

가 (1)

- (2) -

1.4

’ , ’

가가 ,

가 .

(1)

1) (oxidation bleaching)

2) (reduction bleaching)

(2) (whitening)

1) (blueing)

2) (fluorescent whitening)

(3)

1) (solar bleaching · sun bleaching)

2)

. 가

가 .

(recovery of color) ,

가

가 (yellowish) .

(absorption)

(subtractive color mixture)

, 가 (additive color mixture) .

(0.1% owf) .

가 ~

(Ultraviolet) (O₃) 가 ,

1.4.1

< 1.6> ,

< 1.7> .

< 1.7>

,

, 가 .

가 .

()

< 1.8>

가

가

< 1.6>

								PE			
		(H ₂ O ₂)	H ₂ O ₂ → H ₂ O + 1/2 O ₂					○	-	-	-
		(CH ₃ COOOH)	CH ₃ COOOH $\xrightarrow{\text{H}_2\text{O}}$ CH ₃ COO ⁻ + H ₃ O ₂ ⁺ H ₃ O ₂ ⁺ → H ₂ O + 1/2 O ₂ + H ⁺	○	-	-	-	-	○	-	-
		(NaClO ₂)	5NaClO ₂ + 4HCl → 4ClO ₂ + 5NaCl + 2H ₂ O 2ClO ₂ + H ₂ O → HClO ₂ + HClO ₃ HClO ₂ → HCl + O ₂		-	-					-
		(NaClO) (Ca(Ocl) ₂)	NaClO + HCl → HClO + NaCl HClO → HCl + 1/2 O ₂		-	-		-	-	-	-
	(Na ₂ S ₂ O ₄)		Na ₂ S ₂ O ₄ + H ₂ O → NaHSO ₂ + NaHSO ₃								
	(NaHSO ₃)		NaHSO ₂ + 2H ₂ O → NaHSO ₄ + 2H ₂	-			-	-	-	-	-
	2 (NH ₂) ₂ CSO ₂)		NaHSO ₃ + H ₂ O → NaHSO ₄ + H ₂								

: : , ○ : 가 , - :

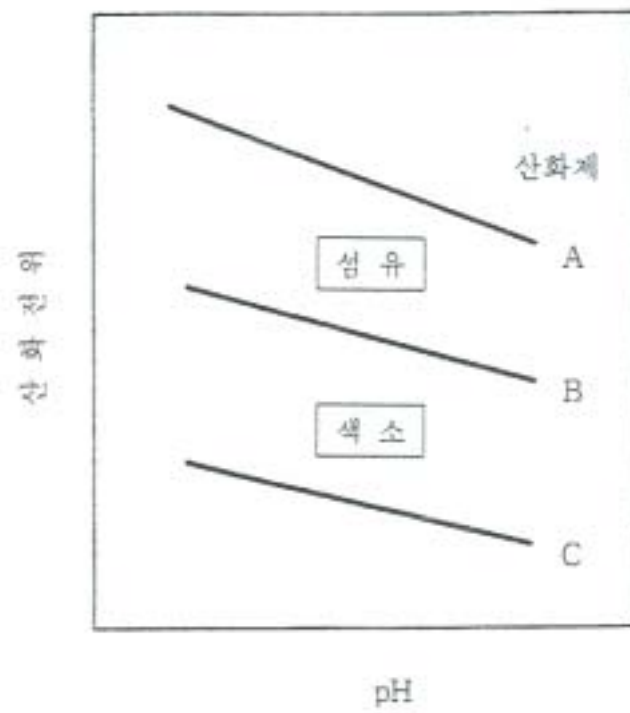
< 1.7>

	· , · · , 가 · , 가	· , , · , -
	· , · , 가 ·	· , · 가 · , - · - 가
	· , · , ·	· ,
	· (pH 6) , · , 가 ·	· , , · , -

< 1.8>

		rH
	1,508	52
	1,450	50
	1,392	48
	1,363	47
	1,073	37
	986	34
	899	31
	812	28

(oxidation potential)
 < 1.8> , (colorant)
 (radical)가 가 가
 A



< 1.8> ,
 가 C 가
 B
 B

가 . 가

800~1,000mV , .

