รายการอ้างอิง

1. MacZura, G.; Moody, K.J.; Anderson, E.M.; and Kunka M.K. Alumina. Ceramic Bulletin. 70 (May 1991) : 846-848.
2. MacZura, G.; Mody, K.J.; Anderson, E.M.; and Kunka M.K. Alumina. American Ceraic Society Bulletin 72 (June 1993) : 76-78.
3. Hector, J.M.,et al. Aluminum Oxide and Hydroxides from Non-Bauxitic Sources. Am.Ceram.Soc.Bull.76 (June 1997) : 55-60,66-69.
4. Levin,I.; and Brandon,D. Metastable Alumina Polymorphs. J.Am.Ceram.Soc. 81 (August 1998) : 1995-2012.
5. Material for ceramics. Ceramic Industry. (Jan 1982) : 53-55.
6. Carim, A.H., et al. Conversion of Diaspore to Corundum : A New α-Alumina Transformation Sequence. J. Am. Ceram. Soc. 80 (October 1997) : 2677-2680.
7. Yet-Ming, C., et al. Physical Ceramics. 32-34.
8. Simpson, T.W., et. al. Kinetics of the Amorphous $\longrightarrow$ γ $\longrightarrow$ α Transformations in Aluminum Oxide : Effect of Crystallographic Orientation. J. Am. Ceram. Soc. 81 (June 1998) : 61-66.
9. Walter, H.G. Alumina as a ceramic material, Alco Research Laboratories.
10. Frenkel, M., et. al. Crystal modification of freshly precipitated aluminum hydroxide by lithium ion interaction. Am. Chem. Soc. 84 (May 1980) : 507-510.
11. Martin, E. S.; and Weaver, M. L. High-Purity Alumina. Am. Ceram. Soc. Bull. 72 (July 1993) : 71-76.
12. Maczura, G., et.al. Special Aluminas for Ceramics and other Industrial Application. Reprint fron Interceram. (March 1976).
13. Tarar, S.S.; and Gunay, V. High-Performance Ceramics. Interceram. 44(April 1995) : 234-237.
14. Blendell, J.E., et.al. High Purity Alumina by Controlled precipitation from Aluminum Sulfate Solutions. Ceramic Bulletin. 63 (June 1984) : 797-802.
15. Lin, S.H.; and Lo, M.C. Recovery of aluminum alum from waste anode-oxidizing solution. Waste Management. 18 (1998) : 281-286.

16. Mohamed, M.A., et.al. Optimization of the extraction of aluminum sulfate and ammonium aluminum sulfate alums from aluminum dress tailings. Journal of Materials Research. 13 (1998) : 1075-1083

17. Incorvati, C.M., et. al. Obtaining Dispersible Bayer-process Aluminas in Water. Am. Ceram. Soc.Bull. 76 (September:1997) : 65-68.

18. Shanefield, D. J. ; and Mistler, R.E. Fine Grained Alumina Substrates : I, The Manufacturing Pdrocess. Ceramic Bulletin. 53 (May 1974): 416-420.

19. Hayes, J.C. U.S. Patent 3,105,739.

20. Gregory, et. al. U.S. Patent 3,951852. (1976).

21. Moyer, P.S., and Forest, L.U. S. Patent 1,958,710 (1934).

22. Schmerling, L. U.S. Patent 2,595,415. (1952).

23. Hirano, H. Behavior of sodium in the silica alumina gels prepared by the instantaneous mixing cogelation-influence of sodium on surface area, solid acid and catalytic properties. Nippon kagaku kaishi. (November 1998). 737-744.

24. Mistler, R.E., and Shanefield, D.J. Washing Ceramic Powders to Remove Sodium Salts. J. Am. Ceram.Soc. 57 (July 1978) : 689

25. Harland, C.E., Ion Exchange Theory and Practice.England.

26. Alberti, G., et.al. Ion exchange of crystalline zirconium phosphate with alkaline earth metal ions. J.inorg.nucl.chem. 35 (1973) : 1327-1338.

27. Sherry, H.S., Ion Exchange. New jersey, 1960.

28. Atkinson, R.J., et. al. Kinetics of isotopic exchange of phosphate at the α-FeOOH-aqueous solution interface. J.inorg.Nucl.Chem. 34 (1972) : 2201-22111.

29. Eschenburg, R.L., et.al. Physical properties of an illitic clay due to spectic base-exchange cations. J. Am.Ceram.Soc. 39(November 1956) : 398-402.

