

PVA

1.

PVA 가

. PVA

.(1, 2, 3, 4) PVA

PVA

.

PVA , 가

-

190~200 .

PVA가 . PVA

(Gel)

. ,

가 .

1 PVA

가

PVA가 PVA

. PVA 1, 3

- -

1,2 .

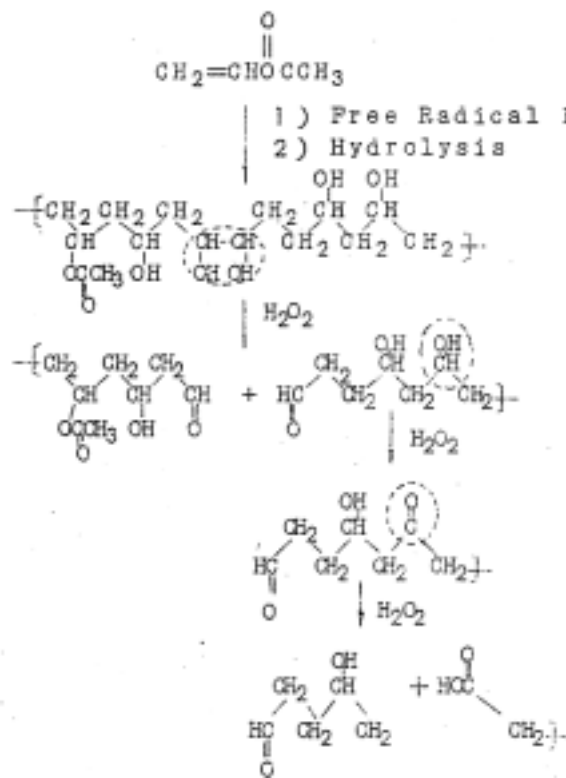
PVA

가

가

가 .

1,3 1,2



< 1> Manufacture of PVA and chain scission using hydrogen peroxide

, , , PH 가 가

PVA

가 PVA .

2.

(1)

Cannon-Fenske Viscometer

25 ° ± 1

.

(2)

PVA

, 55

70 , 50% RH 48

1.4~2.5mil(mil;1/1,000) .

(3)

PVA

Williams and Donermeyer

Atlas Scotch tester

400

10

.

(4)

PVA

10g

/

(hydraulic press)

400

10

.

가

()

(5) PVA

PVA

185

PVA

6%

가

가

.

(6)

ACS

.

(7) PVA

PVA " 0.1gr 2mil 8
100gr PVA PVA
(ring) (0.005~0.05%) PVA

PVA

Brown, Olson Keegan

3M(6 × 1 ")

0.005% PVA 가 .

(frositive test)

0.05% 0.005~0.05%

(8) PVA

PVA 10gr () 250ml

4 , PVA

. PVA .

$$\text{PVA } (\%) = \frac{X \cdot C}{W}$$

C ; PVA (%)

X ;

W ; (± 0.2gr)

(9) ()

10gr

Butterworth 3roll

100% (pick up) 212

, .

AATCC test method 64-1961(for wool scouring)

25 40ml ,

25stroke 가 .

(10) ()

. 10% 가 1.5

10% 3

, 110 .

(11)

4 ; AATCC 97-1968

; AATCC 79-1968

; AATCC 110-1968

3.

(1)

