

가

가

1.

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가 가

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,

(adhesives)

(lubricants)

cooking

가

가 가

.

“polyester/cotton

” [1]

가

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K

polyester/cotton(65%/35%)

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corn Staroh, PVA

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Solvil wax SX -135A

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27

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< 1>

Corn Strach PVA

viscosity

cup()

()

가

< 1>

OS/PVA	유 계 량 (%)	점도 (sec)		
		10	15	20
70/30	2.5	1 ~ 5	6 ~ 10	11 ~ 15
	5.0	16 ~ 20	21 ~ 25	26 ~ 30
	7.5	31 ~ 35	36 ~ 40	41 ~ 45
50/50	2.5	46 ~ 50	51 ~ 55	56 ~ 60
	5.0	61 ~ 65	66 ~ 70	71 ~ 75
	7.5	76 ~ 80	81 ~ 85	86 ~ 90
30/70	2.5	91 ~ 95	96 ~ 100	101 ~ 105
	5.0	106 ~ 110	111 ~ 115	116 ~ 120
	7.5	121 ~ 125	126 ~ 130	131 ~ 135

가 가

, A' , T , a' b' , A' = a'b'T

가 Barella [2]

$$\text{Log } A' = \text{Log } a' + T \cdot \text{Log } b'$$

가 , ,

$$A = a + bT$$

가 . A A' Log , a b .

A' , 가

Log A .

, . - graph

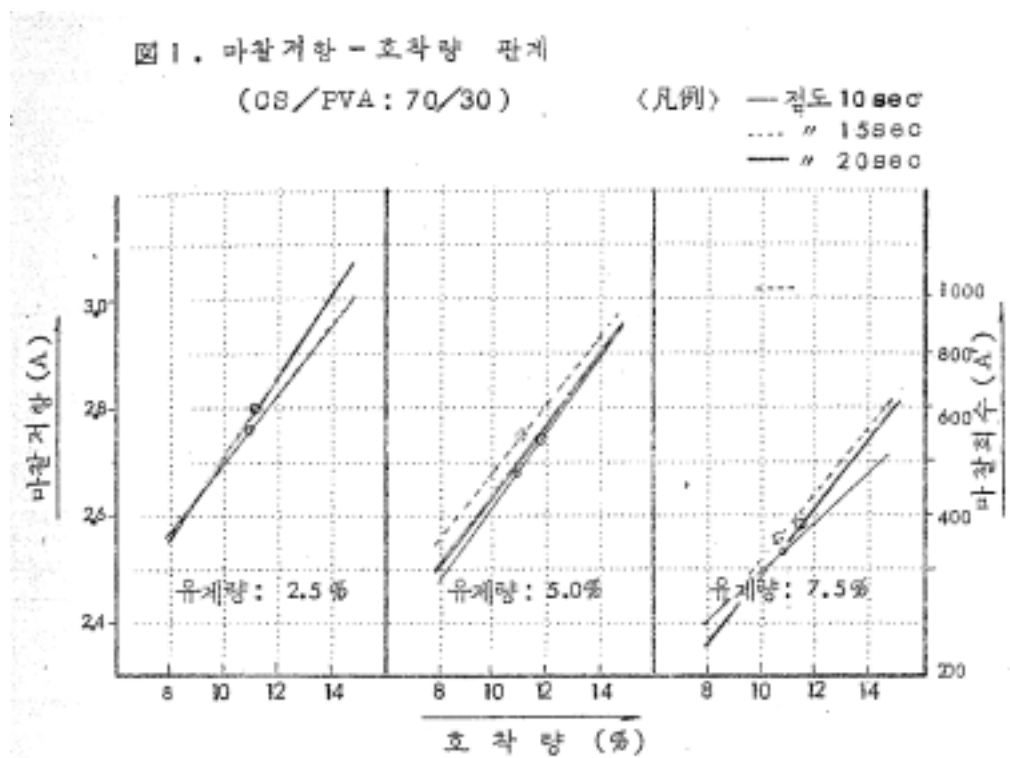
, 가

.[1].

1. CS/PVA : 70/30 糊

< 1> .

< 2> .