A .

(synthetic fiber) (cotton)

가 가

. (silk) (wool)

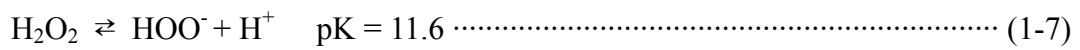
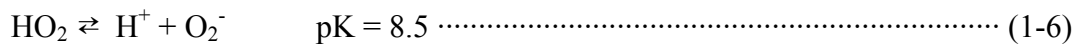
,

가 .

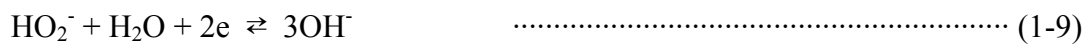
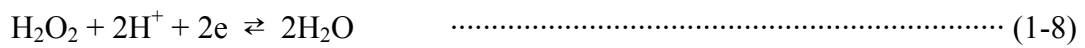
가 .

(1) (hydrogen peroxide)

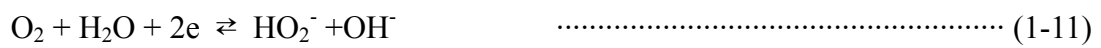
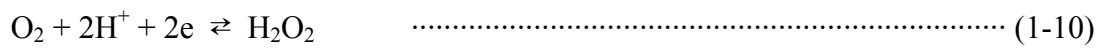
(disaggregation) .



,



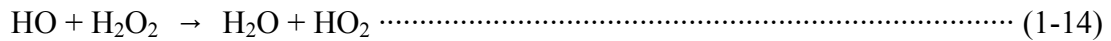
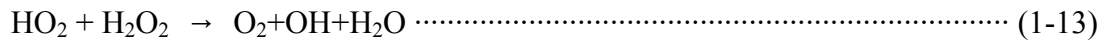
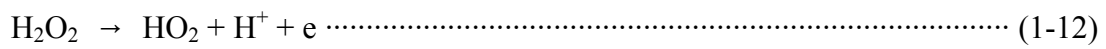
,



. (1-8) (1-9) , (1-10) (1-11)

(oxidation-reduction potential) < 1.9> .

, () . , 가 . ,

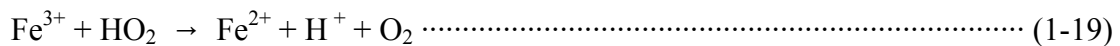
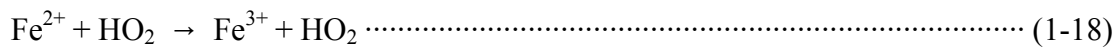
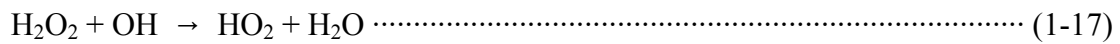
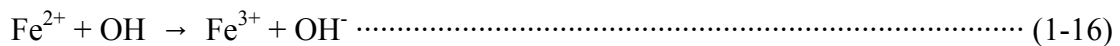
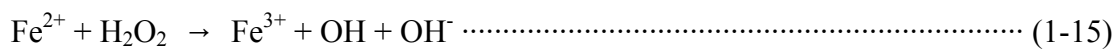


(autolysis)

가 rate-determining step)

(1-12) 가 (catalyst)가

,

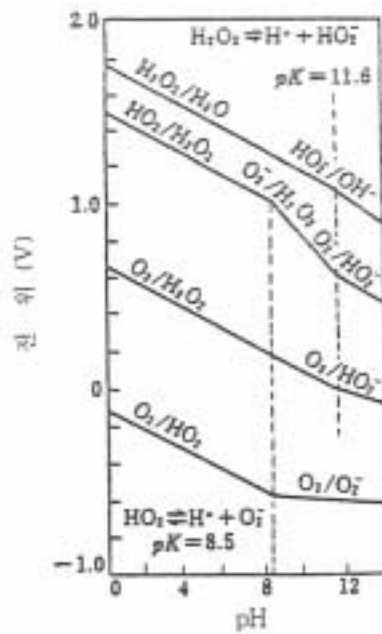


(radical)

