

REFERENCES

- Albert, B. (1957). U.S. Patent 2 795 620.
- Barthomeuf, D. (1996). Basic zeolites: Characterization and uses in adsorption and catalysis. Catalysis Reviews. Science and Engineering, 38, 521–609.
- Breck, D. W. (1974). Zeolite Molecular Sieves. New York: John wiley & sons.
- David, H. E.F., and Blangey, L. (1949). Fundamental processes of dye chemistry. New York: Attorney-General.
- Dixit, L., and Rao, T.S.R.P. (1996). Polarability Model of Acidity of Zeolites, Zeolites, 16, 287–293.
- Dunn, O.R. (1968). U.S. Patent 3 368 365.
- Eulenberger, G.R., Keil, J.G., and Shoemaker, D.P. (1967). Journal of Physical Chemistry 71, 1812.
- Funakoshi, K., Takiyama, H., and Matsuoka, M. (2000). Influences of seed crystals on agglomeration phenomena and product purity of *m*-chloronitrobenzene crystals in batch crystallization. Chemical engineering journal, 81, 307–312.
- Guo, Z., Zheng, S., Zheng, Z., Jiang, F., Hu, W., and Ni, L. (2004). Selective adsorption of *p*-Chloronitrobenzene from aqueous mixture of *p*-Chloronitrobenzene and *o*-chloronitrobenzene using HZSM-5 zeolite. Water research, 39, 1174–1182.
- Kraikul, N., Rangsuvigit, P., and Kulprathipanja, S. (2006). Study on the adsorption of 1,5-, 1,6- and 2,6-dimethylnaphthalene on a series of alkaline and alkaline earth ion-exchanged faujasite zeolites. Adsorption, 12, 317–327.
- Kroschwitz, J. I. (Eds.). (1991). Adsorption, Liquid separation. Encyclopedia of chemical technology Volume 1. New York, Chichester, Brisbane, Toronto, and Singapore: John wiley & sons.
- Kroschwitz, J. I. (Eds.). (1993). Crystallization. Encyclopedia of chemical technology Volume 7. New York, Chichester, Brisbane, Toronto, and Singapore: John wiley & sons.

- Kulprathipanja, S., and Johnson, J.A., Schüth, F., Sing, K., and Witkamp, J. (Eds.). (2002). Liquid Separation. Handbook of Porous Solids Volume 4. Weinheim: WILEY-VCH.
- Laborde-Boutet, C., Joly, G., Nicolaos, A., Thomas, M., and Magnoux, P. (2006). Selectivity of Thiophene/Toluene Competitive Adsorptions onto Zeolites. Influence of the alkali Metal Cation in FAU(Y). Industrial & Engineering Chemistry Research, 45, 8111–8116.
- Lerdsakulthong, A. (2007). Adsorptive separation of chloronitrobenzene: Static Equilibrium Study, M.S. Thesis, Chulalongkorn University.
- Loewenstein, W. (1954). Amer. Mineralog. 39, 92.
- Liu, F., Xia, Fei Z., Chen, J., and Li, A. (2007). Adsorption selectivity of salicylic acid and 5-sulfosalicylic acid onto hypercrosslinked polymeric adsorbents. Frontiers of Environmental Science & Engineering in China, 1(1), 73–78.
- Minceva, M., and Rodrigues, A. E. (2004). Adsorption of xylene on faujasite-type zeolite equilibrium and kinetics in batch adsorber. Chemical Engineering Research and Design, 82(A5), 667–681.
- Mortier, W.J. (1978). Zeolite Electronegativity Related to Physicochemical Properties. Journal of Catalysis, 55, 138–145.
- Mullin, J.W. (Eds.). (2001). Crystallization. Oxford: Butterworth-Heinemann.
- Priegnitz, W.J. (1980a). U.S. Patent 4 234 520.
- Priegnitz, W.J. (1980b). U.S. Patent 4 240 986.
- Priegnitz, W.J. (1980c). U.S. Patent 4 225 518.
- Ralt, D., Matthias, G., Thomas, L., Hans, M.W, and Eberhard, Z. (2003). U.S. Patent 0 181 771.
- Robert, O.D. (1968). U.S. Patent 3 368 365.
- Roberto, L. (1974). U.S. Patent 3 816 551.
- Rousseau, R. W. (Eds.). (1987). Crystallization operations. Handbook of separation process technology. New York, Chichester, Brisbane, Toronto, and Singapore: John Wiley & Sons.
- Ruthven, D.M. (1984). Principles of Adsorption and Adsorption Processes. Canada: John Wiley & Sons, Inc., 3–5.

