

(19)
(12)

(KR)
(A)

(51) 。 Int. Cl. ⁷
C08B 37/16

(11)
(43)

2002 - 0004126
2002 01 16

(21) 10 - 2000 - 0037637
(22) 2000 07 03

(71)

1

(72)

1

102 - 103

(74)

:

(54)

9a

1 (torus) ;

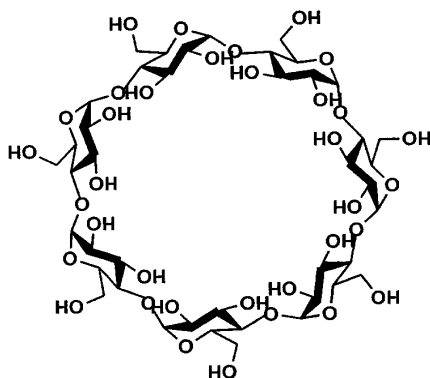
2 (Liquid - Phase Polymer -
Based Retention, LPR) ;

- 3 - ; - (specific viscosity)
- 4 (- ; - - -)(PCL), -
- FT - IR ;
- 5a 5c PCL, - ¹³ C - NMR ;
- 6 PCL (Nephelometric Turbidity Unit, NTU) ;
- 7 PCL , (Colony Forming Unit, CF U) ;
- 8a 8b PCL 2,000 10,000 ;
- 9a 9j LPR , 10 PCL (retention profile) ;
- 10a 10b p - PCL LPR ; p -
- 11 PCL PCL - Cu (Thermogravimetric analysis, TGA) .

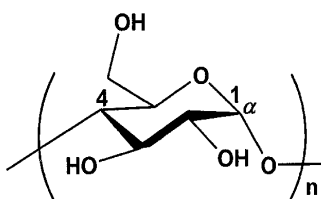
(steric fitting)

- 1 2 , - 1,4
 6 - , 2 - 3 - 가
 (torus) 1 C(2) - OH C(3) - OH
 :

1



2



(5,070,081).

[M. L. Brusseau, X. Wang and W. Wang, *Environ. Sci. Technol.*, 31, 1087 (1997); E. Fenyvesi, J. Szeman and J. Szejtli, *J. Inclusion Phenom. Mol. Recogn. Chem.*, 25, 229 (1996)]

1:1

가

가 가

(saccharide)

3 가 10 14 1

(: 2가 3가)

(Liquid - Phase Polymer - Based Retention, LPR)

2 pH (: pH 5)

(retention) (high binding capacity)

가

1 :

PCL (specific viscosity)

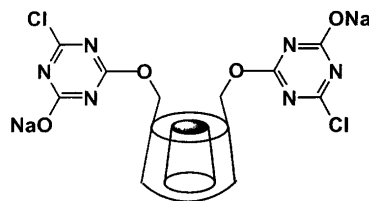
가 3 , 12 가 가 12 (specific viscosity)

1 : (- - -) (PCL)

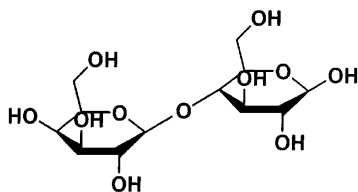
1) PCL

3 (Sigma) 가 (Wacker - Chemie,)

3

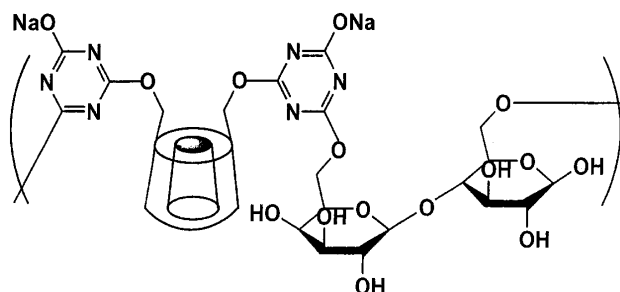


4



, 3% - (150mg, 0.44mmol) 2 5% -
 (0.593g, 0.44mmol) (pH 11.3) 가 , 12
 0.1M ((Amicon) UM - 1 , 1kgmol⁻¹
) 5
 0.70g (: 98%, (())
): 94%).

5



2)

FT - IR (KBr) - (Perkin - Elmer) 2000 , UV - VIS - (Lambda) 12 , ¹³C - NMR FT - NMR (JEOL JNM - LA300WB, 300MHz) , (light scattering measurement)((Malvern) 4700C)

PCL, - FT - IR 4
 C=N , - 1574cm⁻¹
 , PCL 1718cm⁻¹
 C=O , 가

, PCL, - ¹³C - NMR 5a, 5b 5c
 5a , c = 101.9, 81.5, 72.0 59.9 - 1,4 -
 C₁, C₄, (C₂, C₃ C₅), C₆ , 5b . 5b , c = 169.2, 159.5 1
 50.1 - , 2
 5a 2 가 .
 , - 2 3
 c = 149.9 .

PCL 1, DMSO, DMF, CHCl₃, 가 21.6 kgmol⁻¹

2 : PCL

1) (enrichment) (isolation)

6μm = 1:2) 150mL 가 . , 1 PCL 100mg PCL (: K₂HPO₄ 12.5g, KH₂PO₄ 3.8g, (NH₄)₂SO₄ 1.0g, MgSO₄ · 7H₂O 0.1g, (0.8M) 100mL 5.0mL(100mL ZnS O₄ · 7H₂O 1.1g, FeSO₄ · 7H₂O 0.5g, EDTA 0.29g, MnSO₄ · H₂O 0.154g, CuSO₄ 0.026g, Co(NO₃)₂ · 6H₂O 0.025g Na₂B₄O₇ · 10H₂O 0.018g , 1M K₂HPO₄ 71.7mL 1M KH₂PO₄ 28.3mL pH 7.2(25) 0.1M (25) PCL . ,

2) PCL

(pH 7.2) 1L PCL 100mg 가 40mg (4 %) - UV 1mL PCL 가 , 25 40 , PCL , 100μℓ 10

(HS (Scientific), Portable Turbidirt DRT - 15CE) (Daeil Engineering) (Auto Clave DAC 811) (DVB 912)

3) PCL

PCL 6 7 . 6 , PCL (Nephelometric Turbidity Unit, NTU) . , (Colony Forming Unit, CFU) 7 . 7 , 5 (induction phase) 2 (exponential phase) PCL

(JEOL, JSM - 5800)) 8 , 2,000 가(8a), 10,000 PCL 1 2μm (Pseudomonas) 가 가(8b) . ,

2 : PCL -

1)

PCL 가 , Cr(III), Fe(III), Co(II), Ni(II), Cu(II), Zn(II), Sr(II), Cd(II), Pb(II) Al(III) 10 2가 3가 , Ni(II) (Aldrich) , Cr(III) (Janssen) , Pb(II) Sr(II) (Yakuri) , Al(III) (Merck) (Junsei)

2 PCL 10 PCL 1 % 20mgL⁻¹ (PCL (20mgL⁻¹) , 20mL 가 1 % 20mL 가 pH 5 , 1kgmol⁻¹ - (MMCO) (UM - 1) , N₂ 가 .

2) LPR 10 2가 3가 PCL (LPR) , R Z () R Z 1 2 (ICP, Thermo - Jarrell Ash IRIS/AP) ():

1
$$R(\%) = C_f/C_o \cdot 100$$

; C_o , C_r (V_f ()) () ; C_o ()

2
$$Z = V_f/V_o$$

, V_f () ; V_o .

3) 9a 9j LPR , 10 PCL (Z=0 10), 100% (R=100%) Co(II), Pb(II) Al(II) , (PCL)

3 : PCL -

1) (saturation) PCL , PCL (1mL, 10mg) p - (8 0mL, 100mg) 2 () : 19% (= [20mg]/[100mg + 10mg x 100)).

2)

PCL (Acros,) 가 , p- (98%)
 2 , p- PCL (300mgL⁻¹) 4mL 2 % PCL 10mL
 20mL 2 1kgmol⁻¹ (MMCO) pH 5 U
 M - 1) N₂ 가 .

3)

LPR PCL (LPR) , R (R)
 p- Z (Z) 1 2 .

4)

10a 10b p- PCL LPR
 (Z=0 10) p- (: 2) , : 1) (
 , Z=0 20)) . 10a , PCL (R: 80%)

CL (10mg PNP/10mg PCL) , 20mg (10mg PNP + 10mg PCL)가 Z=20 7.2mmol/g P
 가 p- PNP가 (10b) . -
 , PCL 1:1
 15 (, 7.2mmol/0.48mmol) (0.48mmol /g PCL)
 , p- .

3 : PCL -

1)

(2 % , 10mL) PCL (1 % , 10mL) 가 PCL - Cu
 PCL - Cu PCL - Cu ,

2)

(Thermogravimetric analysis, TGA)

, PCL, PCL - Cu PCL - Cu
 TGA 2050(TA (Instruments)) .

PCL PCL - Cu
 , 190 (steady) 가 , 220 1 1 . PCL
 260 423 (T_{max}) , PCL - Cu 가 10% , 220
 , 290 243 (T_{max}) , 170 130 , 194 200
 가 10% , PCL 2 , ,

[1]

| | (%) | | | | | | | TDT* () | |
|----------|-----|------|------|------|------|------|------|----------|-----|
| | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 10% | 50% |
| PCL | 5.0 | 6.6 | 52.2 | 73.0 | 92.8 | 94.0 | 97.2 | 220 | 294 |
| PCL - Cu | 4.7 | 10.0 | 83.2 | 91.7 | 92.3 | 92.2 | 91.4 | 200 | 259 |
| PCL - Cu | 6.4 | 11.0 | 75.1 | 93.3 | 94.1 | 94.6 | 95.2 | 194 | 269 |
| *TDT: | 10% | 50% | | | | | | | |

(57)

1.

2.

1 ,

- , - -

3.

1 ,

, , , ,

4.

1 3 가 ,

10 14

, 1

5.