가

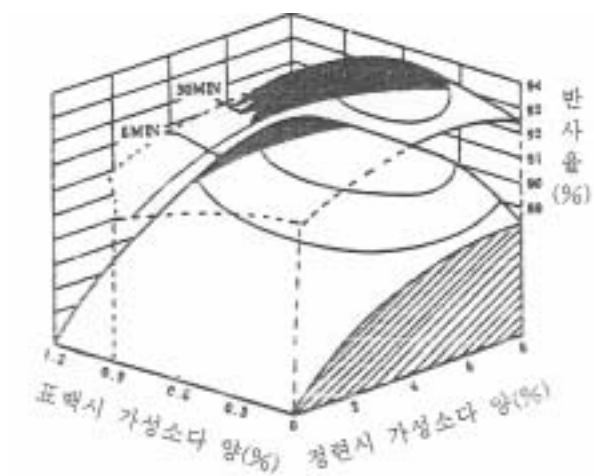
(stabilizer)

(sodium silicate) 가 가
 (colloid)
 Ca Mg
 가 (clelating agent)
 (gluconic acid) 가

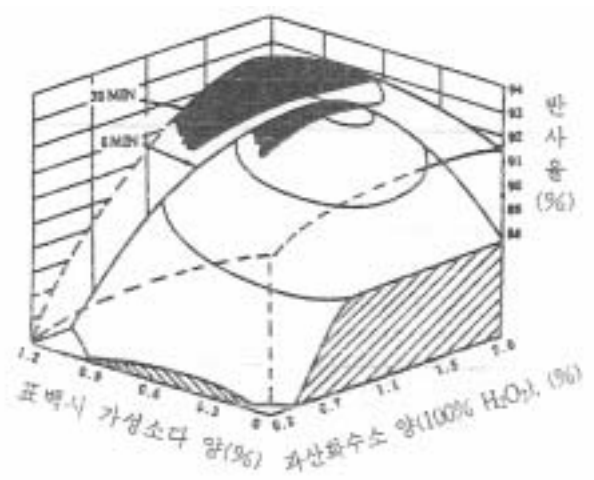


< 1.9>

/ / 3
 . / 2 . 1
 . 3 < 1.9> ,
 가 가
 (fluidity) < 1.10> < 1.11> ,
 (whiteness) 가 ,



< 1.10> , 가
(> 6)



< 1.11> 가
(> 6)

pH10~12 .

,

가 가 , 가

. pH , pH
 (buffer) .
 pH .
 2 1.2 / .
 , 3 .
 1 KPP -
 /
 ,
 .

< 1.9> / 1

		1	2	3	4	5
	(50%)	3.0	3.0	3.0	3.0	3.0
		2.0	2.0	2.0	2.0	2.0
	가	0.8	0.8	0.9	0.9	0.9
		0.1	0.1	0.1	0.1	0.1
		-	0.25	0.25	0.25	0.25
		-	-	-	-	0.3
		-	-	-	0.3	-
	(%)	100	100	1001	100	100
	()	100	100	100	100	100
	()	90	90	90	90	90
	(%)	84.2	84.3	83.5	84.9	85.3
	()	120	52.3	71.4	15.9	2.7

: 1) : 2.6yd/lb , : /PVA

2) → (J-box, 100 , 90) →

< 1.9>

가 ()

(gray fabric)

가

(free-radical)

< 1.10>

		5	22	
	가	90ml/l 30g/l 30g/l 5 g/l	60ml/l 35g/l 40g/l 5 g/l	
	2			
	5			*
		96.6	97.5	99
		28.2	3.0	4.07
	(%)	93	95.5	95
	, (%)	0.19	< 0.2	0.32
	()	< 1		> 180
		3		9

: * :