30. Leum, L.N., et. al. U. S. Patent 3,037,675.(1963).

31. รศ. ธวัชชัย ศรีวิบูลย์, เคมีวิเคราะห์ 2. สำนักพิมพ์มหาวิทยาลัยรามคำแหง (2541) : 670-684

32. Carel, A.B., and Cabbiness, D.K. Analysis of alumina by combined TG/X-ray diffraction. Ceramic Bulletin. 64 (May 1985) : 716-718.

33. Instruction Manual of X-ray Diffractometer Model XRD-6000 : Shimazu Co.,Ltd.

ภาคผนวก

การ์ดมาตรฐาน JCPDS

33-0018

Wavelength= 1.54056

Al(OH)3

2θ	Int	h	k	l	2θ	Int	h	k	l
18.282	100	0	0	2	59.492*	3	2	0	6
20.299*	70	1	1	0	62.510*	4	2	1	6
20.548*	50	2	0	0	62.510*	4	2	3	2
26.514*	17	2	0	2	63.798*	30	3	2	4
26.895*	30	1	1	2	63.798*	30	3	3	0
28.010*	25	1	1	2	64.651*	18	4	1	5
28.724*	13	1	0	3	66.147*	19	3	3	2
36.406*	25	3	1	1	66.648*	13	3	1	6
36.615*	40	0	2	1	67.815*	6	3	3	2
37.082*	15	0	0	4	68.881*	10	0	2	6
37.683*	55	3	1	1	70.715*	7	1	2	6
38.317*	4	1	2	1	71.109*	4	2	2	6
39.313*	15	3	1	2	72.679*	3	4	1	6
40.107*	20	0	2	2	77.428*	3	6	2	2
41.159*	2	1	2	2	77.795*	2	3	3	4
41.689*	27	3	1	2	78.611*	6	4	2	5
43.373*	4	1	1	4	78.611*	6	2	4	0
44.166*	40	3	1	3	78.952*	7	1	4	2
44.752*	3	2	2	2	81.578*	4	1	1	8
45.439*	28	0	2	3	84.539*	4	6	2	4
46.190*	6	1	2	3	89.586*	3	4	4	0
46.190*	6	2	2	2	90.716*	4	6	3	2
47.305*	15	1	2	3					
50.547*	30	3	2	2					
52.174*	30	0	2	4					
52.665*	4	1	3	4					
53.976*	4	1	2	4					
54.423*	30	3	1	4					
55.381*	9	1	3	0					
55.381*	9	2	2	4					
57.850*	7	4	1	4					
58.093*	7	3	1	5					
58.603*	8	5	0	1					
58.603*	8	2	3	0					

Aluminum Hydroxide

Gibbsite, syn

Rad: CuKa1 1.5406 Filter: d-sp: Diffractometer

Cut off: Int: Diffract I/Icor: 1.0

Ref: Csar, A., Poulsen, K., Dow Chemical Company, Freeport, TX, USA, ICDD Grant-in-Aid, (1979)

Sys: Monoclinic S.G.: $P2_1/n$ (14)

a: 8.6552 b: 5.0722 c: 9.7161 A: 1.7064 C: 1.9156

α: β: 94.607 γ: Z: 8 mp:

Ref: Ibid

Dx: 2.437 Dm: 2.400 SS/FOM: F_{30}= 10(.025,113)

ε: 1.572 nωβ: 1.577 εγ: 1.595 Sign: 2V: 0

Ref: Dana's System of Mineralogy, 7th Ed., I, 663 (1944)

Color: White

Sample of reagent grade chemical from Matheson, Coleman, and Bell. Optical data on artificial material, measured density on crystals. C.D. Cell: a=9.716, b: 5.072, c: 8.655, β: 94.61, a/b: 1.9156, c/b: 1.7064, S.G.: P21/n(14). Silicon used as an internal stand. PSC: mP56. To replace 1-263, 1-264, 1-265, 1-266, 7-324 and 12-460 and calculated by calculated pattern 29-41. Mwt: 78.00. Volume[CD]: 425.17.

29-0063

Wavelength= 1.54056

α-Al2O3

2θ	Int	h	k	l
19.580*	35	1	1	1
31.936*	45	2	2	0
37.603*	65	3	1	1
39.491*	40	2	2	2
45.788*	80	4	0	0
60.457*	10	5	1	1
66.761	100	4	4	0

Aluminum Oxide

Rad: CuKa1 1.5418 Filter: d-sp:

Cut off: Int: I/Icor:

Ref: Rooksby, X-Ray Identification and Crystal Structures of Clay, 264 (1951)

Sys: Cubic S.G.: F

a: 7.924 b: c: A: C:

α: β: γ: Z: mp:

Ref: Ibid

Dx: Dm: SS/FOM: F_{7}= 7(.092, 11)

* Revised from 4-33.
PSC: cF?. See original PDF card for Graphical diffractometer trace. Mwt: 101.96. Volume[CD]: 497.55.