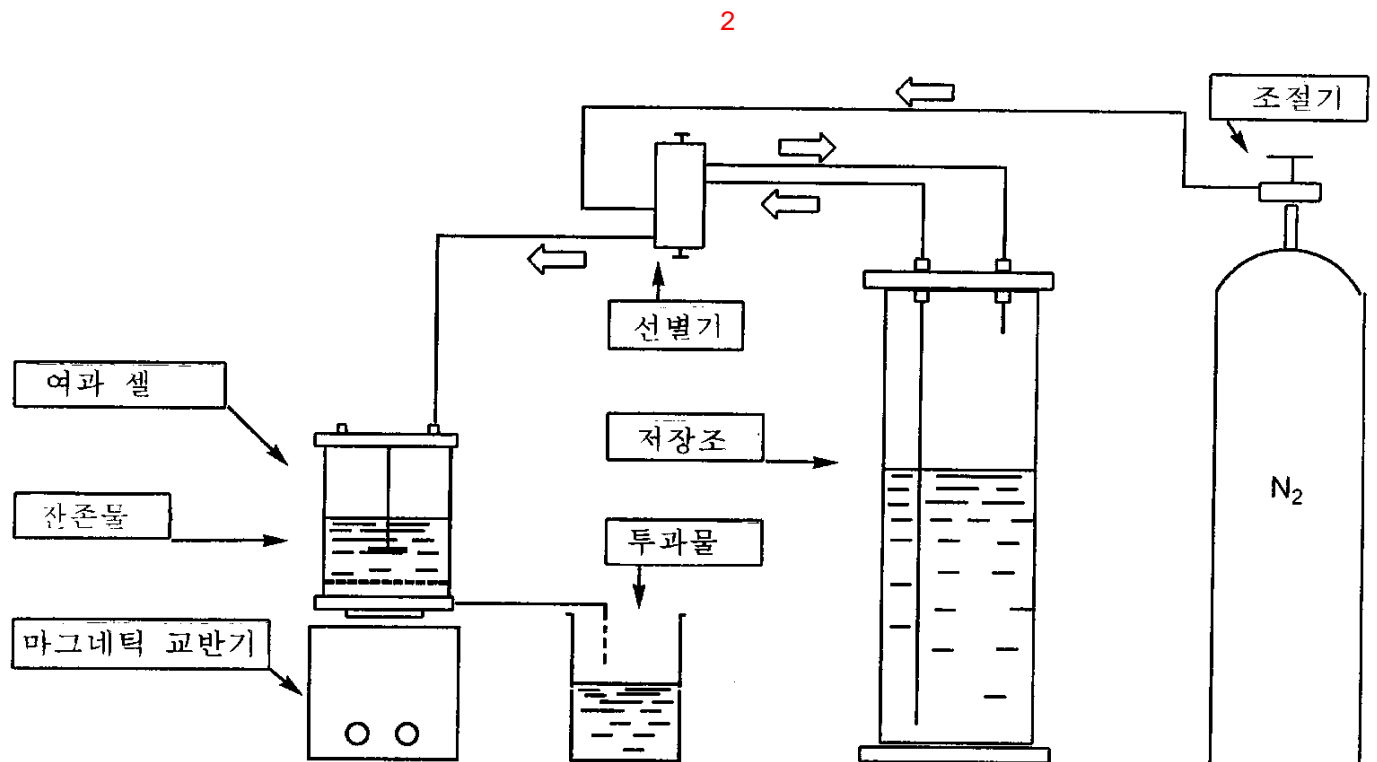
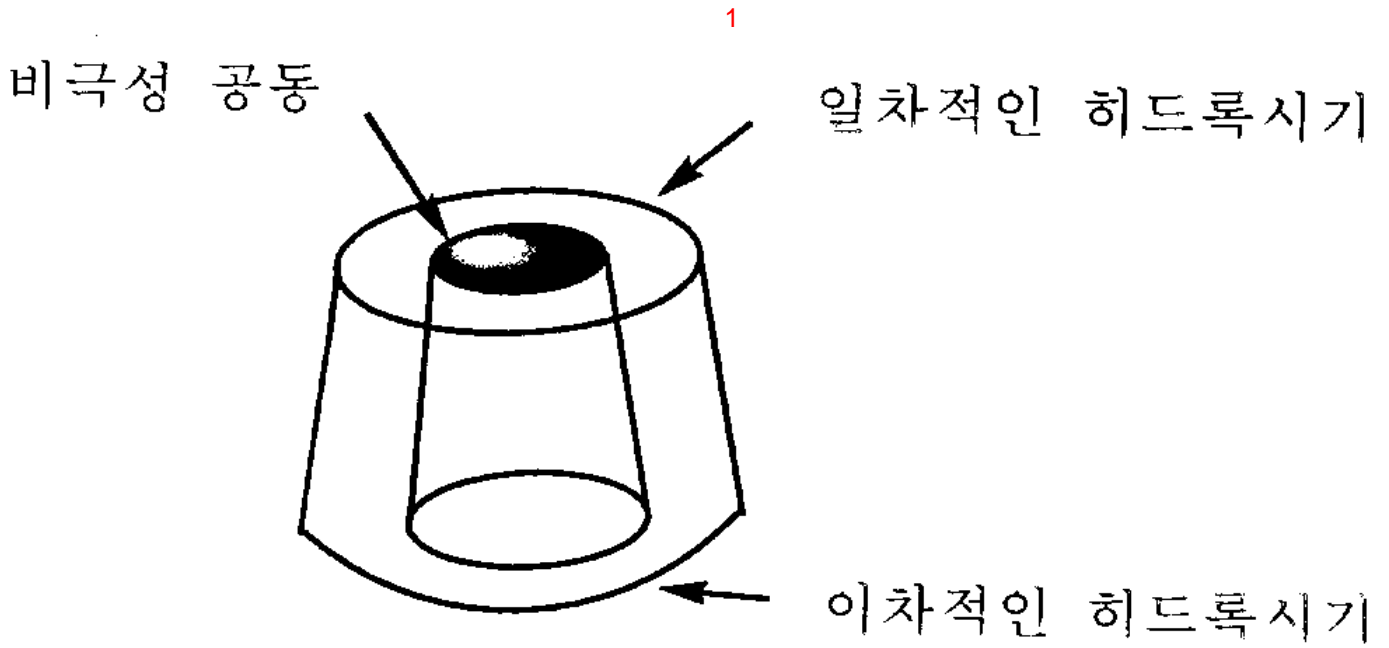
1 3

(inclusion complex)

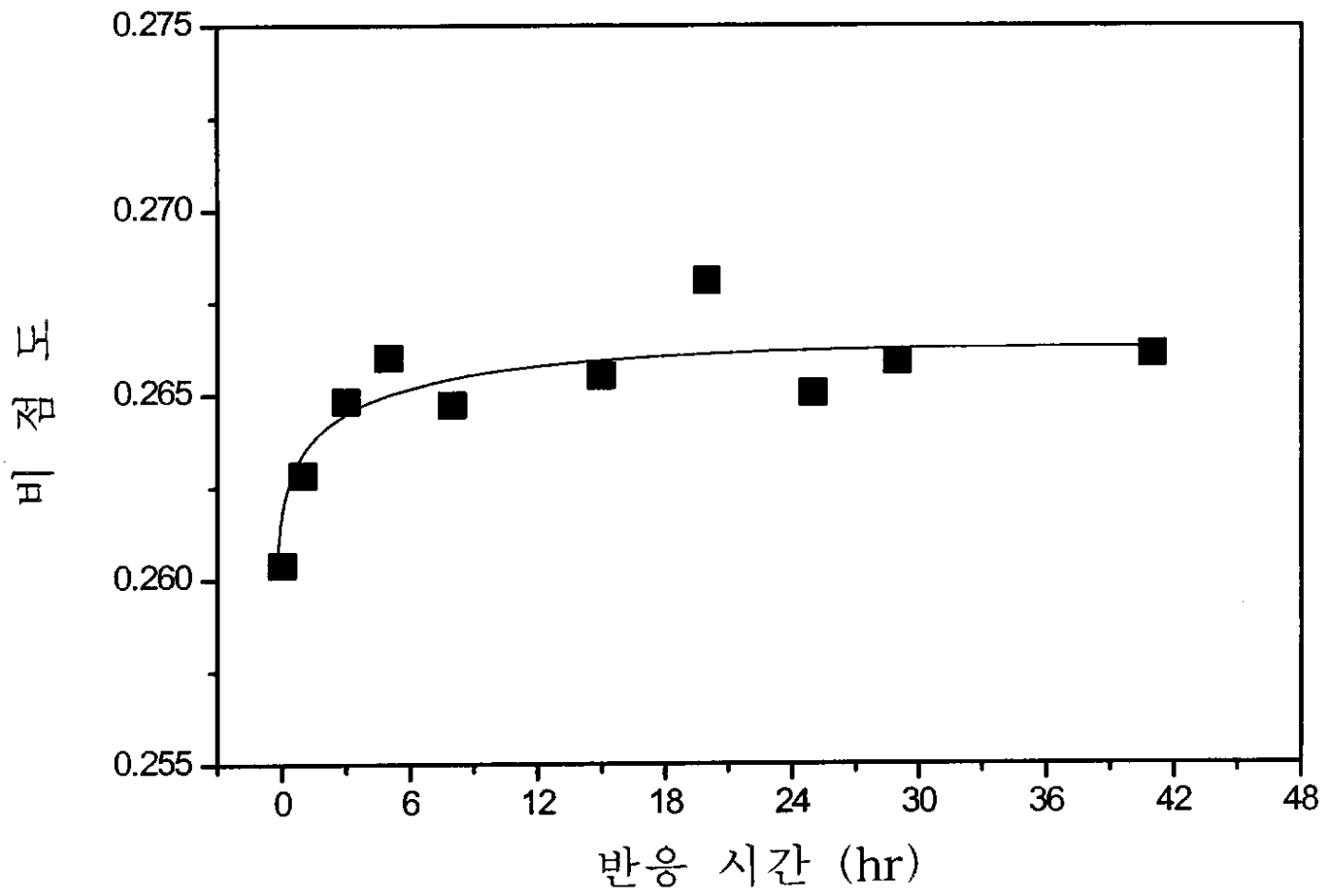
6.