3

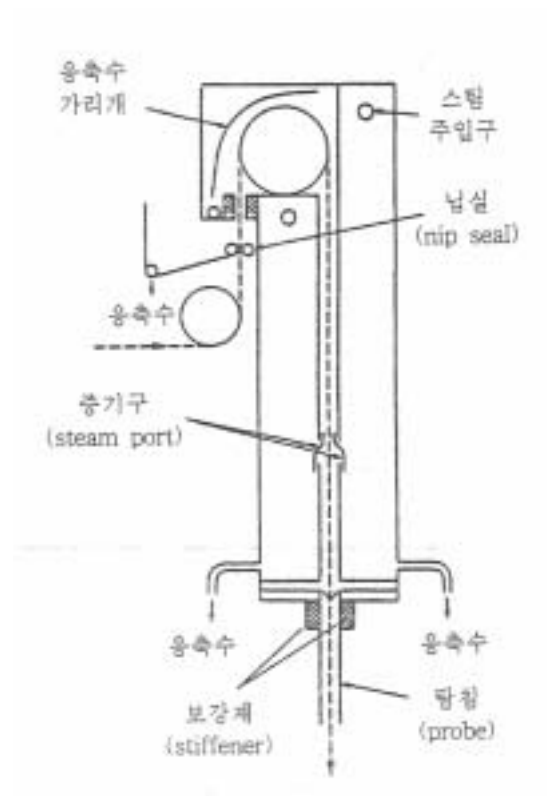
< 1.10>

(steam purge)

2 1/4

2.5 가

2 , 25.3 GI/t ,
3.4~6.9GJ/t



< 1.12> (steam purge) ()

< 1.12>

, (steam port)

(wet pick up) 35~40% 85~100%

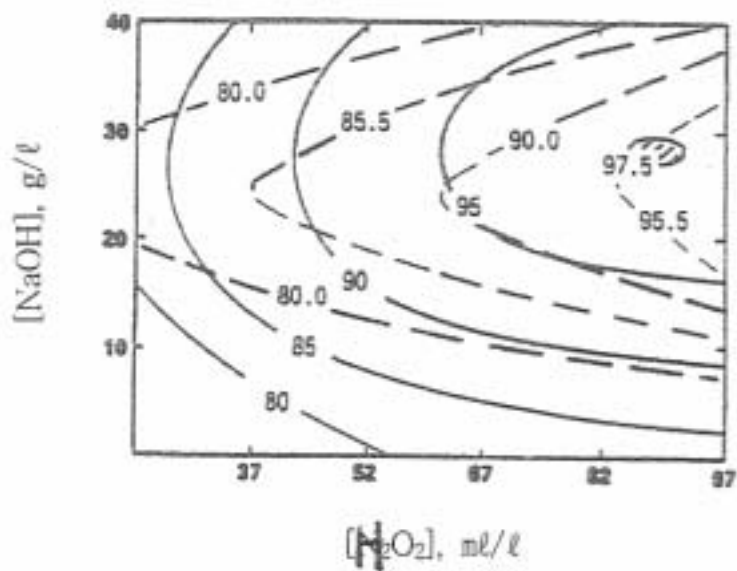
가 가 가 ,
 가 . < 1.13>

가 가 , 가
 가 . < 1.13>
 가 가 가

가 가 가 , 가

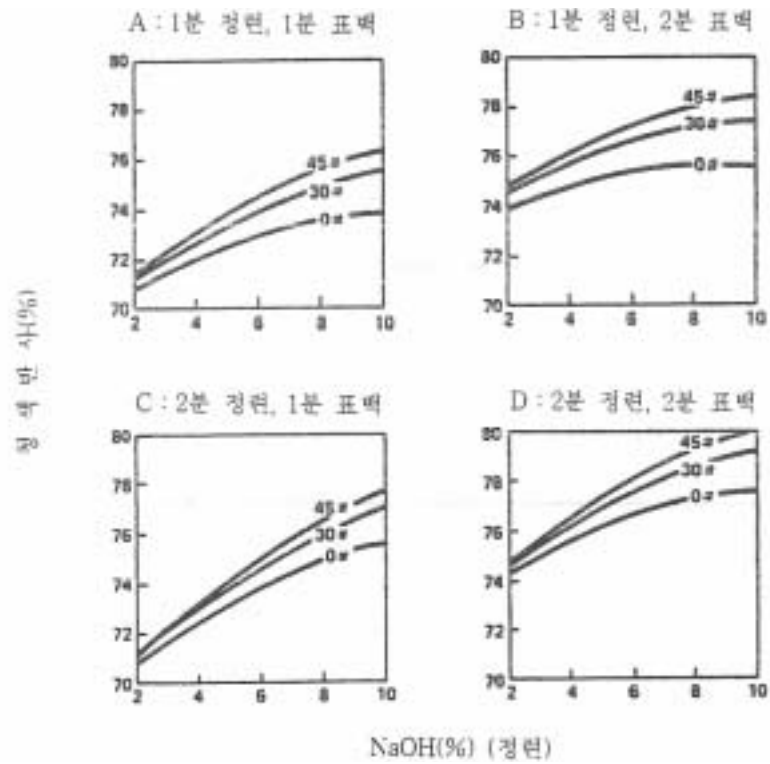
(wetting agent) (emulsifier)

