

(peracetic acid)

(I)

1.

가 .
 ,

가 24 .

. 60 30 60
 .
 ,
 .

가 , 60
 .

, Woods ,
 24 29

(sodium dodecyl benzene sulfonate) 49 15

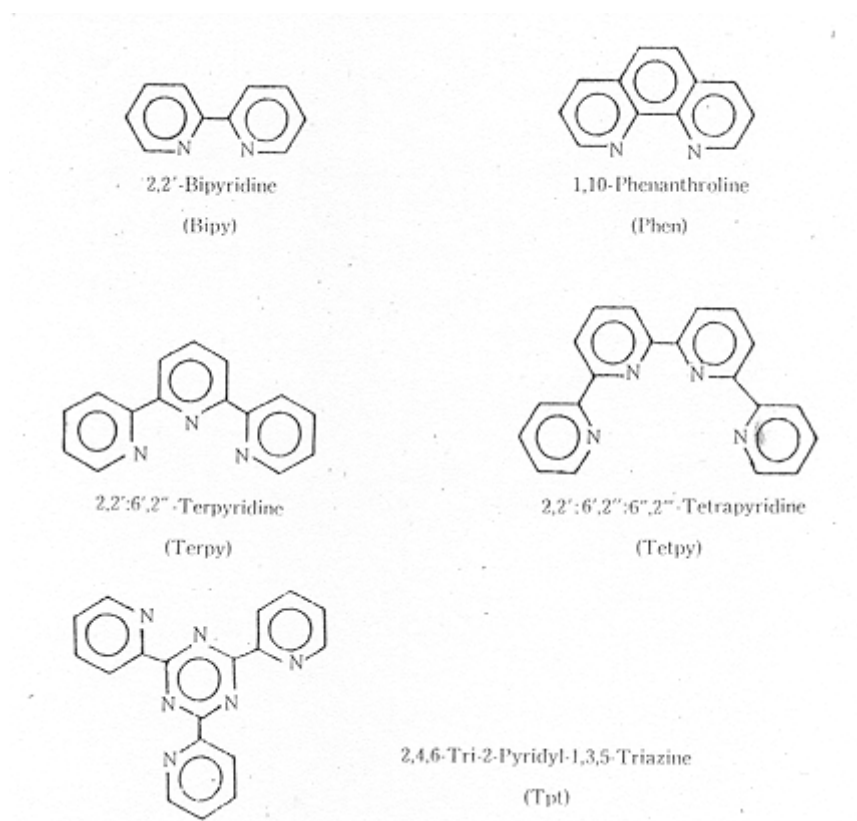
,
 , 2,2'- [2,2'-Bipyridine; (Bipy);(C₅H₄N₂)] 가
 가

.
 Woods ,

가 30

. (Bipy),

2,2'-
(Bipy)
, 5 (5-membered)
-N=N-C=N- α, α' -
(diimine) 가
2,2'-, 1,10- (phenanthroline), 2,2':6',2''- (terpyridine),
2,2':6',2'':6'',2'''- (tetrpyridine) 2,4,6- -2- -1,3,5-
(triazine) < 1> .



< 1> α, α' -

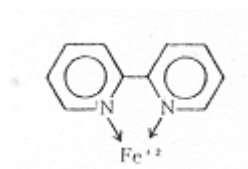
1 (ferrous ion)

,

가 < 2> 1

5

.



< 2> 2,2'-

(Bipy)

(mono),

(bis)

(tris)

,

(Bipy)가

가

(Bipy) 가 가

가

.

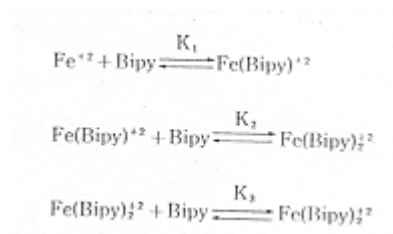
1

< 3> ,

1

가 가

.



< 3> 2,2'-

1

,

1

,

가

(alkyl chain)

가

.

()

.

.

2

.

,

(sodium laurylsulfate) 1

< 4>

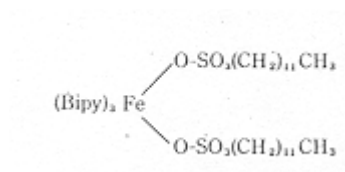
.

Shilt

(Bipy)

,

.