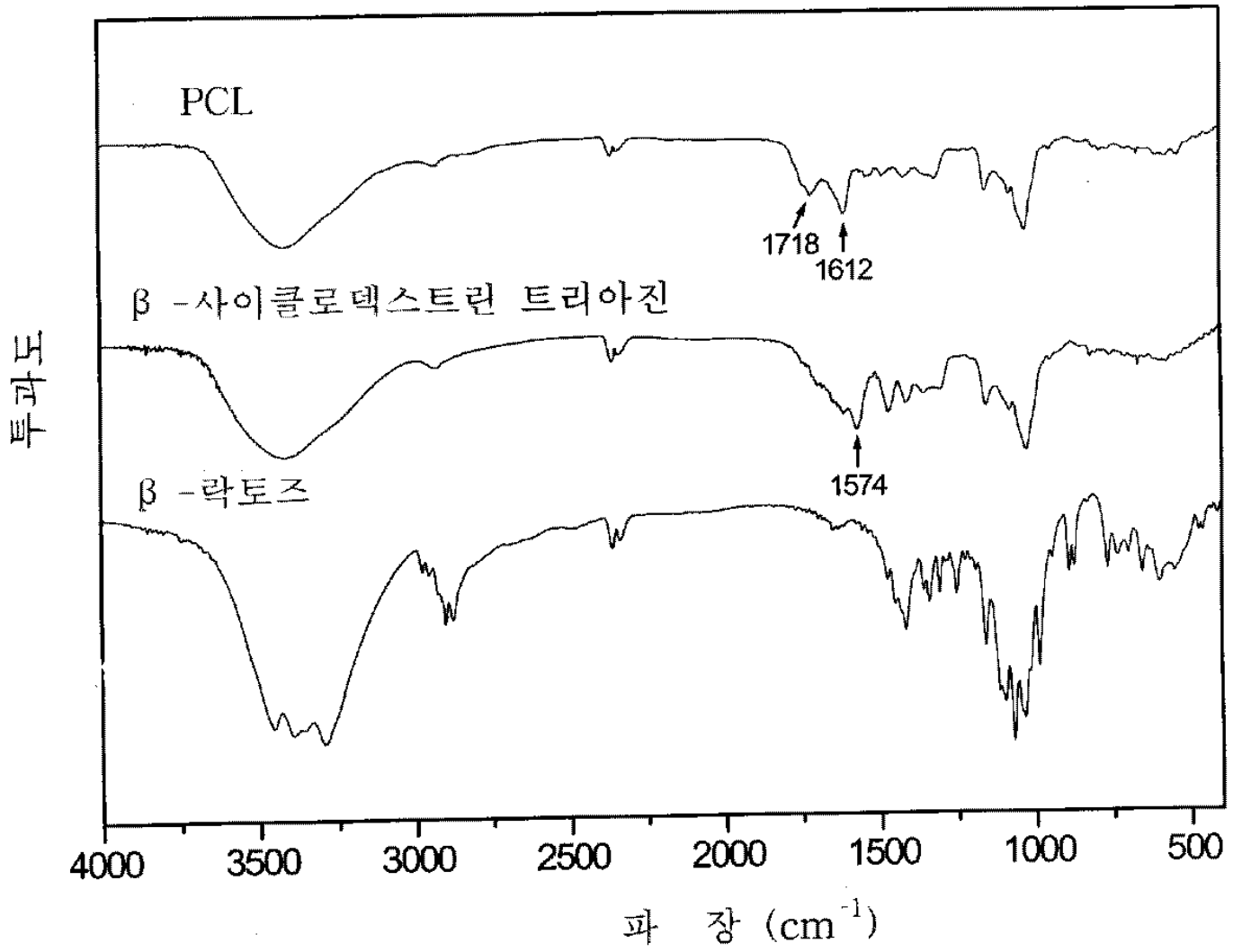
5

Cr(III), Fe(III), Co(II), Ni(II), Cu(II), Zn(II), Sr(II), Cd(II), Pb(II) Al(III)