< 1.10> 가



[: , : (5) 29.5g/l, 2 15g/l]

< 1.13> -



(1.2% H_2O_2 , 1.5% Na_2SiO_3 , 0.7% NaOH ,) (psi)

< 1.14>

가 가 . <

1.14>

가 가 ,

. < 1.15>

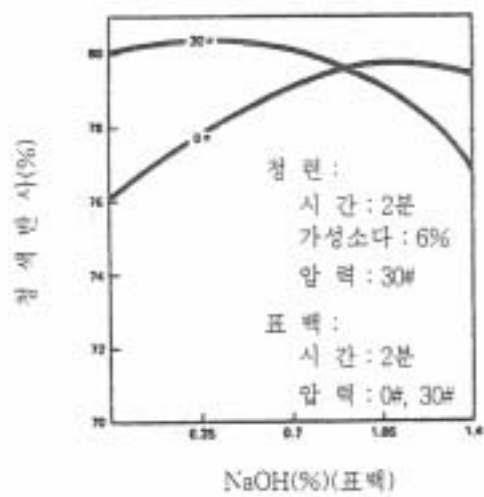
, 가

가 가 . < 1.16>

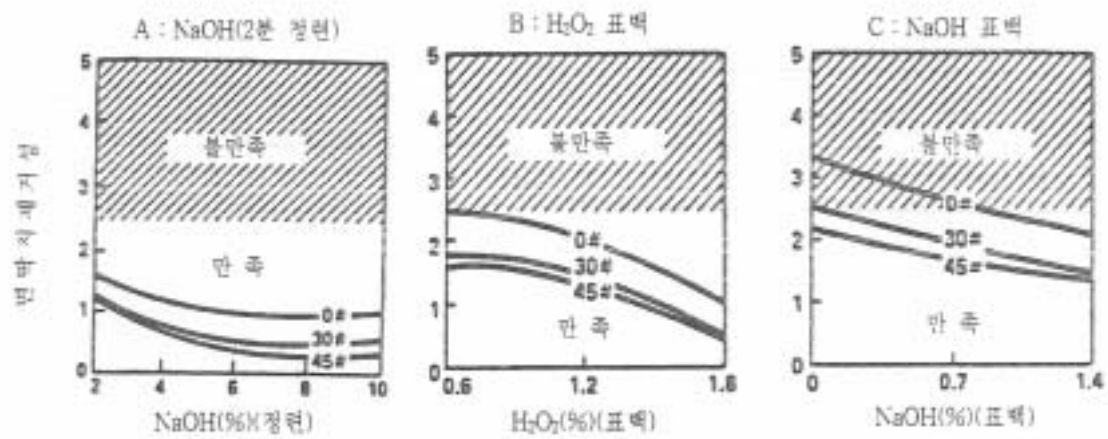
가 / 가 .

< 1.17>

(atmospheric pressure)