< 2>

유제량 (%)	절도(BBO)	절 편	기 물 기
2.5	10	2.060	0.0632
	15	2.052	0.0640
	20	1.943	0.0752
5.0	10	1.937	0.0676
	15	2.055	0.0617
	20	1.962	0.0659
7.5	10	2.034	0.0452
	15	1.922	0.0591
	20	1.861	0.0616

< 1> < 2> ,

가 , . 가

V^2 - t- .[3]

가

1)

V^2 - (variation between slopes) S_2^2

(variation within sets) S_1^2 $V^2 = S_2^2/S_1^2$, $V_{0.95}^2(m-1, \sum N \mu -$

2m) .

$$S_{\mu 1}^2 S_{\mu 2}^2 \dots \dots$$

Bartlett - [3]

가

< 3>

< 3>

구제량 (점도 (sec))	2.5			5.0			7.5		
	10	15	20	10	15	20	10	15	20
N_{μ}	4	4	4	4	4	5	4	4	5
$\bar{T}_{\mu 0}$	11.05	11.0	11.375	11.025	11.2	11.88	10.9	10.725	11.72
$\bar{A}_{\mu 0}$	2.75875	2.756	2.7985	2.6825	2.74575	2.7444	2.52625	2.55625	2.5828
$SSD_{T_{\mu}}$	28.43	19.78	27.3075	24.6475	28.46	31.548	19.38	14.9075	42.488
$SPD_{T_{\mu} A_{\mu}}$	1.79675	1.2651	2.05335	1.66585	1.7548	2.08024	0.8756	0.881375	2.61752
$SSD_{A_{\mu}}$	0.121055	0.083074	0.155657	0.113213	0.111743	0.140637	0.040247	0.052503	0.162703
$SSD_{A_{\mu}/T_{\mu}}$	0.007502	0.002160	0.001258	0.000623	0.003545	0.003468	0.005620	0.000394	0.001448
f_{μ}	2	2	2	2	2	3	2	2	3
$S_{\mu 1}^2$	0.003751	0.001030	0.000629	0.000312	0.001772	0.001156	0.002810	0.000197	0.000483

< 3>

N_{μ}

, $\bar{T}_{\mu 0}$ $\bar{A}_{\mu 0}$

$$SSD_{T_{\mu}} = \sum_{n_i=1}^{N_{\mu}} (T_{\mu n_i} - \bar{T}_{\mu 0})^2$$

$$SSD_{T_{\mu} A_{\mu}} = \sum (T_{\mu n_i} - \bar{T}_{\mu 0})(A_{\mu n_i} - \bar{A}_{\mu 0})$$

$$SSD_{A_{\mu}} = \sum (A_{\mu n_i} - \overline{A_{\mu 0}})^2$$

$$SSD_{A_{\mu}} / T_{\mu} = \sum (A_{\mu n_i} - A_{\mu})^2$$

$$= SSD_{A_{\mu}} - SPD_{T_{\mu}A_{\mu}}^2 / SSD_{T_{\mu}}$$

$$f_{\mu} = N_{\mu} - 2$$

$$S_{\mu_1}^2 = SSD_{A_{\mu}} / T_{\mu} / f_{\mu}$$

$$\mu \qquad \qquad \qquad \text{가} \qquad \qquad \qquad .$$

$$V^2 - \qquad \qquad \qquad S_1^2 \qquad S_2^2 \qquad \qquad .$$

$$S_1^2 \qquad \qquad \qquad , \qquad \qquad \qquad A_{\mu} \qquad \qquad A$$

$$\mu_{ni} \qquad \qquad \qquad SSD_{A_{\mu} / T_{\mu}} \qquad \qquad f_{\mu} \qquad \qquad S_{\mu_1}^2 , \ S_{\mu_2}^2 \dots\dots\dots$$

$$\qquad \qquad \qquad .$$

$$S_1^2 = \frac{\sum_{\mu=1}^m f_{\mu} S_{\mu_1}^2}{\sum_{\mu=1}^m f_{\mu}} = \frac{\sum_{\mu=1}^m SSD_{A_{\mu} / T_{\mu}}}{\sum_{\mu=1}^m N_{\mu} - 2m}$$