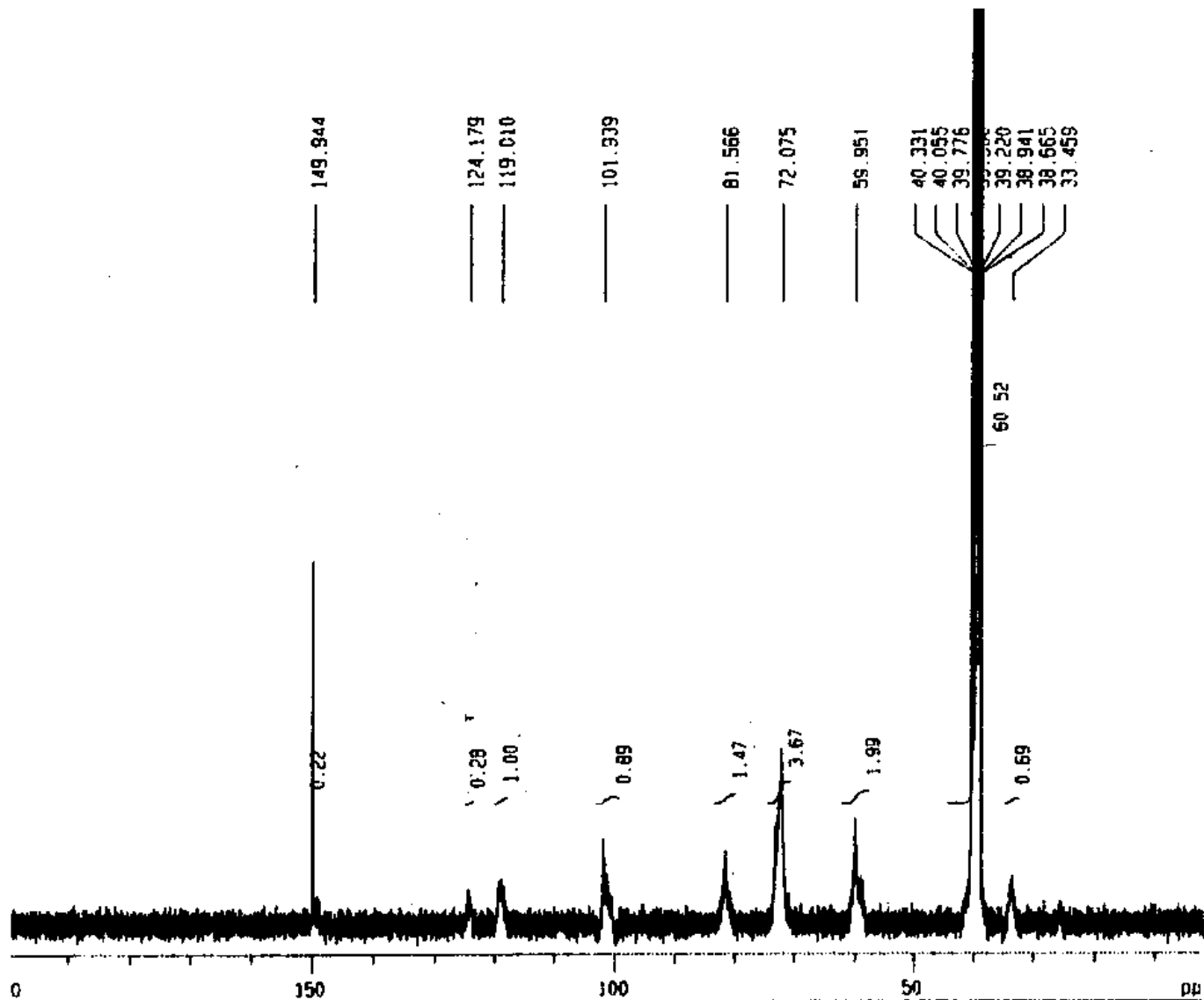


3

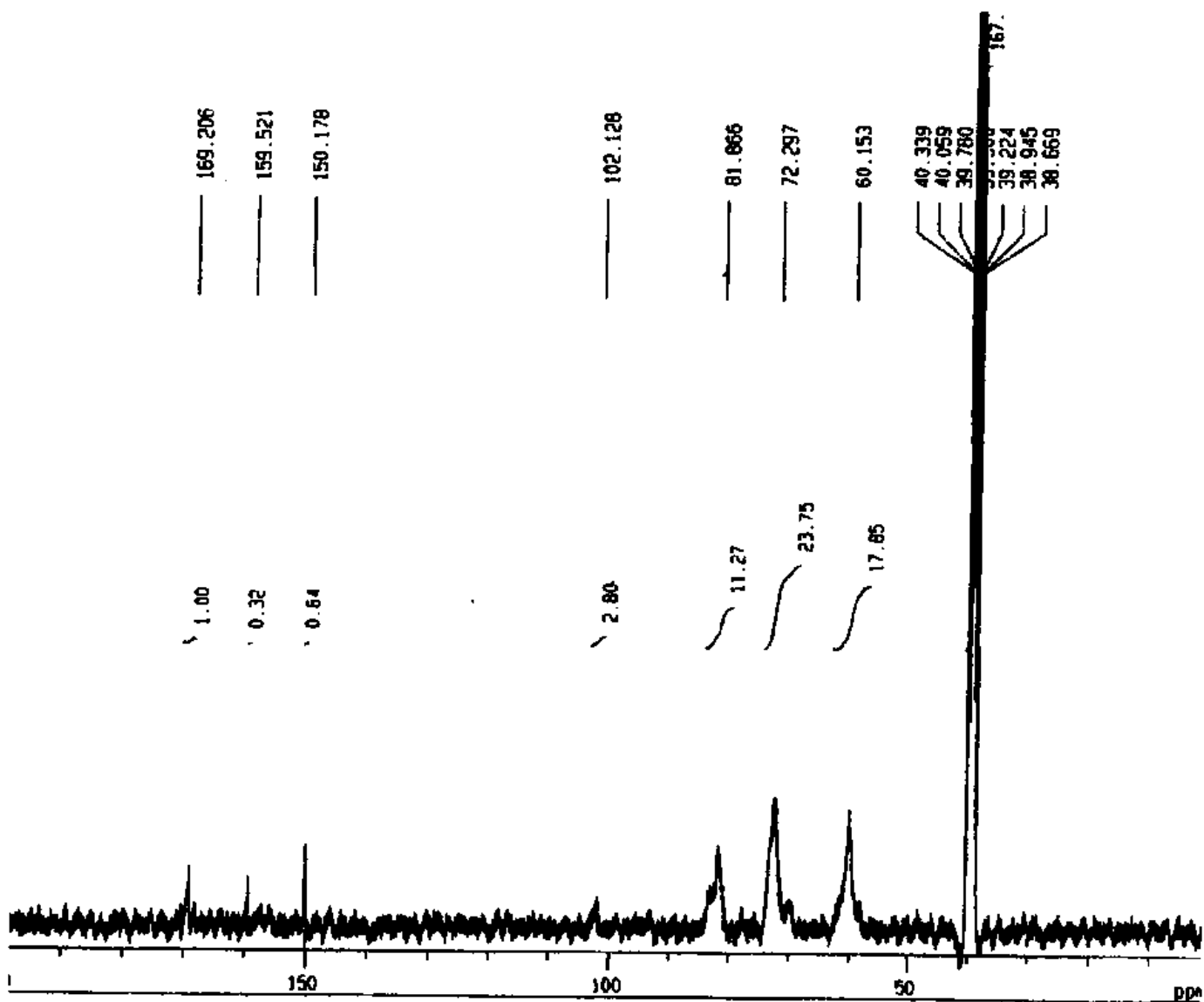




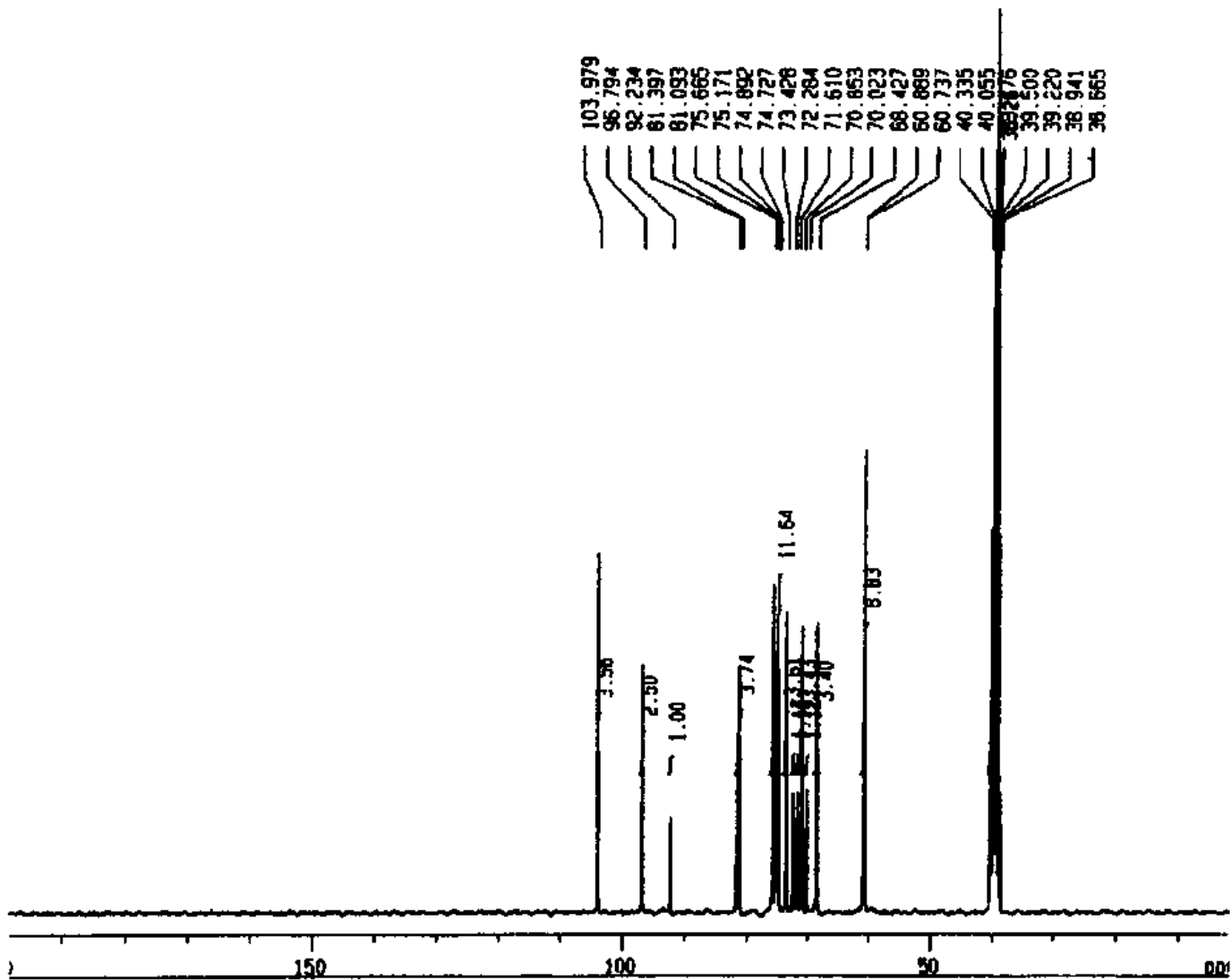
5a

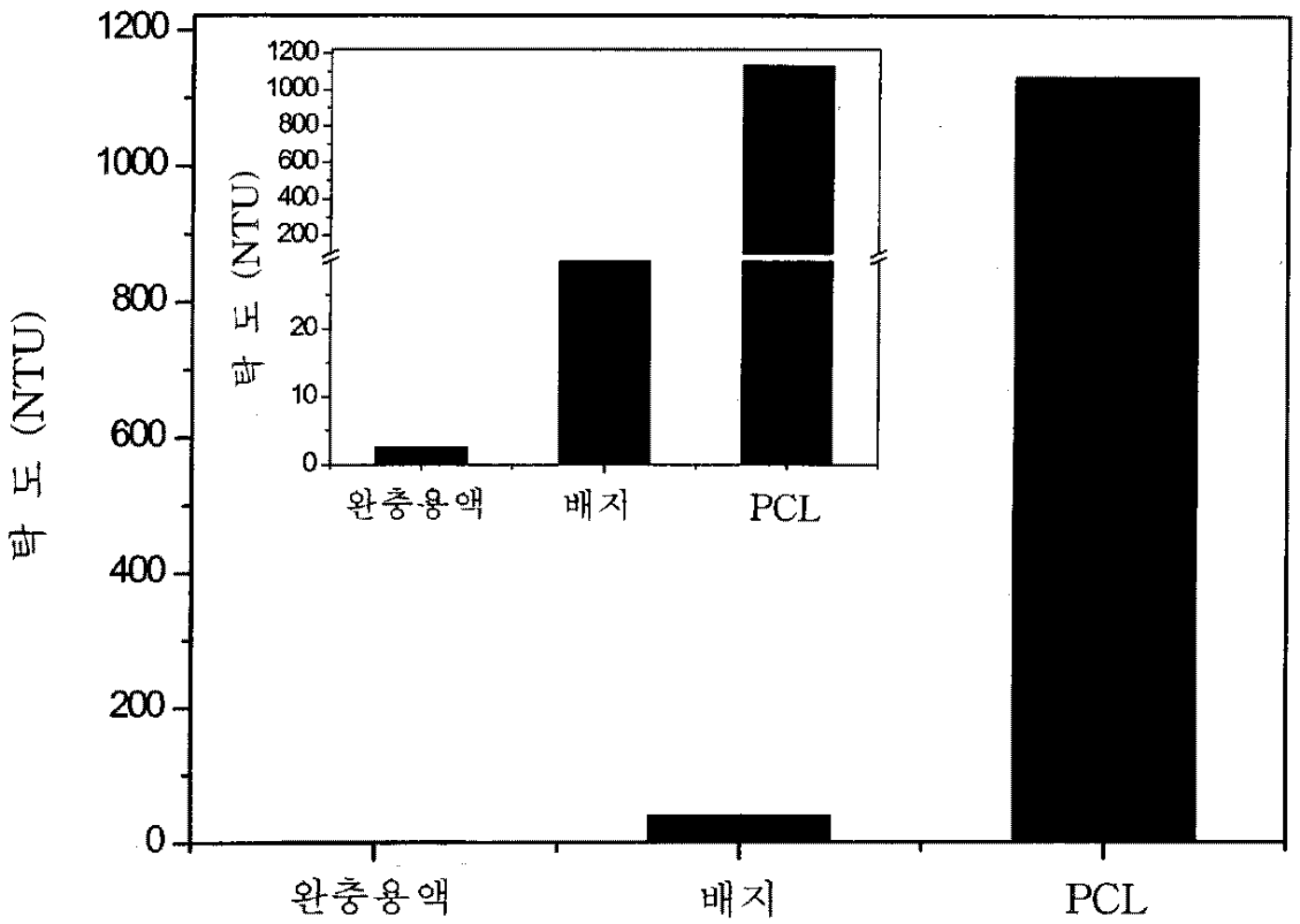


5b