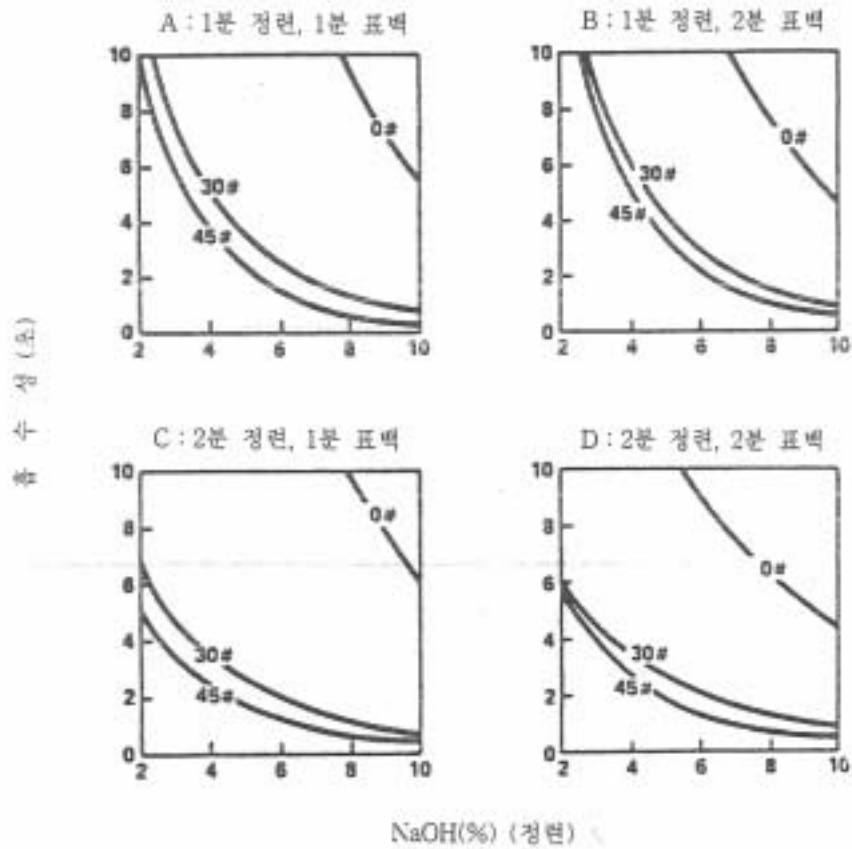
< 1.15> 가



A: (1.8% H₂O₂, 2)

B, C: (6% NaOH, 2) , (1.2% H₂O₂ 2)

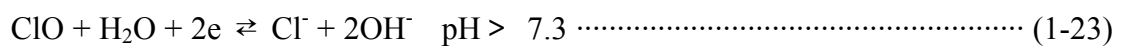
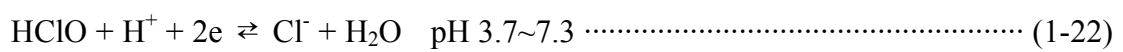
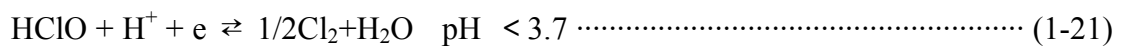
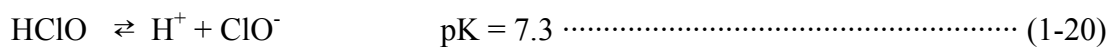
< 1.16> (A), (B, C)



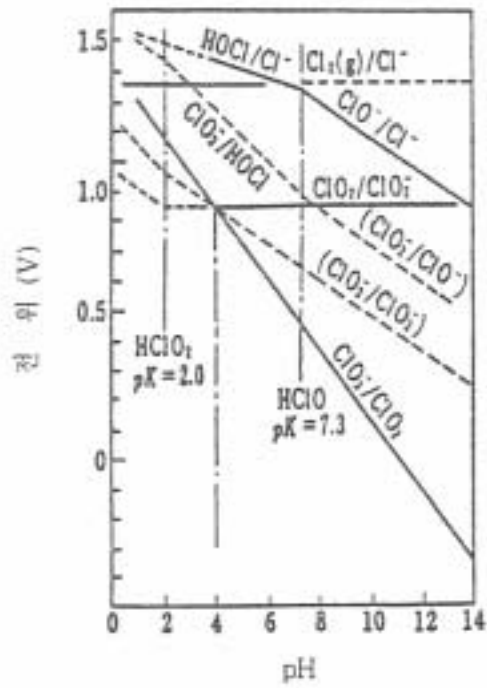
< 1.17> (water absorbency)
(, (< 1.14>))

(2) (hypochlorite)