< 4>

-2,2'-

1

2.

100%

(beck)

.

,

pH

가 pH .

86 × 74 , 3.2oz/yd²(108.50g/m²) .

< 1>

[sodium

tetraborate ; (Borax)]

(Bipy)

SLS

< 1>

성 분	농 도 (m mols/ l)
소듐 테트라보레이트(borax)	25.5
과산화수소	36.7
무수초산	34.4
2,2'-바이피리딘(bipy)	0.640
계면활성제(SLS)	2.60

50% (w/w) 0.9ml 175g/l (Borax)

200ml , 1.0%(m/v) SLS

50ml 500ml , 2,000g/l

(Bipy) 가 .

(Borax) ,

400ml .

500ml 3 , 가

1.3ml 가 5

가 , .

(diacetyl peroxide) .

가 .

$2.8 \pm 0.1g$

60 .

Greenspan Mackellar가 /

가 , 가

5 , .

HunterLab D25M-9

가 . 32.66 .

3.

가. pH

pH가 pH 4.75

10 30 가 , pH

< 5>

. pH 4.75 62.56 ,

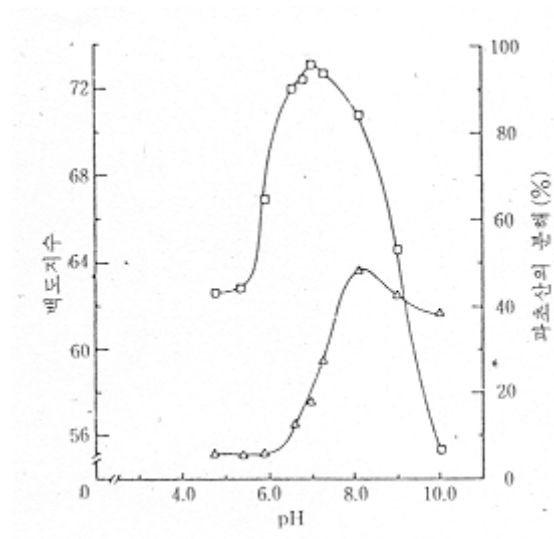
(Bipy) 가 30

(53.76) . pH pH가

5.40 가 가 가 가

pH 7 73.08 ,

pH 10 55.30



< 5> pH가

pH가

. pH가 6

, 가 . pH가 가

가 , 가 .

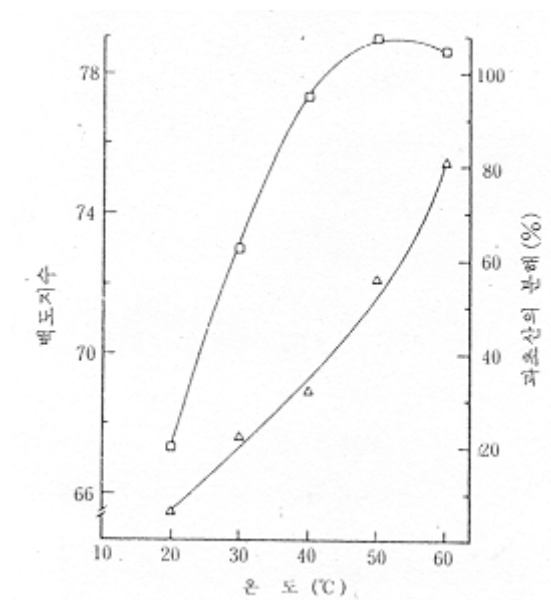
pH 7 pH 가 가

pH가 7 7.2

가 20 60

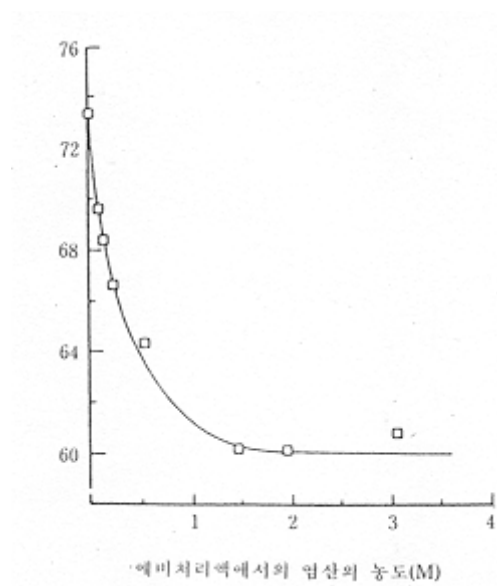
가 , 가 < 6> . 20 66.7

가 50 79 가 .
 20 , 30 가
 53.76 ,
 .
 , 가
 가 .
 20 5.7% 60 81% 가 . 가
 50 . 30
 , 가 73.04