- Takiyama, H., Okada, Y., Arita, H., Uchida, H., and Matsuoka, M. (2002). Morphological changes and local purities of *m*-CNB crystals. Journal of crystal growth, 235, 494–498.
- Thompson, R. W., Karge ,H. G., and Weitkamp, J. (Eds.). (1998). Recent advances in the understanding of zeolite synthesis. Molecular Sieves. Berlin Germany, and New York: Springer, 1–34.
- Titus, E., Kalkar, A.K., and Gaikar, V.G., (2003). Equilibrium studies of adsorption of amino acids on NaZSM-5 zeolite, Colloids and Surfaces A: Physicochemical and Engineering Aspects, 223, 55–61.
- Yang, R.T. (2003). Adsorbents : fundamentals and applications. Canada: John Wiley & Sons, Inc., 157–160.
- Wauquier, J.P. (2000). Petroleum Refining 2 Separation Processes. Paris: Technip. 457–460, 524–534.

Appendix A Adsorption capacities of *m*-CNB and *p*-CNB on the X and Y zeolites from the single component systems, equilibrium constant (K) and determination coefficient (R^2)

Table A1 Adsorption capacities of *m*-CNB, equilibrium constant (K) and determination coefficient (R^2)

Adsorbent	Adsorption Capacity (g/g adsorbent)	Constant (K)	R^2
X zeolite			
Mg	0.13	49	0.990
Ca	0.27	155	0.998
Sr	0.22	892	0.980
Ba	0.11	16	0.946
Y zeolite			
Mg	0.29	161	0.987
Ca	0.28	385	0.989
Sr	0.25	208	0.999
Ba	0.24	522	0.998

Table A2 Adsorption capacities of *p*-CNB, equilibrium constant (K) and determination coefficient (R^2)

Adsorbent	Adsorption Capacity (g/g adsorbent)	Constant (K)	R^2
X zeolite			
Mg	0.12	164	0.990
Ca	0.27	195	1.000
Sr	0.21	199	0.999
Ba	0.14	307	0.998
Y zeolite			
Mg	0.28	32	0.999
Ca	0.28	166	0.999
Sr	0.25	453	0.999
Ba	0.20	50	0.997

CURRICULUM VITAE

Name: Ms. Benyapa Yensukjit

Date of Birth: January 2, 1984

Nationality: Thai

University Education:

2002-2006 Bachelor Degree of Chemical Technology, Faculty of Science,
Chulalongkorn University, Bangkok, Thailand

Presentations:

1. Yensukjit, B., Rangsuvigit, P., Leardsakulthong, A., and Kulprathipanja, S. (2008, November 16-21) Adsorption behaviors of *m*-chloronitrobenzene and *p*-chloronitrobenzene on faujasite zeolites. Poster presented at AIChE Annual Meeting 2008, Philadelphia, Pennsylvania, USA.
2. Yensukjit, B., Rangsuvigit, P., and Kulprathipanja, S. (2009, April 22) Adsorption of *m*- and *p*-chloronitrobenzene on faujasite zeolites and its application on crystallization. Poster presented at The 15th PPC Symposium on Petroleum, Petrochemical, and Polymers, Bangkok, Thailand.