PVA 가

3 PVA가 .

PVA

PVA

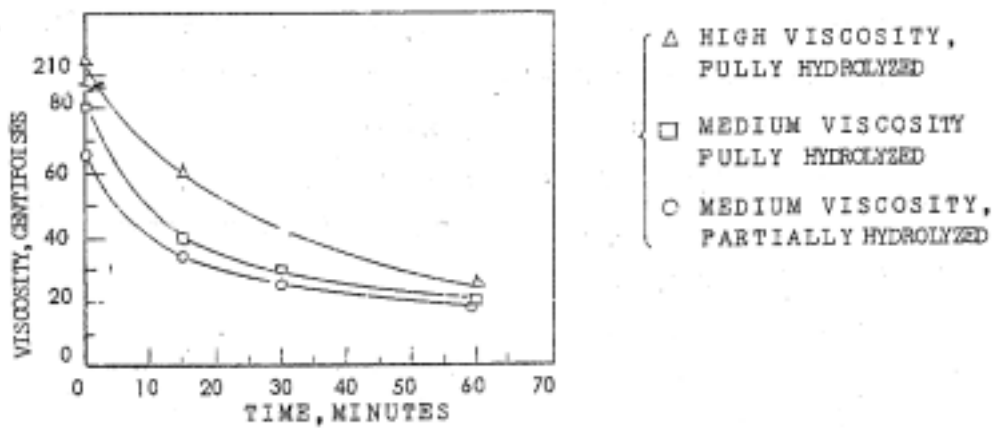
PVA(88% 가

.

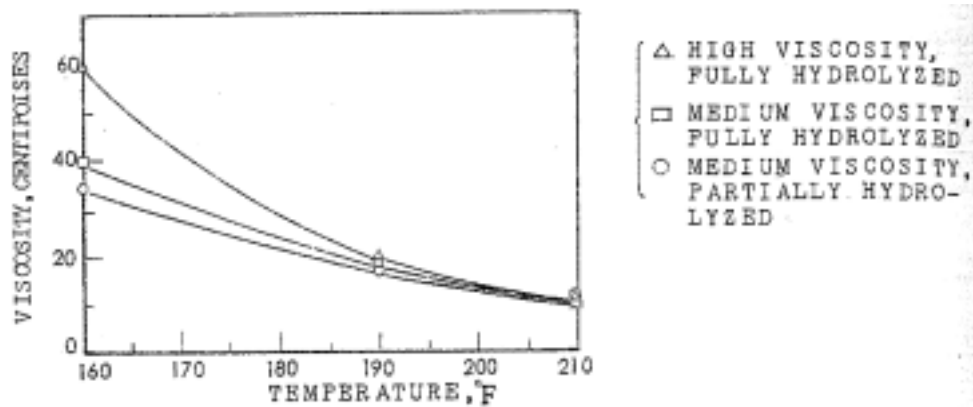
2 3 PVA 6% 0.35% 160

가

가



< 2> Effect of time on viscosity of 6% PVA solutions treated with 0.35% H₂O₂ at 160F.



< 3> Effect of temperature on viscosity of 6% PVA solutions treated with 0.35% H₂O₂ for 15 minutes.

3 6% PVA 0.35% 15

가

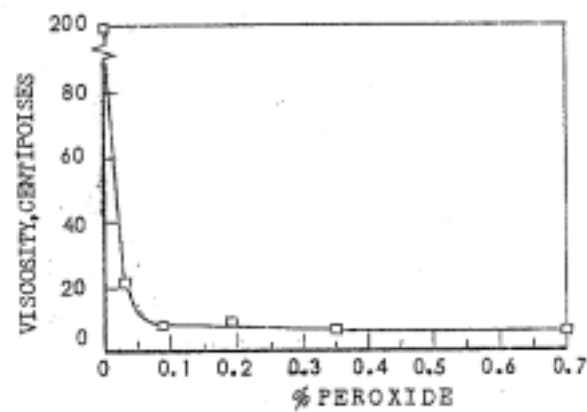
20 Centipoise

160

60

190

15



< 4> Effect of H2O2 concentration on viscosity of 6% PVA solution treated
at 205F for 15 minutes.

4 205 15 가 PVA

0.1%

PVA

200Centipoise

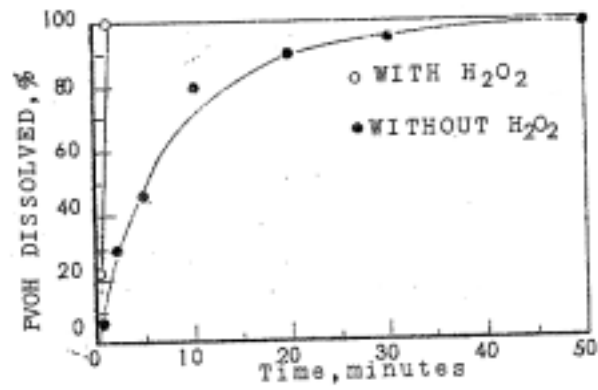
15 Centipoise

PVA

5 210

15

25



< 5> Solubility(at 25C) of PVA. Film cast from solutions treated and not treated with H_2O_2 .