< 6> 가

.
 ,
 . (Bipy)가
 ,
 가
 가 가 60
 , pH가 pH가
 30 60 . < 7>
 가 2.0mol 가 가 가
 . 가
 가
 (Bipy)



< 7> 가

(neutron activation) , 2.0mol ,

가 < 2>

.

4

가

< 2> a .

가 $68.29 \pm 10\%$ ppm

, 7.38ppm , 4

. 2.0M ,

$14.128 \pm 10\%$ ppm

. , 가

가

. < 2>

가 . , $25.872 \pm 10\%$ ppm

(Bipy)

1 가

.

.

4

(Bipy) 2.0M

24 pH 7 60

.

< 2> , 2.0M

원 소	농 도 (ppm)		
	정련된 면	염산처리후	표백후
TITANIUM ^a	2.11±5%	< 0.5	< 0.5
IODINE	0.140±7%	< 0.03	< 0.03
MANGANESE ^a	* 1.632±0.5%	0.516±2%	0.817±2%
MAGNESIUM	7.24±15%	< 2.0	< 2.0
COPPER ^a	2.29±8%	< 1.0	< 1.0
VANADIUM ^a	0.070±10%	0.011±5%	0.037±5%
CHLORINE	24.16±5%	10.75±10%	15.72±10%
ALUMINUM	33.91±1%	15.94±10%	21.68±10%
MERCURY	< 0.010	0.061±12%	0.065±12%
SAMARIUM	< 0.005	0.0002±10%	0.010±5%
URANIUM	< 0.001	< 0.001	< 0.001
LANTHANUM	< 0.4	0.003±10%	0.012±5%
CADMIUM	< 0.8	< 0.15	< 0.15
GOLD	< 0.0001	< 0.00001	< 0.00001
ARSENIC	< 0.2	< 0.02	< 0.02
ANTIMONY	< 0.05	0.001±10%	0.003±10%
BROMINE	1.081±1%	0.044±3%	0.028±3%
SODIUM	50.44±3%	0.975±10%	130.170±1%
POTASSIUM	<500.0	2.674±20%	< 1.5
CERIUM	< 0.2	0.005±15%	0.011±10%
CALCIUM	<100.00	< 1.0	10.883±20%
SELENIUM	< 0.1	< 0.015	< 0.015
THORIUM	< 0.004	0.001±10%	0.002±10%
CHROMIUM ^a	0.095±7%	< 0.040±15%	0.045±15%
EUROPIUM	< 0.001	< 0.005	< 0.005
YTTERBIUM	< 0.03	< 0.002	< 0.002
BARIUM	< 5.0	< 0.5	< 0.5
CESIUM	0.0076±10%	< 0.001	0.004±10%
SILVER	< 0.005	< 0.02	< 0.02
NICKEL ^a	< 5.0	< 0.25	< 0.25
SCANDIUM ^a	0.0038±2%	< 0.001	0.003±7%
RUDIBIUM	< 20.0	< 0.01	0.031±20%
IRON ^a	68.29±10%	14.128±10%	25.872±10%
ZINC ^a	7.38	0.259±20%	1.918±15%
COBALT ^a	0.017	0.007±8%	0.010±6%
MOLYBDENUM	< 1.0	< 0.5	0.5

^a Fourth-period transition metal.

