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(73) 5 3 6

(72) 1465-2

가 1866-900

가 337-84

가 1771-5

(74)

:

(54) ,

1. LCD ,

2. , 가
, 가 , 가3. , , ,
1 , 가,

(95) HF (95) HF (95)

Poly-Si (W) SiSx가

가 가 가

(One-Bath) (W) 1

3가

() () ()

가

가 SC2 SC1

HF

가 가 가

가 가 가

가 가

(b)
(c)
(d)
(e)

(a)

(T1) 가

(T1)

가

(T1) 가

(T1) 가

가

10 (1) (2) (3) (4) (3) (2)

(3) (5) (4) (7) (8) (5) (C)가

(3) (5) (7) (8) (5) (C)가

(W) (C) 25 (W)가 (8) (C) (7)

(2) Y (8) (17) (W) 가 (10a),(10b),...(10n)

(10a),(10b),...(10n) (11) 1 (12) 2 (13) (11) (13)

(12),(13) (12) 2 (13) (W)

(10b~10n) (2) (10n)가 (10n) (W) Y

가 IPA (17) 50 (W) (17)가 (2) (16)

(16) X Z 가 Z (6) (C)가 (C)

(4) (10b 10n) (W)가 (10n)

3 4 (15) (20) IPA (40)

(20) 2 (19A,19B) (24)가 1

(19A) (19B) (L2) (20) (20) HF

2 (40) (30) (20) IPA (40)

IPA (41) (42) (44)가 , IPA 가 IPA (43)가 ,

IPA (113) (41) (42)

(45) 가 . (42) (41) IPA 가

(41) (46)가 (47) (48)가 (46) (V7) (47)가

(30) 3 (V6) (50) (51) N₂ 가 (52) (V1~V7),(Vt), (V6) , IPA (P1),(P2), (20) (20a) (20b) (20b) (22)가 (22) (23) O (28)

(20a) (20c) (24)가 (24) (L1) (L2) (P1) (V2) (24) 2 (L2),(L3) (L3) (P2) HF (19B) 4 (20a) (21)가 3 (21) (W)가 (2)

(20c) (21) (25) (25) (25a) (25b) (25c) (25b) (25a) (2)

(60) (61), (62), (63)가 (60) 가 (61) (61) (63)

(20) 2 (100)가 (100) (V4),(Vt)가 (100) (L2) (P1) (V4) (L4) (100) (Vt) (20a) (20b) IPA (32)가 (30) (32)

(34) (30) (31)가 (V5) 가 IPA (33) (80) ()가

(20b) (31) (32)가 (31) (30) 가 (50) (20) N₂ 가 가 (71)가 (20a) 2 (80) (20a) (72)

(70)가 (70) 14M (80) 5 8 , 2 (W) 1 50 (W) (10a) (11) (11) (W)

(W) 2 (13) (W) 1 (12) (W) (10n) (20a) (10b) 10n) (21) (W) (20a) (20a) (20b) (23) (91) (19A) (20a) (91) (91) (20) (20a) (20b)

a)

1

(80) (P1) (V2) , (W) (91) (20a) (91) (20)

가 (20a) (20a) (91) (v2) , 1

(S1). (P2) (V3) , (20a) HF ,

(80) (20a) (20a) HF (V3) (60) (62) (61) (61) (20a) (80)

(F2) (60) (62) (S3). 가 , (62) (61) (91) ()

HF (P1) (V2),(V4) (100) (91) (20a) ()

(100) (91) (20a) (Vt) , (100) (W) 2 (S4). HF

2 , (20a) (HF (S4) 2) (70)

, 14M (20b) 2 , (S6) (S6

) (27) (20b) , O (28) (20b) , (27) (20a)

(S6). N₂ 가 (P1) (V2) (91) y1

(24) (20a) (20a) (91) N₂ 가

(20a) (20a) (91) IPA 가 IPA (30)