08-0013

ε-Al2O3

Aluminum Oxide

Rad.: CuKa λ: 1.5418 Filter: Ni Beta: IM d-sp:

Cut off: Int.: Estimation: I/Icor.:

Ref: Rooksby, H. X-Ray Identification and Crystal Structures of Clay, 264 (1951).

Sys: S.G.:

a: b: c: A: C:

α: β: γ: Z: mp:

Ref:

Dx: Dm: SS/FOM: F=<1(.)

Synthetic form - produced at low temperature, said to be a mixture of "new" ε alumina and θ alumina.
* Reflections corresponding to those of θ alumina
Deleted by JVS March 8, 1960. Mwt: 101.96.

Wavelength= 1.54056

2θ	Int	h	k	l	2θ	Int	h	k	l
14.437*	20				57.636*	20			
16.220*	20				60.024*	40			
19.580*	20				61.524*	10			
28.309*	10				62.491*	40			
29.257*	40				64.276*	60			
30.063*	10				64.980*	80			
31.361*	50				66.600*	40			
31.936*	70				67.637	100			
32.902*	80				70.236*	20			
34.882	100				72.222*	20			
36.649*	80				73.064*	20			
36.962*	20				73.793*	20			
38.957*	80				75.092*	20			
40.040*	30								
42.611*	90								
44.141*	10								
44.832*	60								
46.433*	10								
47.462*	40								
48.623*	50								
49.931*	10								
50.854*	20								
52.454*	10								
53.750*	10								
56.214*	50								

05-0712

α-Al2O3

Aluminum Oxide

Corundum

Rad.: CuKa1 1.5405 Filter: d-sp:

Cut off: Int.: I/Icor.:

Ref: Swanson, Fuyat, Natl. Bur. Stand. (U.S.), Circ. 539, II, 20 (1953).

Sys: Rhombohedral S.G.: R3c (167)

a: 4.758 b: c: 12.991 A: C: 2.7303

α: β: γ: Z: 6 mp:

Ref: Ibid.

Dx: 3.989 Dm: SS/FOM: F30=49(.0147, 42)

Pattern taken at 26 C. Sample from Mallinckrdot Chem Works, PSC: hR10. Deleted by NBS card Set 10. Mwt: 101.96. Volume[CD]: 254.70.

Wavelength= 1.5405

2θ	Int	h	k	l	2θ	Int	h	k	l
25.583*	74	0	1	2	103.339	2	4	0	4
35.134*	92	1	0	4	111.023	3	3	1	8
37.782*	42	1	1	0	114.119	2	2	2	9
41.682*	<1	0	0	6	116.134	12	3	2	4
43.360	100	1	1	3	116.623	3	0	1	14
52.549*	43	0	2	4	117.894	6	4	1	0
57.515*	81	1	1	6	122.063	4	4	1	3
59.765*	3	2	1	1	124.638	2	0	4	8
61.341*	7	0	1	8	127.722	12	1	3	10
66.544*	32	2	1	4	129.907	4	3	0	12
68.193*	48	3	0	0	136.151	22	4	1	6
74.263*	2	2	0	8	142.383	4	1	1	15
76.877*	16	1	0	10	145.058	11	4	0	10
80.688*	6	2	2	0					
83.204*	<1	3	0	6					
84.371*	4	2	2	3					
85.177*	1	1	3	1					
86.371*	5	3	1	2					
89.013*	6	0	2	10					
90.658*	3	0	0	12					
91.197*	7	1	3	4					
95.255*	13	2	2	6					
98.401*	1	0	4	2					
101.086	11	2	1	10					

ประวัติผู้วิจัย

นางสาวจตุพร โพธิ์ศรี เกิดวันที่ 2 ตุลาคม พ.ศ. 2518 ที่กรุงเทพมหานคร สำเร็จการศึกษาปริญญาตรีวิทยาศาสตรบัณฑิต ภาควิชาวัสดุศาสตร์ คณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย เมื่อปีการศึกษา 2540 เข้าศึกษาต่อในหลักสูตรวิทยาศาสตรมหาบัณฑิต สาขาเทคโนโลยีเซรามิก จุฬาลงกรณ์มหาวิทยาลัย ในปีการศึกษา 2541 สำเร็จการศึกษาในภาคการศึกษาปลาย ปีการศึกษา 2543