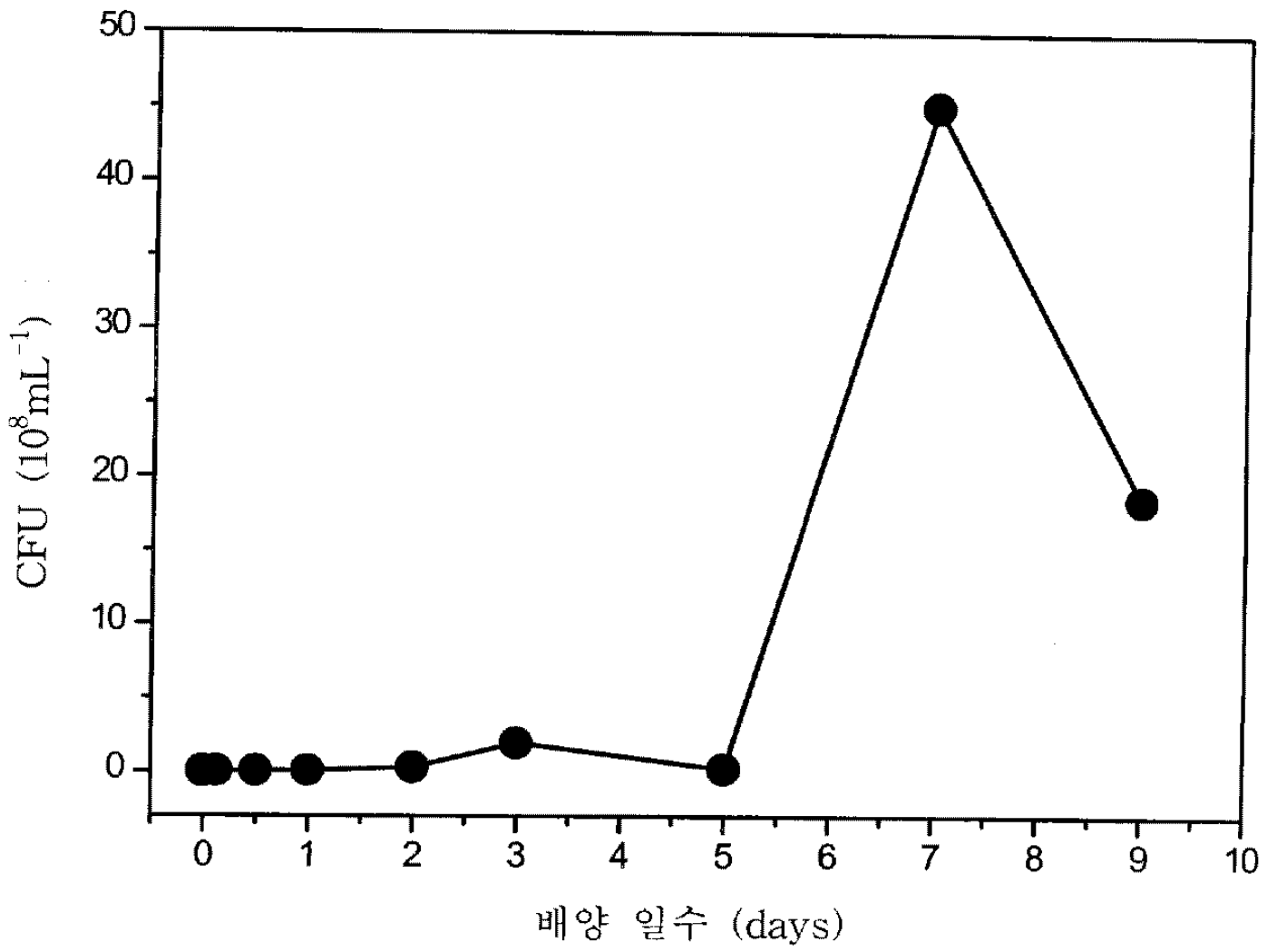


5c

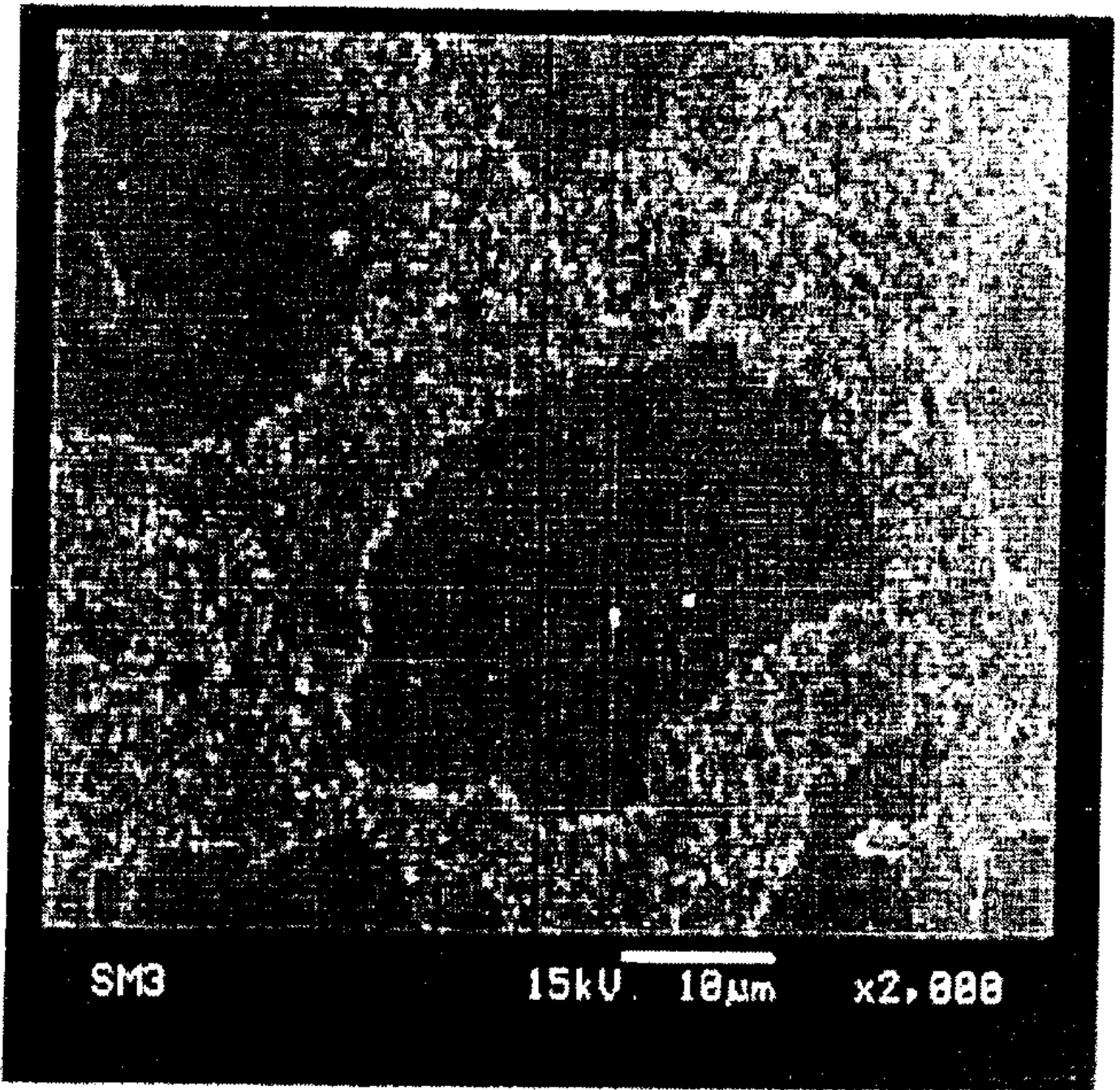




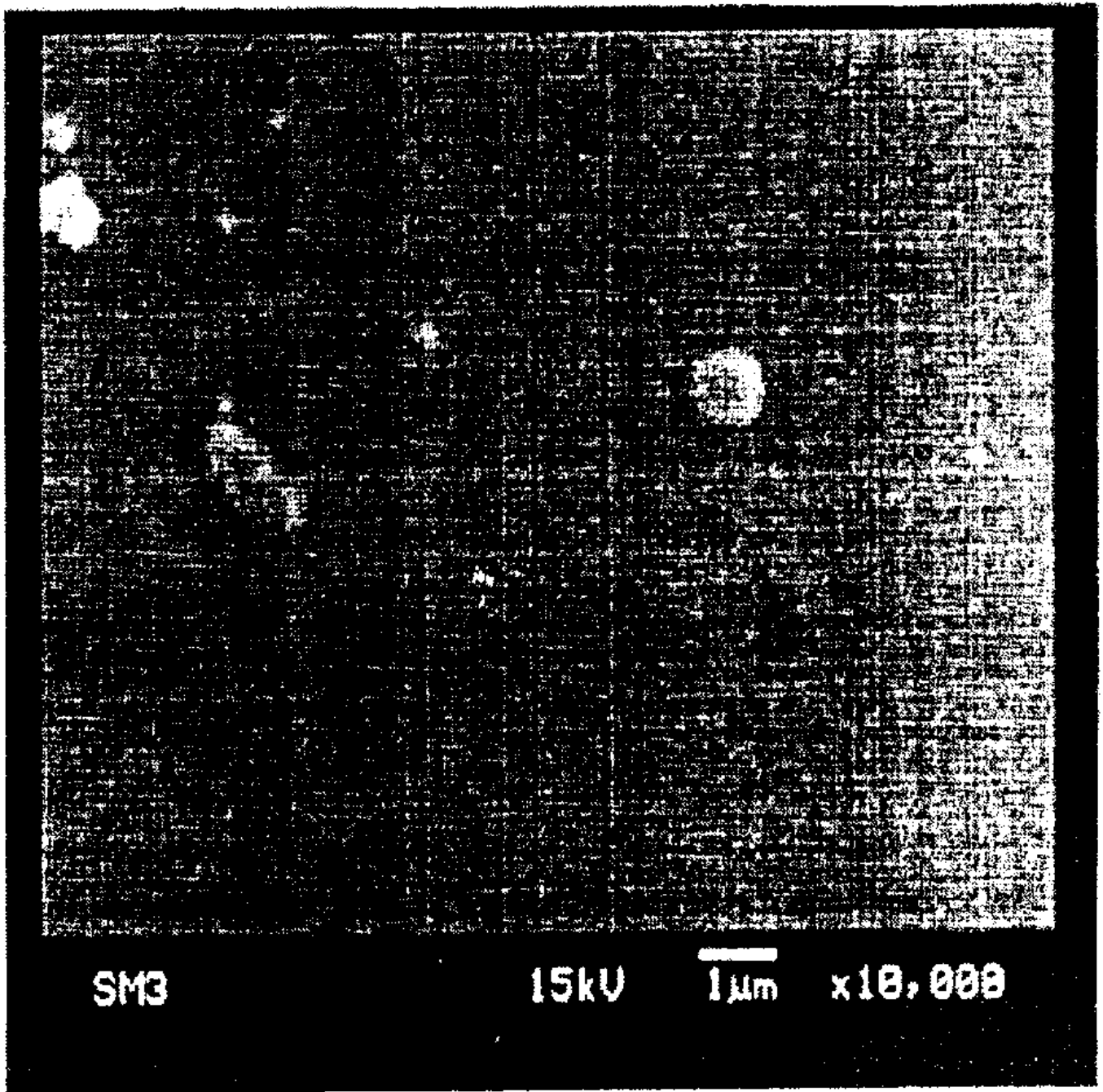
7



8a

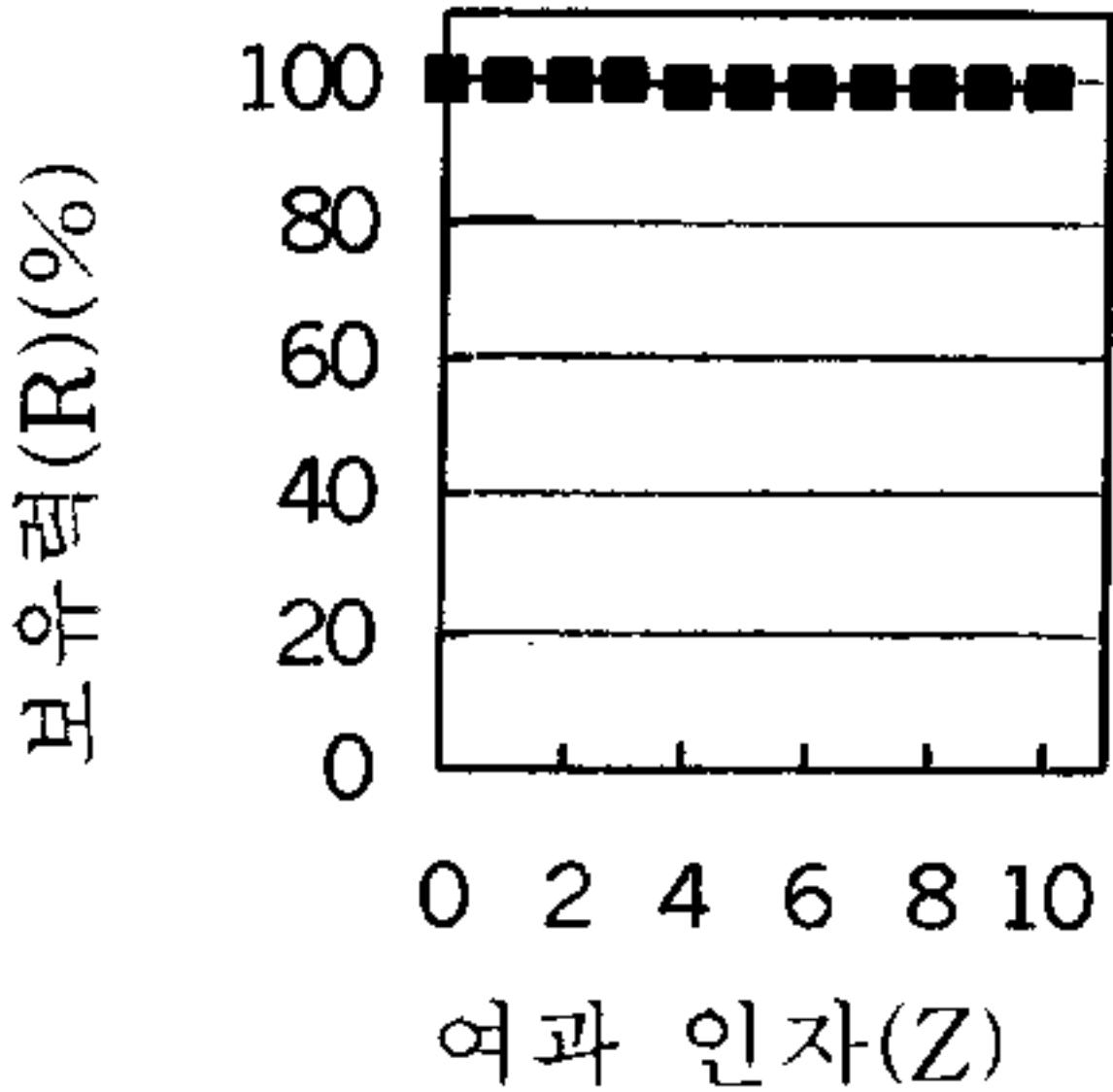