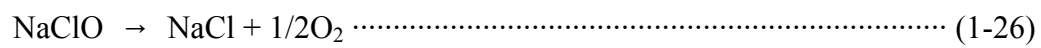
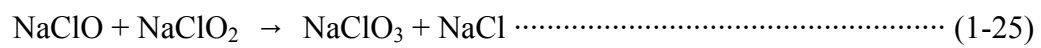
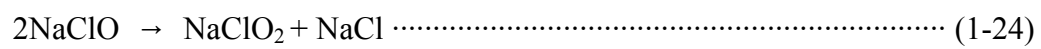
(hypochlorous acid)



< 1.18> ,



< 1.18> ,



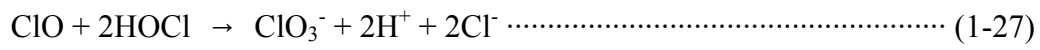
(1-24)가 , (1-25) 가 . (1-26)

가 Co, Ni, Cu .

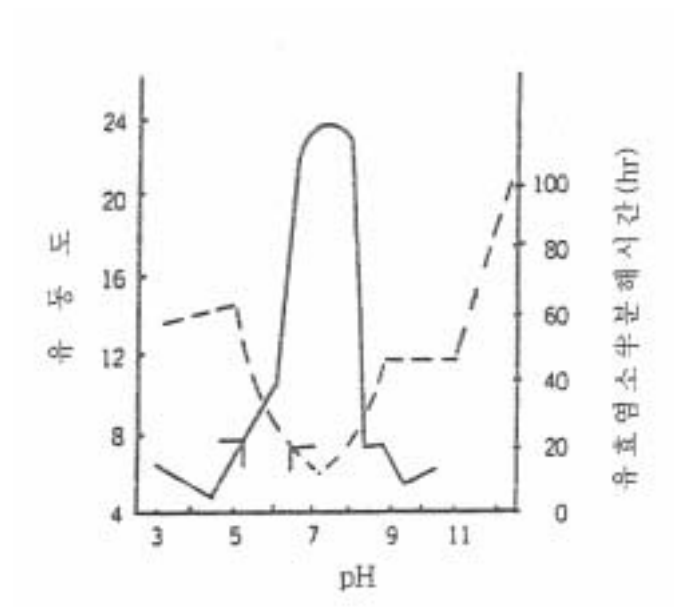
< 1.19> 가 ,

pH

ClO⁻가



가 ,



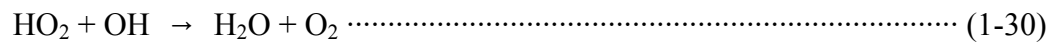
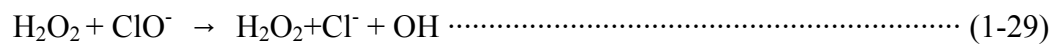
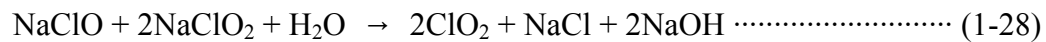
< 1.19> pH

가 , 가

pH 9.5~11 가

, 10 2~3 가

가



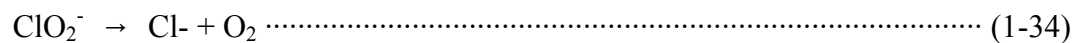
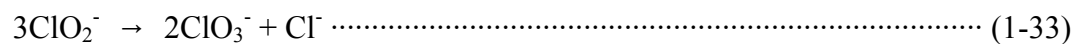
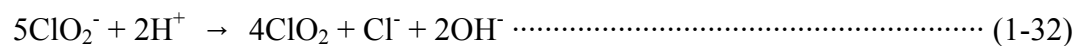
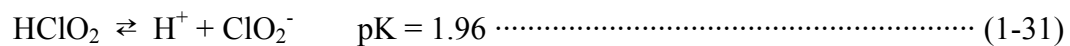
가 . 가

,

가

(3) (sodium chlorite)