(V2) , (20a) (91) 가 (V7) (20a) N₂ 가 (45)

(V5) , (33) (20a) , IPA (LD) (Y2

20a) IPA (90) (91) (S7). IPA (90) IPA

(V5) , (20a) (33) , IPA (91) (20a) , IPA

(W)가 (S8). 가 N₂ 가 (27) , (6) (C) (20a)

N₂ 가 (20a) (W) (4) (W) , IPA (90) (91) (W)

8 (24) (91) (92) , IPA (90) (91) (90)

(93) (W) (93) (W) IPA (91) (W)

9 2 (24) (20a) (20a) 가 , HF (24)

(20a) 가 , 1 가 , (W)

LCD 3 (14) (20a)

10 (60) (20a) (61) (61)

, (20a) (60) (64) (65) 가 (64) (24)가

(20) () (64) 2 (24)가

(60) , (20a) HF 가 , (64)

3 (24) (W) , 1

11 15
 (200) (203) , (202) (204) , (202)
 (203) (204) (203)
 (202) (205) , (206) , (207) (205)
 (C)가 (C) 25 (W)가 (207)
 (C) (W)
 (206) (203) , (207) (206) (211) (W)
 가
 (203) Y (221 228) (221 2
 28) (221) (213) 1 /
 (222) (W)가
 2 / (224) (NH₄ OH-H₂O₂-H₂O)
 (W)가 (226) 3 / 1 /
 (222) 2 / (224) (W)가
 (203) (228)가 (228) (W)
 , IPA , 12 1 (254)
 3 (255) (228)
 가 (203) Y 가 (211)
 (211),(221)가 (203) (213),(214) (213),(214) X
 (W) 가
 , (212) 50 Z 가 , Z 가
 (209) (208) (208) (C)가 ,
 (C) (W)가 (224)
 13 15 2 / (224) 가 (23
 13 2 / (230) 가 (238)
 0) 212) (214) , (239)가 (224) ((224)
 (210)가 (210)
 가 (224) (231) (231) (232) (231)
 (230) (231)
 , (231) (233)가 (233)
 (231) 50 (W)가 (233) (234)
 (234) (235a),(235b) (236)가 (234)
 (231) (237) (231) (W)
 (91) (237) (238)가 (230)
 (238) (238) (238)가 , (239)
 (210)가 (240) (239) 가 (231)
 (231)
 14 (224) , (240) 2 (241),(242)
 (224) (240) , 2 (242) 가 (241),(
 1 (241) 가 (248)
 242) 가
 (231) 3 (235a),(235b),(236)가 (235a),(235b) (248)
 1 2 (241),(242) (235a),(235b) (R)
 (243) (243) (244) (91) (235)
 (253) (243) (251) (236)가
 (232) (91) (232) (246) (247)
 (243) (調合) , (245) (R)
 (243) (R) (231) (247) (243) (248)
 W) APM (248) (V9) (231) (235a),(235b)
 (248) (249) (DIW) (V10)
 (248) (V11) (E) (R)
 (232) (V12) (R) (232)
 (V13) (E) (236) (V14) (251)

(243) (243) (V15'),(V16) (E) (R)
 , (251) (V16) (E) (247) (R)
 가 (V17) (E)
 (252) (253) (232) 12
 (252) (R) (243) (254),(255) (E)
 (262) 가 (261)가 (262) 가 (261)
 (V19) , (AH) 가
 (262) (V20) (AL)
 (E) (AH) (AL)
 (261) pH ,
 (231) (271) (272) (273)
 (272) (AL) (274) (273) (273) (275) (275)
 72) (V21)가 (V21) (V22) (E) (273)
 (275) (V22)가 (V22) (273)
 (V21) (V22) (276) (273)
 (V21)가 (V22)가 (276)
 V21)가 , (V22)가 (276)
 (273) (V21'),(V22) (273)
 () 가 (V21) , (V22)
 (W)
 (214) (231) , (W) (233) (231)
 (W) (W) (R) (231)
 가 , (251) (231) (243)
 (237) (91) (W) (252)
 (253) (232) (231) (91) (W) (W) (2)
 31) 가 가 (231)
 (231) 가 가 (231) (235a),(235b) (91)
 (231) 가 (231) (231) (231) (E)
 가 (V13) , (231) (W)
 (271)가 (271)
 가 (271)가 가
 (271) (273a) (273)
 15 (273) (231) (273a) (232)
 (271) 가 (AH)
 (AL) 가
 (AL) 가 (231)
 (W) (12) (15)
 (W) (231) (248) 1 (+
 +) (231) (248)
 1 (E) 1
 가 가
 가 「1」
 「」
 2 (AH),(A
 L) 가
 가
 16 21 1 2