$$S_2^2 \qquad \qquad \qquad , \qquad \qquad \qquad b_{\mu} \qquad \qquad \overline{b}$$

$$\qquad \qquad \qquad .$$

$$\overline{b} = \frac{\sum_{\mu=1}^m b_{\mu} SSD_{T_{\mu}}}{\sum_{\mu=1}^m SSD_{T_{\mu}}} = \frac{\sum_{\mu=1}^m SPD_{T_{\mu}A_{\mu}}}{\sum_{\mu=1}^m SSD_{T_{\mu}}}$$

$$S_2^2 = \frac{1}{m-1} \sum_{\mu=1}^m (b_{\mu} - \overline{b})^2 SSD_{T_{\mu}}$$

$$V2- \qquad \qquad \qquad < \qquad 4> \qquad \qquad \qquad . \qquad \qquad \qquad 3$$

$$\qquad \qquad \qquad , m = 3 \qquad \qquad \qquad .$$

< 4>

유제량(%)	2.5	5.0	7.5
S_1^2	0.001820	0.001091	0.001066
$\bar{b}$	0.0677	0.0650	0.0570
S_2^2	0.001194	0.000255	0.001840
V^2	0.656	0.234	1.726
$V_{0.95}^2 (m-1, \sum N\mu - 2m)$	5.14	4.74	4.74

V^2 $V_{0.95}^2 (m-1, \sum N\mu - 2m)$,
가 가

$\bar{b}$, 0.677, 0.0650

0.0570 < 2> <

5>

< 5>

유제량(%)	점도 (sec)	절 권	기 물 기
2.5	10	2.011	0.0677
	15	2.011	"
	20	2.028	"
5.0	10	1.966	0.0650
	15	2.018	"
	20	1.972	"
7.5	10	1.905	0.0570
	15	1.945	"
	20	1.915	"

$$(\bar{T}_{\mu 0}, \bar{A}_{\mu 0})$$

$$(\text{linearity}) \quad .$$

$$, \qquad \qquad \qquad t \qquad \qquad \qquad \Sigma N_{\mu} - 3$$

$$t-$$

$$.$$

$$S_3^2 \qquad \qquad \qquad S_1^2 \qquad \qquad S_2^2$$

$$S_0^1(\frac{(\sum N_{\mu}-2m)S_1^2+(m-1)S_2^2}{\sum N_{\mu}-m-1} \quad .) \quad ,$$

$$V^2=S_3^2/\frac{(\sum N_{\mu}-2m)S_1^2+(m-1)S_2^2}{\sum N_{\mu}-m-1}$$

$$, \quad V_{0.95}^2(m-2,\sum N_{\mu}-m-1) \qquad \qquad \qquad . \; S_3^2$$

$$.$$

$$S_3^2=\frac{1}{m-2}\sum_{\mu=1}^mN_{\mu}(\bar{A}_{\mu 0}-A_{\mu})^2$$

$$=\frac{1}{m-2}\sum_{\mu=1}^mN_{\mu}\{\bar{A}_{\mu 0}-\bar{A}_{00}-\hat{b}(\bar{T}_{\mu 0}-\bar{T}_{00})\}^2$$

$$A_{\mu} \qquad \qquad \qquad A=\overline{A}_{00}+\hat{b}(T+\overline{T}_{00}) \qquad \qquad T$$

$$\bar{T}_{\mu_0} \qquad \qquad \qquad A \qquad \qquad \qquad \text{가} \qquad \qquad \qquad , \quad \bar{A}_{00} \qquad \qquad \bar{T}_{00} \qquad \qquad \bar{A}_{\mu_0}$$

$$\bar{T}_{\mu_0} \; (\mu=1,2,3) \quad \text{가} \qquad \qquad \hat{b} \qquad \qquad \qquad .$$

$$\hat{b}=\frac{SPD\bar{T}_{\mu 0}\bar{A}_{\mu 0}}{SSD\bar{T}_{\mu_0}}==\frac{\sum N_{\mu}(\bar{T}_{\mu_0}-\bar{T}_{00})\bar{A}_{\mu_0}}{\sum N_{\mu}(\bar{T}_{\mu_0}-\bar{T}_{00})^2}$$

$$< \quad 6> \qquad \qquad \qquad .$$

< 6>

유계량 (%)	2.5	5.0	7.5
s_0^1	0.001664	0.000905	0.001238
$\hat{b}$	0.1166	0.0500	0.0407
s_3^2	0.000019	0.006142	0.002822
v^2	0.011	6.787	2.279
$v_{0.95}^2 (m-2, \sum N_{\mu} - m - 1)$	5.32	5.12	5.12