(chlorous acid) (disassociation) ,



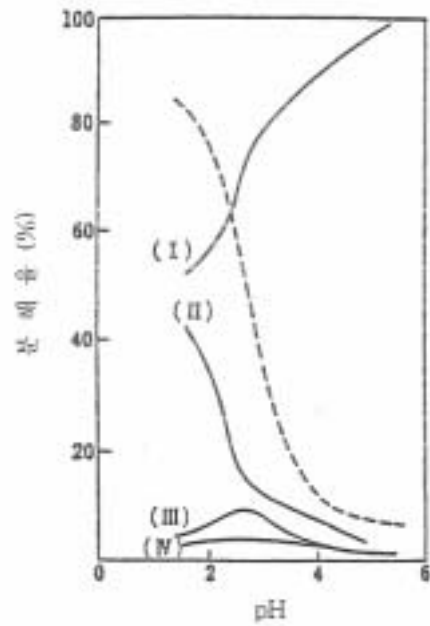
가 < 1.20>

, pH 4 (1-32) 가 가

. (1-32) (1-33) . < 1.20>

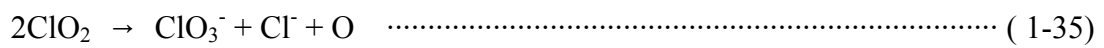
, 가 pH 3

(1-34)



: 60 , 60
:
< 1.20> pH

HClO_2 ClO_2^- 가
, ClO_2 가 가 , < 1.20>
 ClO_2



,
가 ,
<
1.18> .

(activator)

가

가

가

< 1.11>

< 1.11>

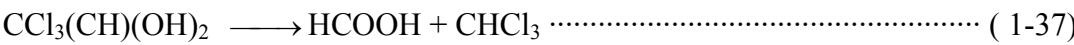
		pH 3-5 가	가
		가	
		가	
		가	
		가	

가 (amine) ,

(pyrolysis)

2

가



/ 2
.

,
,
.

.

(percentage of loss in boil-off) 5~6%
,

.

< 1. 12>

Pad-steam	1~2hr	, , (chloral), 2
	4hr	, , , ,
	40	, 2 ()
Pad-roll (, 70)	가 .	
	가 .	, (water imbibition) , 2
Cold pad-batch (,)		,

-
,

. < 1.11>

가 .

- (formic acid .)

, Chesner < 1.12> . ,

,

.

- , ,

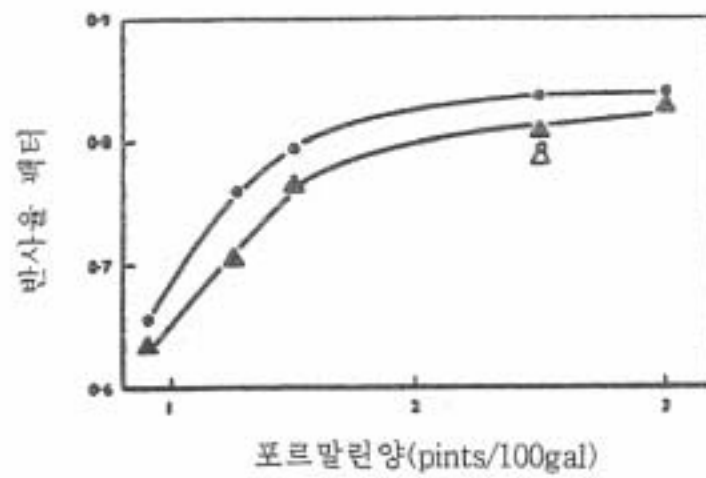
.

(purging)

10 가 가 ()

pH 10 , pH 4~5

가 . < 1.21> .



< 1.21> ()

(KMnO₄) (chlorine dioxide)가 가

가 , (Mn(OH)₂) .

(dispersant) 가 .

(M₂S₂O₈ MHSO₅) (caro's acid · H₂SO₅) 2

， pH .

· ，

20~30 g/l (80%)

1 g/l Cellofas B(CMC)

0~1 g/l

2 g/l

4 g/l 2

1~3 g/l

/ / /

·

，

(5g/l) (1g/l)

·

1.4.2

，

· ，

가

·

， 가

가

가

，

·

， 가

가 , 가

가 ~

(fastness)

3

(excitation) 가

가 ,

(sensitization)

(stilbene) 가

, 가

가

(exhaust)

가

가