 .
 0.05 2 kg[kg/l · h] 1 l 1 (l) 0.01 5 kg, 0.02 2.5 kg,
 3 5 500 , 10 400 , 3- -3,5,5- (l) 1 NH
 NH₃ 가 NH₃ 가 NH₃ . NH₃ . IPN

a) ,
 (fixed catalyst bed) .
 (IV) , IPDA
 c) .
 3 b) 110 160 50
 300 , b) 100 250 . c) b)
 b) .
 c) , c) b) b) 20 40% .
 . IPDA
 IPN IPDA
 , , , , , , 0.03 % , , ,
 . 1 0.03 %
 .
 0.03 %
 0.01 10 % , 0.05 5 % , 0.5 3 %
 , Ru, Ir, Pd, Pt () Ni .
 85 95 % , 0.2 55 98 % , 0.5 75 95 % , 1
 6 % , 0.2 15 % , 2 10 % , 3 8 % ,
 0.03 % 가 .
 , () , 0.01 10 % , 0.05
 1 , 5 % , 0.5 3 % 가 .
 . 0.015 % ,
 0.01 % .
 0.03 % , 0.015 % , 0.01 % .
 0.03 % , 0.03 %
 . Na 0.003 % .

a), b) c) 3 , b) c) 2가 1가
0.03 %

Co, Ru, Ni, Fe, Rh, Pd, Os, Ir, Pt Cu 1 0.03 %

i) 가 가 , , 1 1 ()

ii) i)

iii a) 50 200 , ,

iii b) 600 , 가 가 100

iv) iii a) iii b) () () 가 300 1000 ,

v) iv)

vi) H₂/N₂ H₂/N₂

vii) 20 60 , 가

35 , 20 30 vi) 0.03 % 15

i)

90 , 40 80 , 1 () () 30
Ir, Pt Cu , 45 55 Co, Ru, Ni, Fe, Rh, Pd, Os, 1
) 가 1 (pH
5.5 9.0, 6.0 8.0, 6.2 6.8 , pH
, 5 , 2 , 1.5 , Co Ru pH
, Co ()

가 , ()
가 iii b), iv) () vii)

ii)

i) , ,

iii a)

50 200

iii b)

iii a)

(iii b))

() 100 600

()

가

iv)

iii a)

iii b)

500 600

1

300 1000 ,

400 800 ,

() 가

v)

950

1

70 200 ,
300 1000 ,

90 150 ,
700 1000 ,

100 130
800

vi)

4 8

2 24 ,
280

30 70% ,
5 15
320

40 60%

200 H₂ ,
400

가
250 350

2 10 ,

vii)

20 50 ,

20 40 가
가

가 60 , 20 60 ,
100% 가

200 m² /g,
0 cm³ /g,

0.11

12 m² /g ,
18 100 m² /g
0.40 cm³ /g,

12 500 m² /g,
0.10 cm³ /g ,
0.12 0.20 cm³ /g

0.10 15
1.0

% Ru/Co

Ru

0.01 10 % ,

0.1 5 % ,
Co

i) 0.5 2
Co Ru

iii b), iv) () vi)

가

active catalyst) / IPN IPDA 0.03 % , 0.03 (all-a) %
 IPDA 0.03 % 0.03 % IPN

1:

Na Co

10 % Na , 0.55 % Co 0.45 % H₃PO₄

1 ()
 0.12 cm³/g

16 m²/g

[1]

Co(%)	76	87.9
Mn(%)	4.2	6.6
P(%)	1.8	5.5
Na(%)	<0.01	<0.01
	100 %	

1

EP-A 0 742 045

Na

2: IPDA

IPN IPDA 3 250
 Na () Na
 2 / 280 가 .12
 (130 ml/h), (600 g/h) 300 l/h -Al₂O₃ 1 ()
 , 200 ml 80-100 . 90 . 3(
) 130

2가

Na Co	Na
(1)	()
92.9	92.5

/	68.7	75.8
HCN (IIa IIB)	4.6	1.5
(IIIa IIIb)	0.7	0.1
(V)	0.4	2.6
(IV)	0.2	0.1

가 . Na (IIa, IIb, IIIa, IIIb IV) Na / (V)

(57)

1.

50 200 50 300 0.03 %
 , IPN), NH₃ H₂ 3- -3,5,5- ()
 (, IPDA) / 가 70/30 3- -3,5,5-

2.

1 , 2 .
 A) , IPN, NH₃ H₂ 20 150 50 300
 B) A) 60 100 50 300
 , A) B) 2 .

3.

1 , 3 , .
 a) IPN , 20 150 50 300 1
 3- -3,5,5- (I)
 b) a) 2 60 10
 0 50 300
 c) b) 3 110 1
 60 50 300

4.

3 , a) 30 130 () 100 250 .

5.

3 4 , b) () c) 100 250 .

6.

1 5 0.015 % , 0.01 % .