2.5% 7.5% ,
 5.0% .
 .(1
 3 “O” mark가 ,
 .)
 , 3

$S_1^2, S_2^2, S_3^2, S_o^2$ t

$$t = \frac{|b - \bar{b}|}{S_o \sqrt{\frac{1}{SSD_{\bar{T}\mu_0}} + \frac{1}{\sum SSD_{T\mu}}}}$$

So

$$S_o^2 = \frac{(\sum N_{\mu} - 2m)S_1^2 + (m-1)S_2^2 + (m-2)S_3^2}{\sum N_{\mu} - 3}$$

< 7>

< 7>

유제량(%)	2.5	5.0	7.5
S_o^2	0.001481	0.001429	0.001396
t	0.729	0.537	0.692
$t_{0.025, \Sigma N\mu-3}$	2.262	2.228	2.228

가 , 가
가
3
가 . <
8>

< 8>

유제량(%)	절 편	기 불 기
2.5	2.015	0.0679
5.0	1.988	0.0647
7.5	1.928	0.0564

2)

< 9> . 가 all

< 4> V^2

, < 10> .

< 9>

유제량 (%)	2.5	5.0	7.5	유제량 (%)	2.5	5.0	7.5
N_{μ}	12	13	13	$SSD_{A\mu}$	0.364334	0.376432	0.262550
$\bar{T}_{\mu}$	11.141667	11.407692	11.161538	$SSD_{A\mu}/T_{\mu}$	0.014131	0.014714	0.009682
$\bar{A}_{\mu}$	2.771083	2.725769	2.557231	f_{μ}	10	11	11
$SSD_{T\mu}$	75.849157	86.529232	79.370904	$S_{\mu_1}^2$	0.001413	0.001338	0.000103
$SPD_{T\mu A\mu}$	5.153892	5.594568	4.479997				

< 10>

유제량 (%)	
S_1^2	0.001204
$\bar{b}$	0.0630
S_2^2	0.002766
V^2	2.297
$V_{0.95}^2(2, 32)$	3.30

< 11>

유제량 (%)	결 편	기 울 기
2.5	2.069	0.0630
5.0	2.007	"
7.5	1.854	"

< 8> .

< 11> .

< 6> $(\bar{T}\mu_0, \bar{A}\mu_0)$

< 12> .

< 12>

유제량 (%)	
S_0^1	0.001296
b	0.2092
S_3^2	0.297900
V^2	229.85
$V_{0.95}^2 (m-2, \sum N_{\mu}-m-1)$	4.13

V^2 가 $V_{0.95}^2 (m-2, \sum N_{\mu}-m-1)$,

, .

, 가

, < 11> .

< 11> 2.5% 5.0% 7.5% 가

2.069 2.007 1.854 , 2.5%

13 3.9% .

2. CS/PVA : 50/50

CS/PVA : 70/30

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13>

CS/PVA : 70/30

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< 13>

유제량 (%)	절 편	기 울 기
2.5	2.179	0.0832
5.0	2.111	"
7.5	2.018	"

< 13>

2.5%

5.0%

7.5%

가

2.179

2.111

2.018

,

2.5%

14%

31%

.

3. CS/PVA : 30/70

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< 14>

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< 14>

유제량 (%)	절 편	기 울 기
2.5	2.245	0.0912
5.0	2.191	"
7.5	2.096	"

< 14> 2.5 5.0% 7.5% 가
 2.245 2.191 2.096 2.5%
 12% 29% .

-
1. 15% 가 (가
 log.) 가
 , 가가 .
 2. 가 ,
 .
 3. type 가 , 가 -
 .
 4. , 가 -
 , .