(2) PH
가

(80%)

, (70%, 67%)

PVA

PVA

가

. Williams Donermeyer

PVA

PVA

PVA

PH

< 1> Effect of PH on PVA Removal Using H₂O₂

Formulation	PH	% PVA Removed From * Fabric During Desizing
0.5 % H ₂ O ₂ I. 0.1 % Surfactant 0.5 % NaOH	12.1	70
0.5 % H ₂ O ₂ II. 1.0 % Na ₂ SiO ₃ 0.5 % NaOH 0.1 % Surfactant	11.9	67
0.5 % H ₂ O ₂ III. 0.1 % Surfactant	7.0	80

*Average of duplicate values which varied by no more than 0.5%

(3)

PVA 7% , 4.0oz/yd² 50/50
/ , 가 가
0.4~0.5%
0.1%
0.2% (Chelating agent) 가 . PH
8.5, 66% . J- 15
" 190 145 (Tensitrol washer)

$$\begin{array}{c}
 \text{---} \left(\begin{array}{c} \text{CH}_2 \text{---} \text{CH}_2 \text{---} \text{CH}_2 \text{---} \text{CH}_2 \text{---} \text{CH}_2 \text{---} \text{CH}_2 \text{---} \text{CH}_2 \text{---} \text{CH}_2 \end{array} \right)_n \text{---} \\
 \quad \quad \quad \text{OH} \quad \quad \text{OH} \quad \quad \text{OH} \quad \quad \text{OH} \quad \quad \text{OH} \quad \quad \text{OH} \quad \quad \text{OH} \\
 \downarrow \text{H}_2\text{O}_2 \\
 \text{---} \left(\begin{array}{c} \text{CH}_2 \text{---} \text{CH}_2 \text{---} \text{CH}_2 \text{---} \text{CH}_2 \text{---} \text{CH}_2 \text{---} \text{CH}_2 \text{---} \text{CH}_2 \end{array} \right)_n \text{---} \\
 \quad \quad \quad \text{OH} \quad \quad \text{OH} \quad \quad \text{OH} \quad \quad \text{OH} \quad \quad \text{OH} \quad \quad \text{OH} \\
 \downarrow \text{NaOH} \\
 \text{---} \left(\begin{array}{c} \text{CH}_2 \text{---} \text{CH} \text{---} \text{CH} \text{---} \text{CH} \text{---} \text{CH} \text{---} \text{CH} \text{---} \text{CH} \text{---} \text{CH}_2 \end{array} \right)_n \text{---} \\
 \quad \quad \quad \text{OH} \quad \quad \text{OH} \quad \quad \text{OH} \quad \quad \text{OH} \quad \quad \text{OH} \quad \quad \text{OH}
 \end{array}$$

J- 가 J- PH
 , . J-
 PH 가

Sample No.	Fabric Location	Wet Fabric PH	%H ₂ O ₂ cwf	% H ₂ O ₂ Consumed
1	Pre J-Box	7.4	0.29	38
	Post J-Box	6.4	0.18	
2	Pre J-Box	7.2	0.35	45
	Post J-Box	6.3	0.18	

(Control)

/ 0.1% , 가

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< 3> Mill Trial Data. Comparison on Fabric Processed in Presence
and Absence of H₂O₂ During Desizing

Sample Location	Desize Process	%w PVA On Fabric	Whiteness (Blue Included)	Absorbency, Sec	% w CCl ₄ Extrac- tables
1st Desize Washer	Control	1.0	58.9	100	0.56
	H ₂ O ₂	1.1	71.8	50	0.60
2nd Desize Washer	Control	0.050	60.5	66	-
	H ₂ O ₂	0.025	68.9	43	-
Bleach	Control	5×10 ⁻³	113.1	Instant	0.23
	H ₂ O ₂	2.5×10 ⁻⁴	113.8	Instant	0.16
Greige	—	7.2	-	-	0.54

1

(0.1%)

(1.0%) ,

PVA .

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PVA .

4

가

.

2

PVA

.

.

가 .

가

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가

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PVA

.

PVA가

.