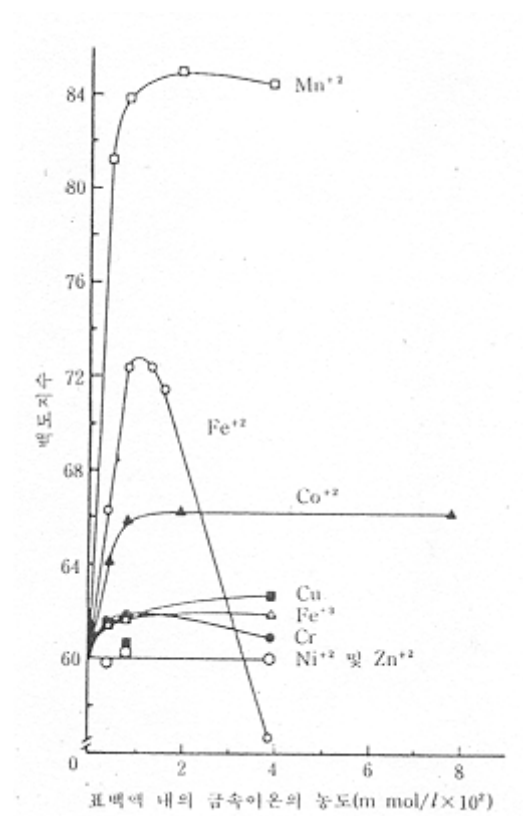
, , 1 , 2 , , ,
가 ,

가 < 8> . , 1 ,
 가
 . , , 2

$1.92 \times 10^{-2} \text{mmol/l}$ 가 66.10

,
 (0.017ppm)
 가
 (Bipy)

가



< 8> 가

가

가 , 가 $1.00 \times 10^{-2} \text{mmol/l}$ 가 72.20 가

, 가 가

. , (Bipy)

1 가 . 가

44.8 60.3ppm ,

(68.29 $\pm$ 10% ppm) ,

72.20 73.26 .

(Bipy) .

2

2가

.

가

가 가 가 , $1.92 \times 10^{-2} \text{mmol/l}$ 가

84.58 , .

가 ,

. $7.7 \times 10^{-3} \text{mmol/l}$

20.7 , 2.7 3.8

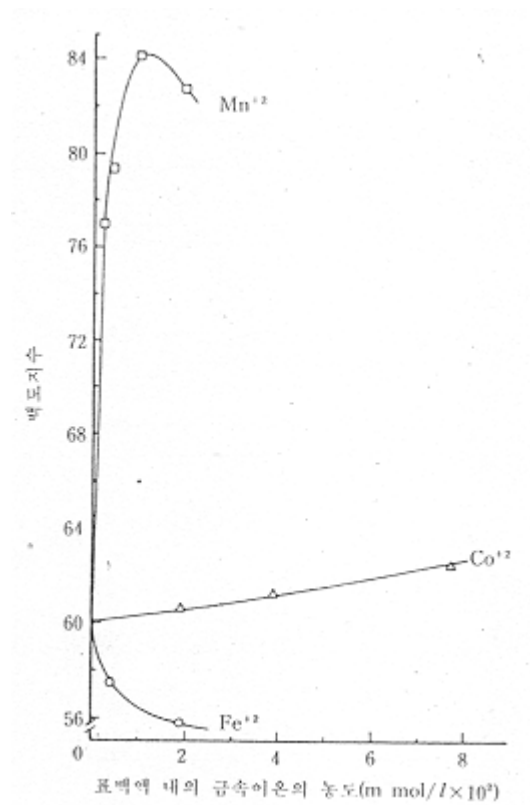
.

, 524 544nm

.

, 가

.
 , 1
 가
 , 가
 (Bipy) . 가 < 9> ,
 (Bipy)
 .
 ,
 .
 , 1
 가 가 ,
 가
 . 가
 가 .
 (Bipy) .
 1 (Bipy)
 가 2.0M
 , 0 7.70×10^{-2} mmole/l 1 200m1 24 60
 1 . 0.640mmole/l
 (Bipy) 400m1 30 120 ,
 . 가 <
 3> . 1 가 가 가
 , CIE Y , 520nm Hunter Lab a
 가 .



< 9> $\text{Co}^{+2}, \text{Fe}^{+2}$ Mn^{+2} 가

< 3> 1

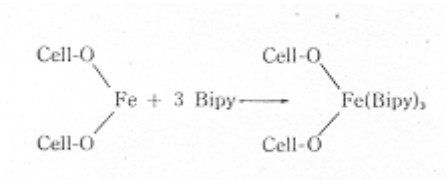
처리액중의 황산 제일철의 농도 (m mol/l × 10²)	Y	a	반사율 (520 nm)
0.00	78.86	0.37	75.03
1.92	70.19	7.55	61.78
3.85	59.06	16.57	46.85
7.70	44.24	26.11	28.97

(Bipy)가

가

, < 10> .

SLS



< 10> 1 2,2'- (Bipy)

-2,2'- 1

(Bipy)