8b

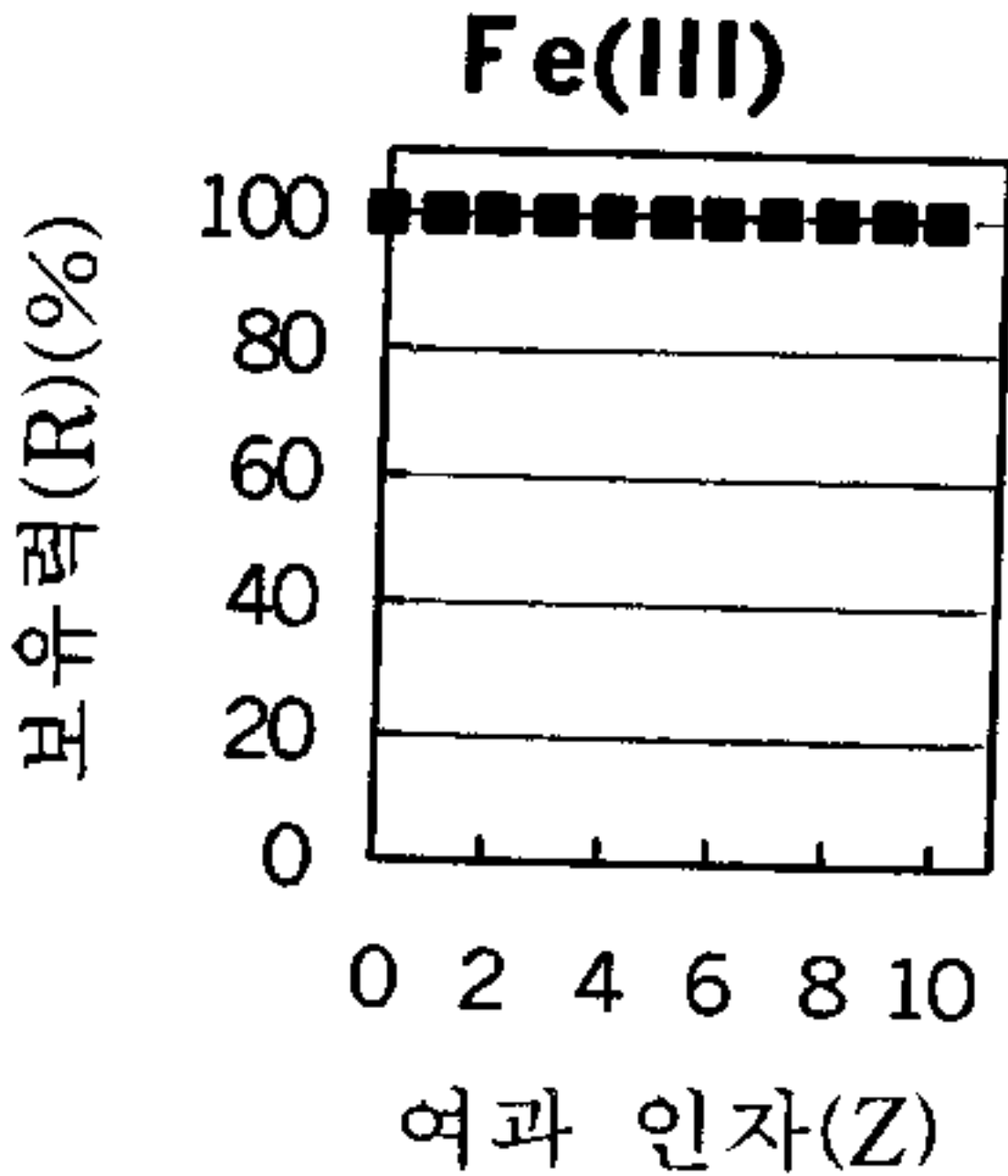


9a

Cr(III)

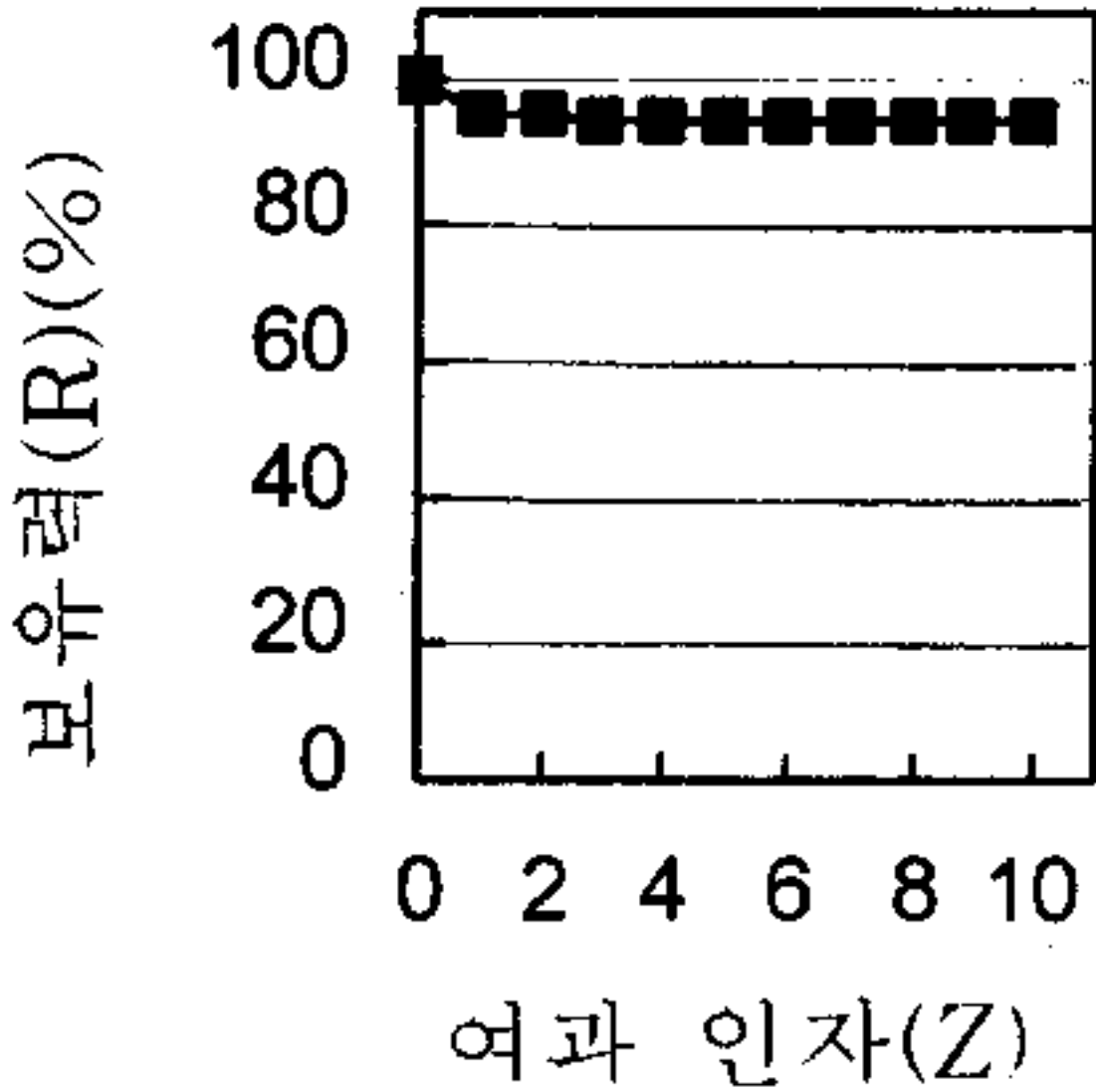


9b



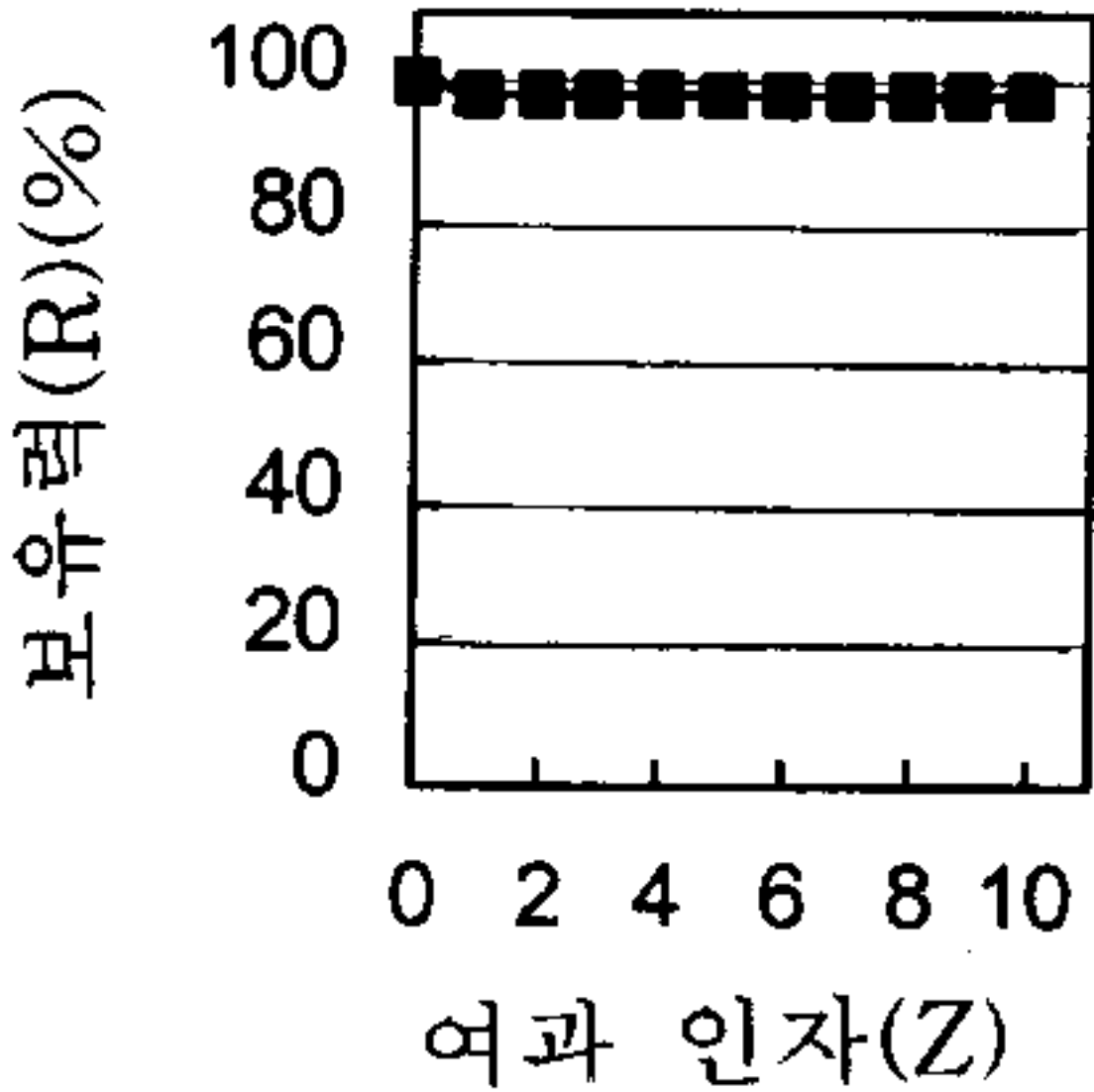
9c

Co(II)



9d

Ni(II)