PVA가

PVA $5 \times 10^{-3}\%$

가

.

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PVA

.

PVA

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PVA

.

1

40gpm

20gpm

PVA가

PVA

가

가

가

가

0.03~0.6C

< 4> Mill Trial Data, Influence of H₂O₂ Desize and Wash Water Flow Rate upon
PVA Removal from Fabric at First Desize Washer

Desizing Process	Water Flow Rate, gpm	% PVA on Fabric	Fabric Absorbency, Sec
Control	40 - 42	1.0	100
Control	20 - 21	1.7	174
H ₂ O ₂	40 - 42	0.1	50
H ₂ O ₂	20 - 21	0.5	78

(4)

Wash&Wear

PVA

가

PVA

(

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PVA

가

PVA

12~15%

PVA

PVA

가

PVA

PVA

가

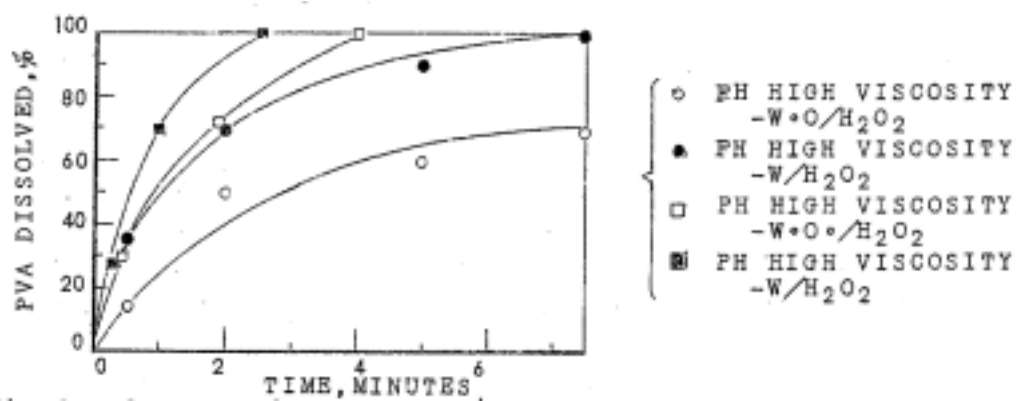
PVA

-PVA

PVA

PVA

PVA



< 7> solubility(at 80C) of heat-set PVA film cast from solutions treated and not treated with H₂O₂.

7

PVA

PVA

PVA

7

PVA

PVA

(

400

10

)

PVA

PVA

< 5> Effect of H2O2 Desizing on Removal of PVA from Heat-Set Fabrics

Fabric	Greige	Percent PVA on Fabric		
		After H ₂ O ₂ Desize	After Water- Surfactant Desize	
50/50 Polyester/ Cotton(3.80Z/yd ²)	7.2	0.14	0.62	0.60 avg
		0.18	0.61	
50/50 Polyester/ Cotton(7.90Z/yd ²)	4.5	0.34	1.4	1.5 avg
		0.17	1.3	
		0.23	1.7	

가 3.8oz/yd² 7.9oz/yd²

PVA 7.2% 4.5%

50/50

/

PVA

(5)

PVA
(0.2~0.4%) 가 PH(6~8) 15 (190 °
~212) PVA
,

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PVA

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.

(inhibitor) 가

가

가

가 PVA

.

3

,

PVA

.

,

,

.()

가

,

3

7, 18, 19 26 Centipoise

.

PVA

.

가

PVA

< 6> Influence of H₂O₂ Decomposition Inhibitors on Properties of PVA Solutions

Treated at 205F for 15 Minutes

Equipment Cleanliness	PVA Solution Properties						
	H ₂ O ₂	Before Treatment			After Treatment		
	Inhibitor Level(ppm)	Viscosity (cps)	H ₂ O ₂ (%W)	PH	Viscosity (cps)	H ₂ O ₂ (%W)	PH
Passivated	5	207	0.52	6.1	127	0.51	5.9
Not Passivated	5	216	0.50	6.7	18	0.34	5.4
Passivated	800	207	0.51	6.1	170	0.50	5.9
Not Passivated	800	216	0.51	6.7	19	0.40	5.4
Passivated	3,700	207	0.51	6.1	208	0.51	5.9
Not Passivated	3,700	216	0.51	6.7	26	0.43	5.4