(300) (303) , (302) (304) (302)
 (303) (304) (303) (305) (307) (305) (C)
 C)가 (W) (C) 25 (W)가 (306) (307) (C)
 (306) (303) (307) (315) (W)
 가 (303) Y (341 349) (341 349
) (342) (341) (318) 1 /
 SC1 (NH₄OH-H₂O₂-H₂O) (W) SC1
 (344) (W) (HF-H₂O) (W) HF 2 /
 (W) (HCL-H₂O₂-H₂O) (W) 3 / (346)
 SC2 SC2
 , SC1 HF SC2 RCA
 3 (315),(316),(317)가 (303) Y 가
 (315),(316),(317) 50 (W) (318),(319),(320)
 (318),(319),(320) X Z 가 , Z 가
 (304) (308) (308) (C)가
 (C) (W)가 50 (W) 1 (321a),(321b)
) (321a),(321b) (326a),(326b) (323)
 (326a),(326b) (323) (324) Z ()
 (318) (323) (324) () X
 (324) Y 가 (325) (323)
 (326a),(326b) (321a),(321b) 가 (321a),(321b)
 (327a),(327b),(328a),(328b) 2 (327a),(327b),(328
 a),(328b) 50
 18 (324 347) (351)가 (342)
 (353),(354),(355) 1 (352) 3 (353),(354),(355) , 3
 50 (352) (353),(354),(355) (C)
 (P) 가 (C) (P) SC1 (342)
 18 21 (W) SC1 (362) (363) (361) 가 S
 C1 (342) (361) (362) (362) (365) (366)
 (364) (366) (363) (365) (365)
 (366) (367) (367a) (365)
 (W)
 19 , 20 (361) (370) (371) (370)
 (351) (W) (371) (370)
 , (370) (371) (373)가
 (373) (374) (363)
 21 (371) (373) (370) (363) (374)
 (374) (380) , (381) , (382) , (383)
 (383) 가 가 , 가 가 , (C)
 383) 가 (384) (384) (371)
 (381) (382) (374) , (385) (3
 81) (382) (374) (385) (385) (388) ,
 (371) (385) (386) , (387) , (385)
 (389) (386),(389) , (388) 가 ,
 (371) (386) (387) (388) (391
) (385) (387) (390) (388) (3

89) (392) (393) , (385)

(400) SC1 (403),(406),(409) 1 (

403) (401) (402) 가 2 (406) (404) (40

5) 가 3 (409) (DIW) (408) (407) 가 1 3 (403)

,(406),(409) () (371)

(400) (420) 1 (421) 가 ,

(402),(405) (407)가

(420) 1 2 (421),(422) , CPU(423) , (424) 가 2 (422)

(385) (388) , CPU(423) . (424),

(371) N₂ () , CPU

(423)

CPU(423) (371) , , , (424)

1 (421) . CPU(423) (424)

. CPU(423) (1),(2) , (442)