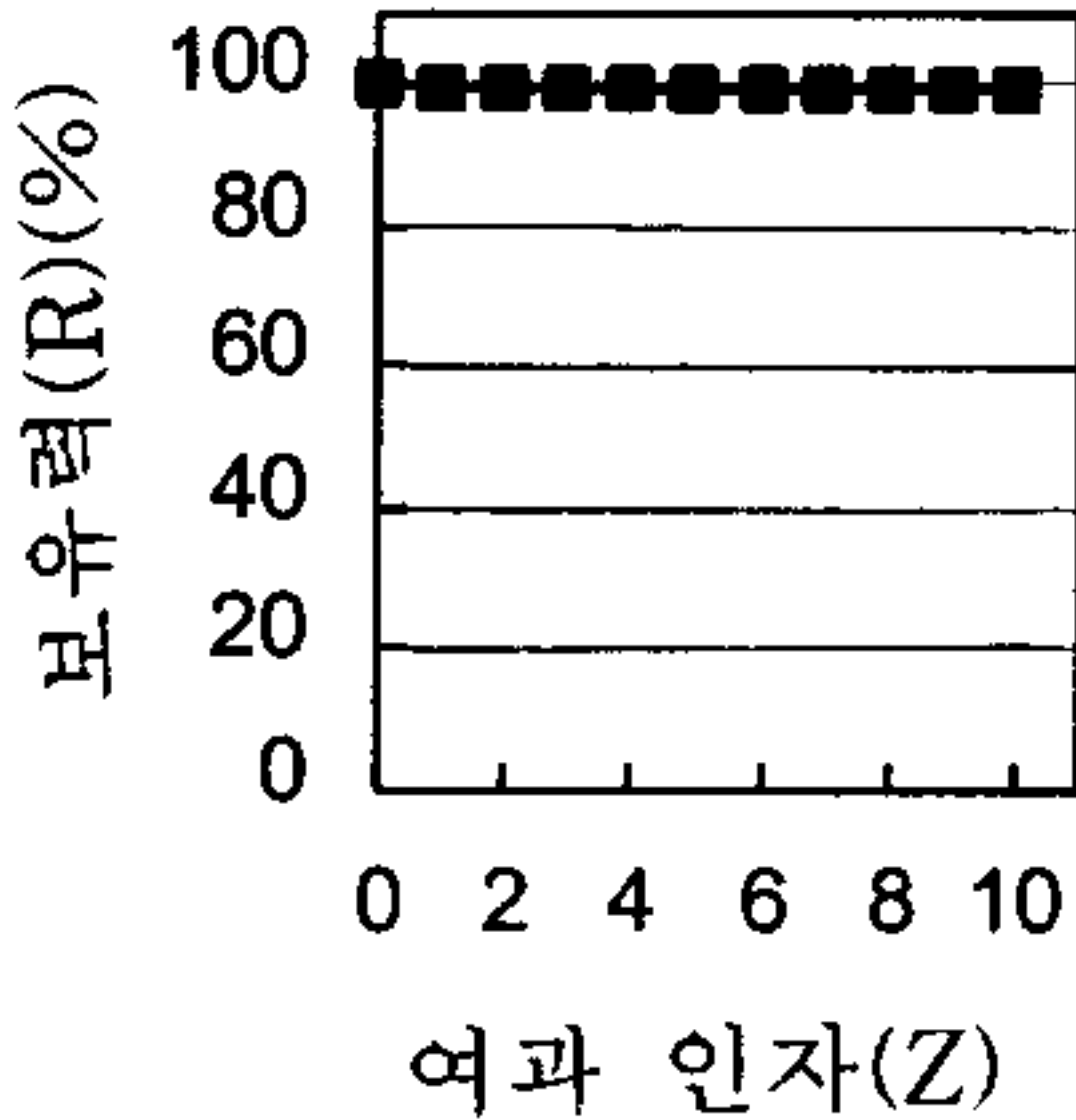
9e

Cu(II)

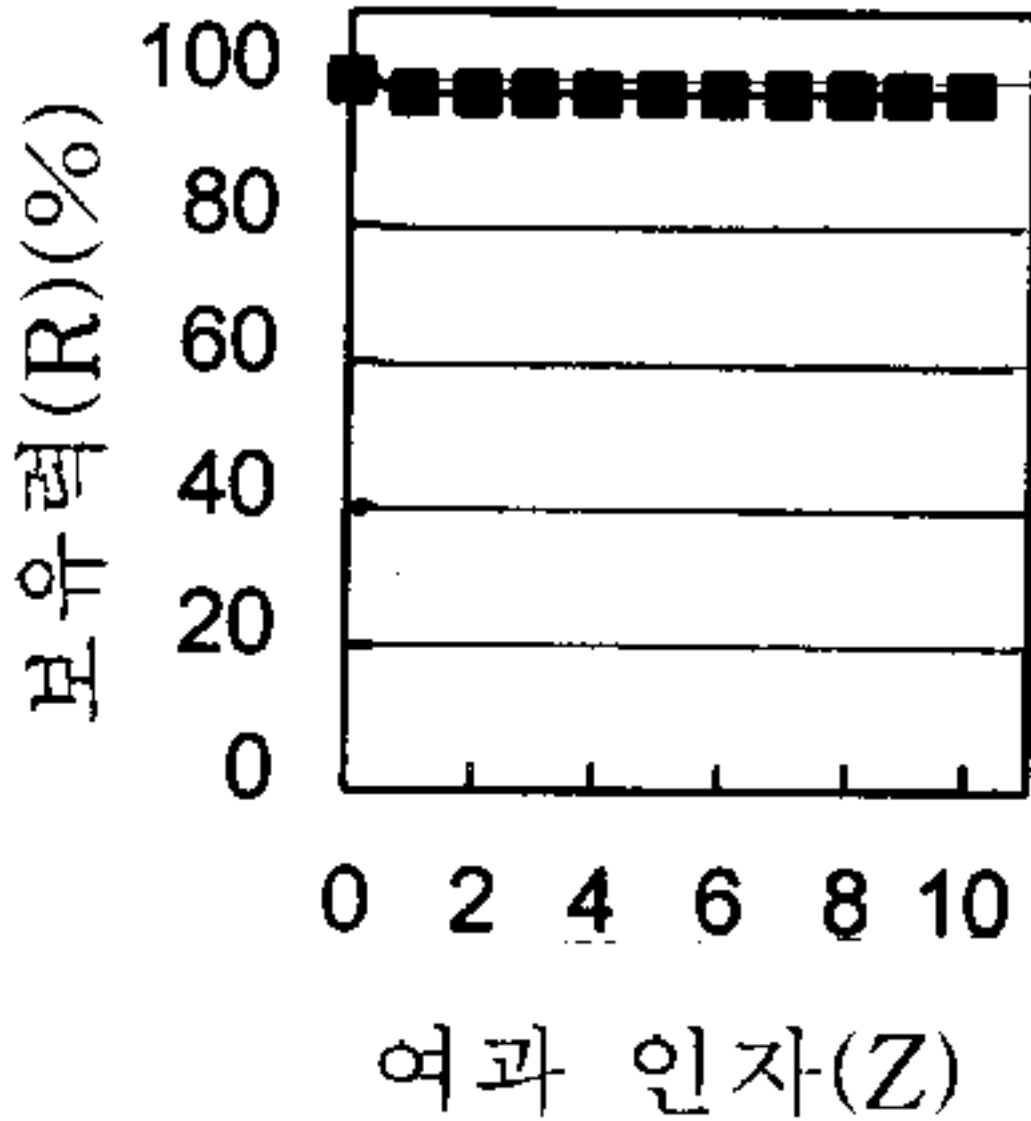


9f

Zn(II)

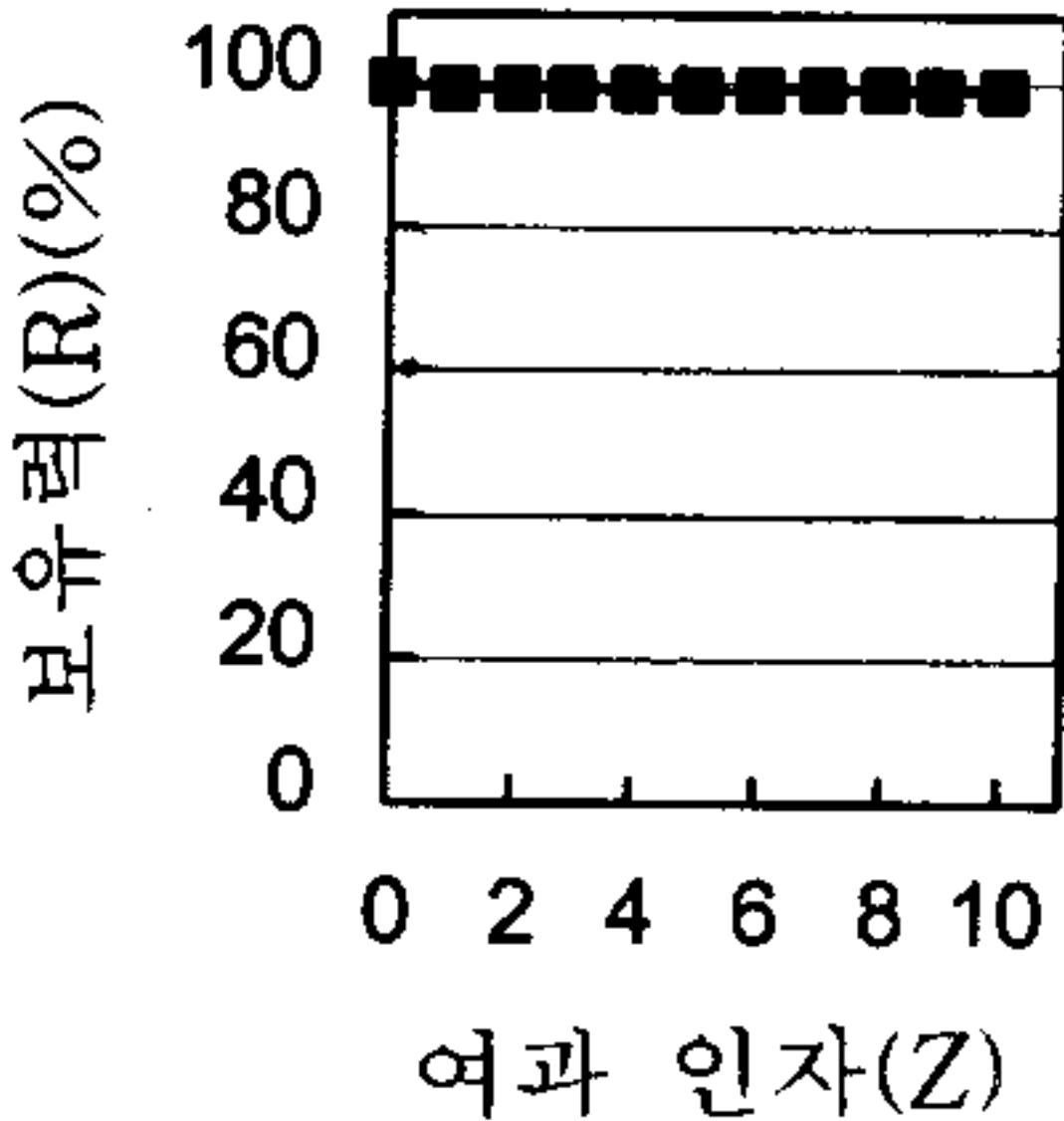


9g

Sr(II)