(electron transfer reaction)

가 PVA

8 2 PVA

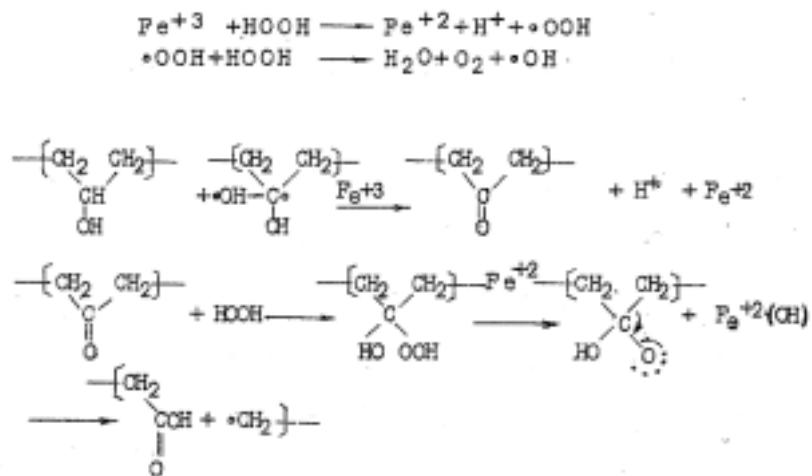
PVA Co⁺⁺Fe⁺⁺⁺ . Fe⁺⁺⁺ PVA
$$\text{Fe}^{+++}$$

Fe⁺⁺⁺

PH

3

PH



< 8> Possible mechanism for catalytic degradation of PVA using H_2O_2 .

< 7> Effect of Catalysts on Properties of PVA Solutions Treated with 1% H_2O_2 at 150F for 10 Minutes.

Catalyst in Sample	Visco- sity (cps)	H_2O_2 (%w)	PH	Color
0.1% $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$	6	0.62	2.9	red brown
0.07% $\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}^{\text{a}}$	82	0.97	5.5	very faint pink
None	188	0.98	5.5	colorless
Control (no H_2O_2)	204	-	6.1	colorless

a Equivalent to 0.1% $\text{Fe}(\text{NO}_2)_3 \cdot 9\text{H}_2\text{O}$ on a molar basis.

Fe^{+++}

Co^{++}

Co^{++}

PH5.5

Fe⁺⁺⁺

. Fe⁺⁺⁺

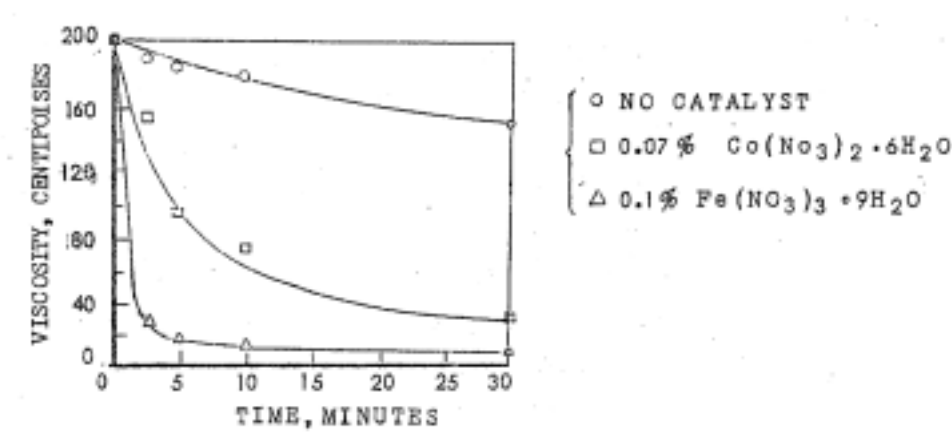
Co⁺⁺

9

PVA

. 150 Co⁺⁺

PVA



< 9> Effect of CO⁺² and Fe⁺³ catalysts on viscosities of 6% PVA solutions treated with 0.5% H₂O₂ at 150F

4.

PVA

PVA가

PVA ,

가 .