, (400) (400) NH₄ OH, H₂ O₂ ,

(371) , (342)

$$\Delta V_{NH_4OH}^B(T1) = \frac{1}{0.89 \times 0.28} \left[\beta_{NH_4OH} \times V(T0) - C_{NH_4OH}^{100}(T1) \frac{1}{\alpha(T1)} V(T1) \right]$$

$$\Delta V_{H_2O_2}^B(T1) = \frac{1}{1.11 \times 0.31} \left[\beta_{H_2O_2} \times V(T0) - C_{H_2O_2}^{100}(T1) \frac{1}{\alpha(T1)} V(T1) \right]$$

$$\begin{aligned} \Delta V_{H_2O}^B(T1) &= \left[\beta_{H_2O} \times V(T0) - [1 - C_{NH_4OH}^{100}(T1) - C_{H_2O_2}^{100}(T1)] \frac{1}{\alpha(T1)} V(T1) \right] \\ &\quad - \frac{0.72}{0.28} \left[\beta_{NH_4OH} \times V(T0) - C_{NH_4OH}^{100}(T1) \frac{1}{\alpha(T1)} V(T1) \right] \\ &\quad - \frac{0.69}{0.31} \left[\beta_{H_2O_2} \times V(T0) - C_{H_2O_2}^{100}(T1) \frac{1}{\alpha(T1)} V(T1) \right] \dots (1) \end{aligned}$$

$$\alpha(T1) = 1 + \frac{1}{0.28} \left(\frac{1}{0.89} - 1 \right) C_{NH_4OH}^{100}(T1) + \frac{1}{0.31} \left(\frac{1}{1.11} - 1 \right) C_{H_2O_2}^{100}(T1)$$

$$\beta_{NH_4OH} = 0.28 \times 0.89 \times \frac{H_{NH_4OH}^B}{H}$$

$$\beta_{H_2O_2} = 0.31 \times 1.11 \times \frac{H_{H_2O_2}^B}{H}$$

$$\beta_{H_2O} = \frac{H_{H_2O}^B}{H} + 0.72 \times 0.89 \times \frac{H_{NH_4OH}^B}{H} + 0.67 \times 1.11 \times \frac{H_{H_2O_2}^B}{H} \dots (2)$$

(1),(2)

V^B_{NH₄OH}(T1) , (T1)

0.89 , 0.28

NH₄OH , (2) ()

V(T0) , ()

C¹⁰⁰_{NH₄OH}(T1) , (T1) 100% (wt%) ,

(388)

(T1) , (T1) (2)

V(T1) , (T1) (424)

V^B_{N₂O₂}(T1) , (T1)

1.11 , 0.31

H₂O₂ , (2) ()

$C^{100}H_{2O_2}(T1)$, (T1) 100% (wt%)
 (388)
 $V^B H_{2O}(T1)$, (T1)
 $H^B H_{2O} / H$, (2) ()
 $H^B H_{4O_2} / H$,
 $H^B H_{2O_2} / H$,
 $H^B H_{2O} / H$, 1/7
 CPU(423) (1) (2) (342) 가 $NH_4OH:H_2O_2:H_2O=1:1:$
 5, PCU(423),
 1 (421) 1 (421) (400),
 (400) (371) (342)
 1 (421) (400) CPU(423) CPU(423)
 가, CPU(423) (361)
 2,
 50 (W) (342) (W) (342) (370) 가 SC1 (37
 0) (W) (318) (370) (351)
 (371) (W)
 SC1 1:1:5,
 (370) 가
 0.5:0.6:4.9 가
 (W) (370) (388)
 2 (422) CPU(423) (424) (71)
 CPU(423) CPU(423) (1),(2)
 1 (421) (400) (400) (371)
 (342)
 SC1 50 (W) (343) (344 347) (343) HF
 (W) (349) (304) (C)

(57)

1.

- (a),
 (b),
 (c),
 (d) (T1) 가,
 (e) (T1)

2.

1 (a) (e)

3.

가

(T1)

가

(T1)

가

4.

3

5.

3

가

가

6.

3

5

가

가



