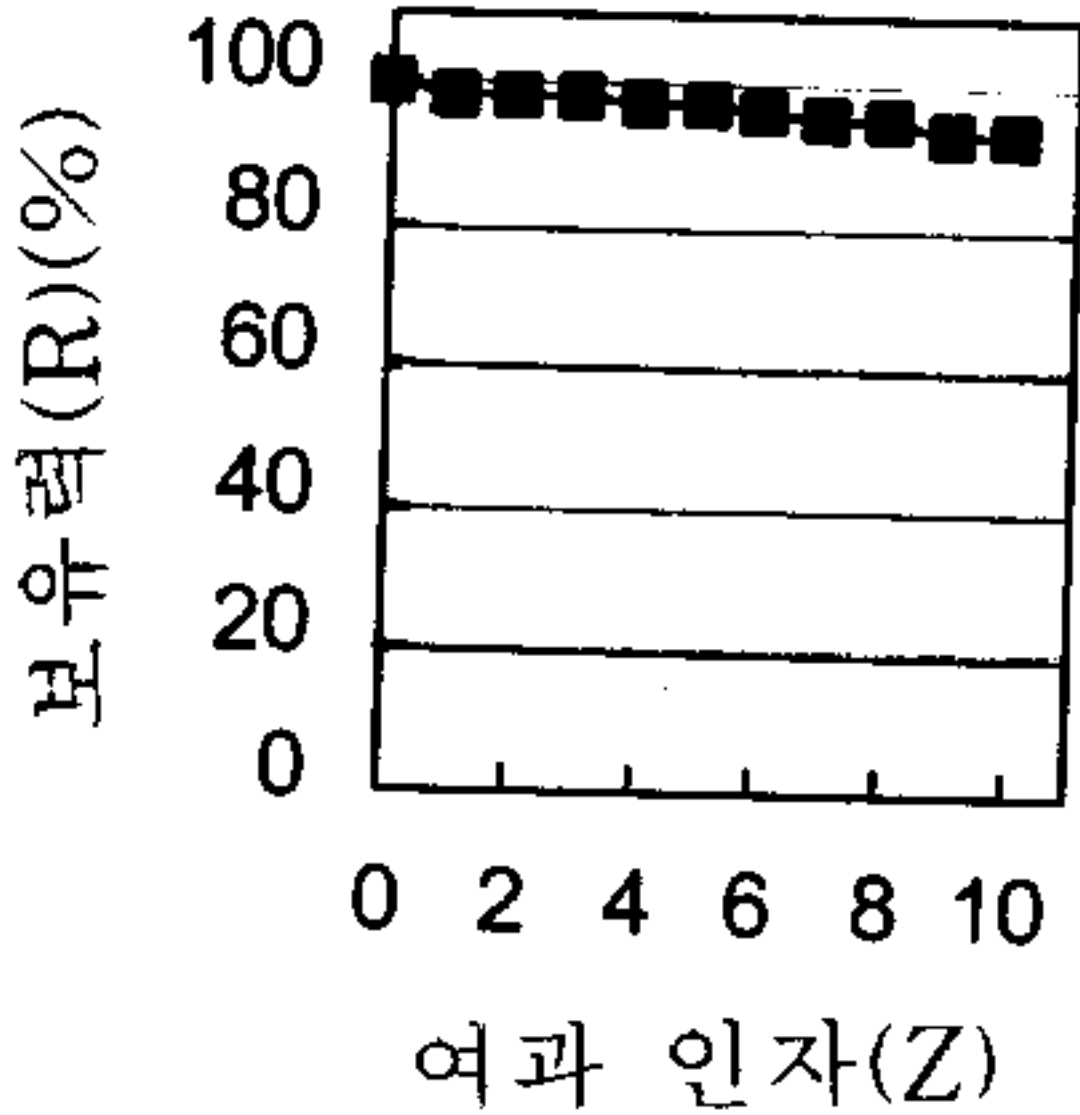
9h

Cd(II)



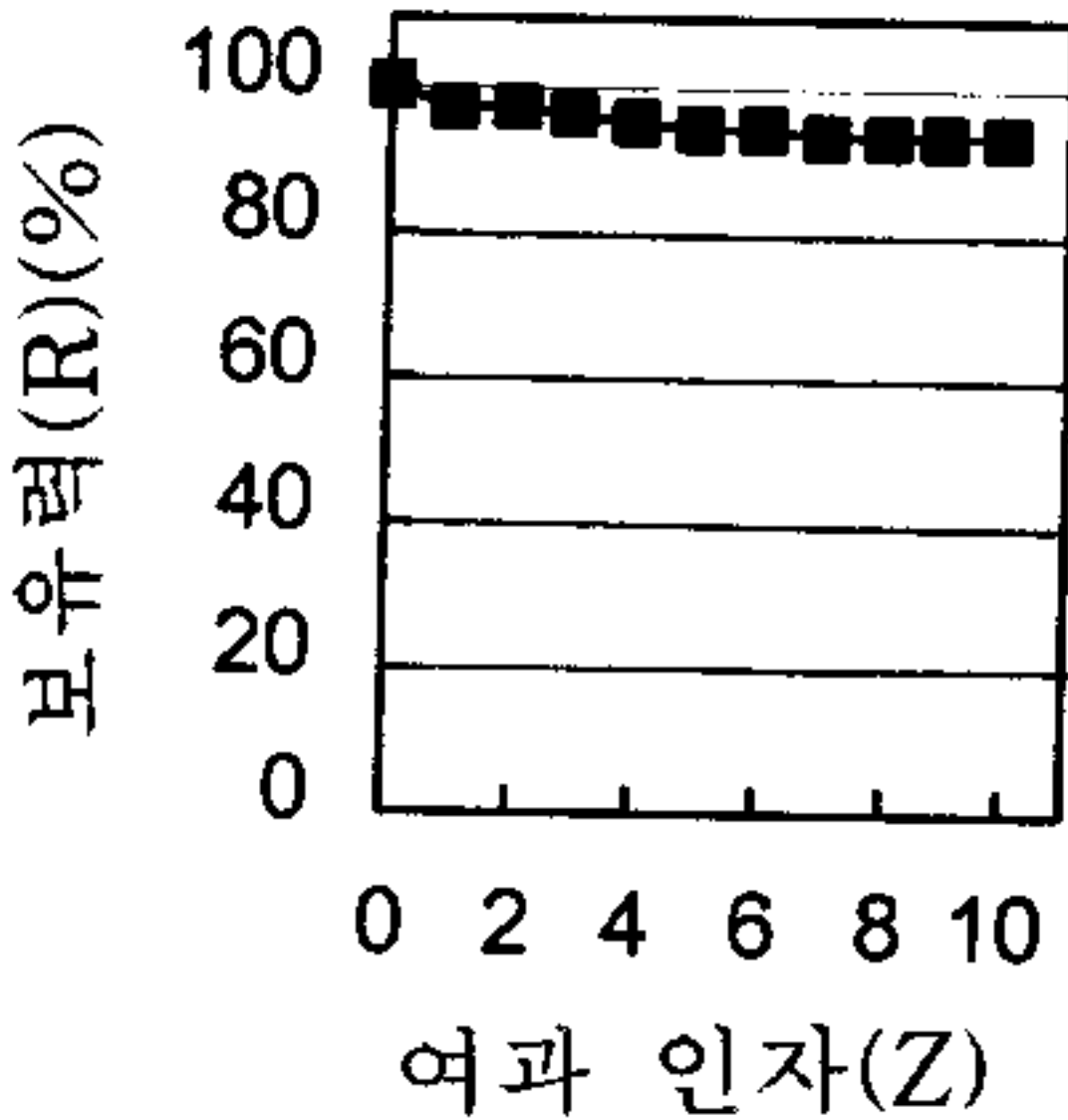
9i

Pb(II)

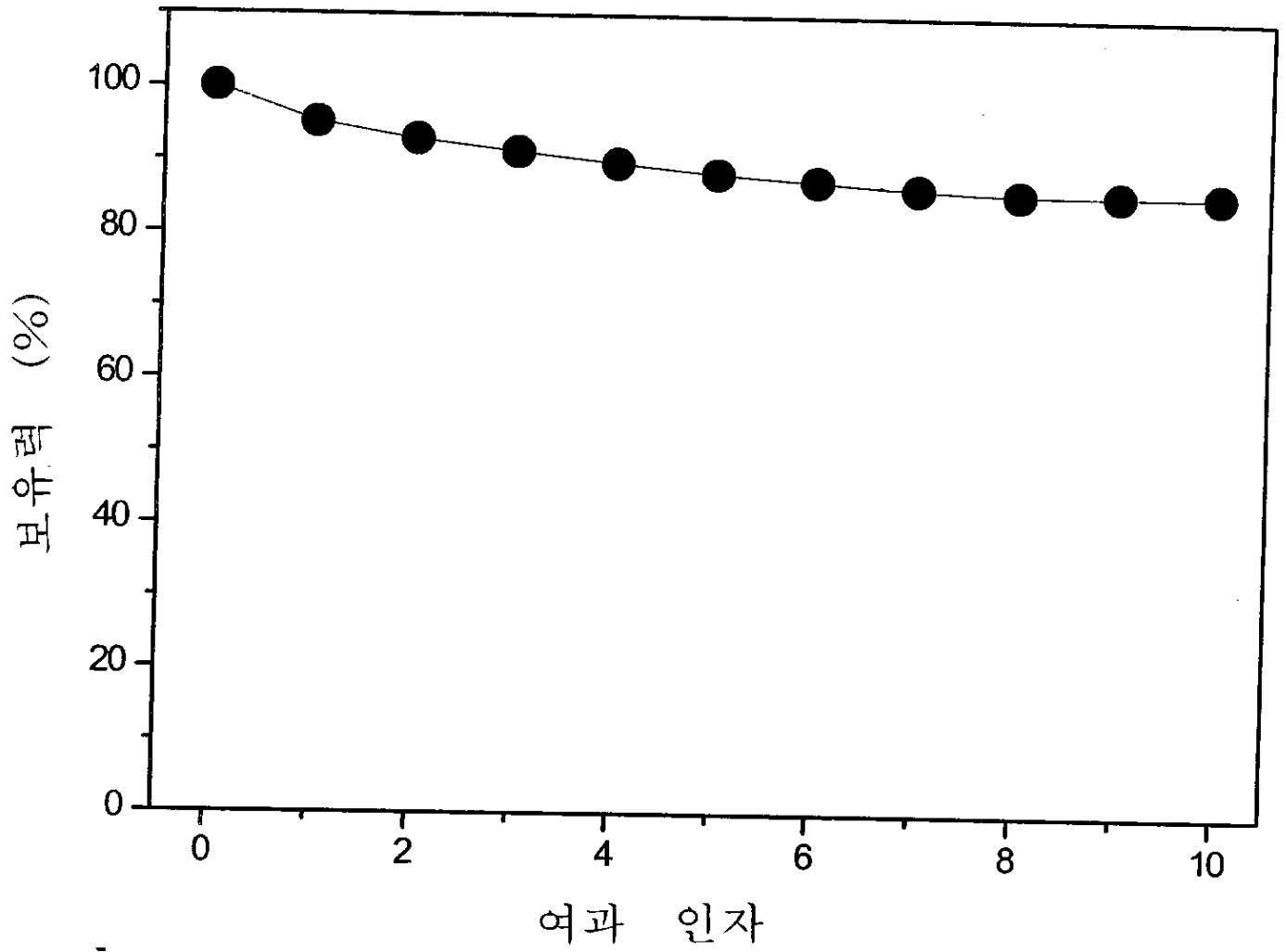


9j

Al(III)



10a



10b

