



DAFTAR PUSTAKA

- Abubakar, A., Pindiga, N.Y. and Danbature, W.L. (2023) ‘Synthesis and Characterization of Zeolite A from Alkali Kaolin using Conventional Hydro Thermal Synthesis Technique’, *Nanochemistry Research*, 8(3), pp. 190–196. Available at: <https://doi.org/10.22036/ncr.2023.03.004>.
- Alfaro, S. *et al.* (2007) ‘Aging time effect on the synthesis of small crystal LTA zeolites in the absence of organic template’, *Materials Letters*, 61(23–24), pp. 4655–4658. Available at: <https://doi.org/10.1016/j.matlet.2007.03.009>.
- Alkan, M. *et al.* (2005) ‘The effect of alkali concentration and solid/liquid ratio on the hydrothermal synthesis of zeolite NaA from natural kaolinite’, *Microporous and Mesoporous Materials*, 86(1–3), pp. 176–184. Available at: <https://doi.org/10.1016/j.micromeso.2005.07.008>.
- Anggoro, D.D. (2019) *Buku Ajar Teori dan Aplikasi Rekayasa Zeolit*. Available at: https://www.researchgate.net/profile/Didi-Anggoro-2/publication/321094902_Teori_dan_Aplikasi_Rekayas_Zeolit/links/5b58306ca6fdccf0b2f35495/Teori-dan-Aplikasi-Rekayas-Zeolit.pdf.
- Ariyanto, S.V., Joni, I. and Yunanto, F. (2023) ‘Xrf and Xrd Testing for Sand Mineral Content Identification At Talang Siring Beach’, *EduFisika: Jurnal Pendidikan Fisika*, 8(2), pp. 226–232. Available at: <https://doi.org/10.59052/edufisika.v8i2.27428>.
- Arnelli, A. *et al.* (2018) ‘Synthesis of Zeolite from Bagasse and Rice Husk Ashes as Surfactant Builder on Detergency Process: Variation of NaOH Concentration for Silica Isolation’, *Jurnal Kimia Sains dan Aplikasi*, 21(3), pp. 139–143. Available at: <https://doi.org/10.14710/jksa.21.3.139-143>.
- Awad, M.E. *et al.* (2017) ‘Kaolinite in pharmaceuticals and biomedicine’, *International Journal of Pharmaceutics*, 533(1), pp. 34–48. Available at: <https://doi.org/10.1016/j.ijpharm.2017.09.056>.
- Bergaya, F., Theng, B.K.G. and Lagaly, G. (2006) *Handbook of Clay Science, Developments in Clay Science*. Available at: [https://doi.org/10.1016/S1572-4352\(05\)01039-1](https://doi.org/10.1016/S1572-4352(05)01039-1).



- Cheng, Y. *et al.* (2019) ‘Dehydroxylation and structural distortion of kaolinite as a high-temperature sorbent in the furnace’, *Minerals*, 9(10). Available at: <https://doi.org/10.3390/min9100587>.
- Derbe, T. *et al.* (2023) ‘Mini Review on Synthesis, Characterization, and Application of Zeolite@MOF Composite’, *Advances in Materials Science and Engineering*, 2023. Available at: <https://doi.org/10.1155/2023/8760967>.
- Dewi, R. *et al.* (2020) ‘Physicochemical characterization of natural kaolin from jaboi indonesia’, *Rasayan Journal of Chemistry*, 13(1), pp. 382–388. Available at: <https://doi.org/10.31788/RJC.2020.1315523>.
- Dongoran, J. *et al.* (2021) ‘Perkembangan Zeolit Sebagai Katalis Alam Potensial’, *Jurnal Jejaring Matematika dan Sains*, 3(2), pp. 28–39.
- Eviva, N., Shofiyani, A. and Sayekti, E. (2023) ‘Synthesis of NaP Zeolite Based on Bauxite Red Mud Using Hydrothermal Method on Mole Ratio of $\text{SiO}_2/\text{Al}_2\text{O}_3$ Variations’, *Positron*, 13(1), p. 77. Available at: <https://doi.org/10.26418/positron.v13i1.60099>.
- Fajriani, I.Y., Syaiful, A.Z. and Ariani, F. (2022) ‘Pemanfaatan Zeolit Yang Teraktivasi Asam Klorida (HCl) Sebagai Adsorben Logam Berat Timbal (Pb)’, *Saintis*, 3(1), pp. 58–69.
- Fitriana, N. and Rusmini, D. (2019) ‘PEMBUATAN ZEOLIT ALAM TERAKTIVASI HCl DAN KARAKTERISASINYA MAKING ACTIVATED NATURAL ZEOLITE AND CHARACTERIZATION’, *UNESA Journal of Chemistry*, 8(1), pp. 2017–2019.
- Fricha Febriani Paula Koloay, Sunarti, J.B.M. (2024) ‘Synthesis of Zeolite-A from Oil Palm Shell Ash for Adsorption of Ferrous Metal Ions in Borehole Water’, *Indonesian Journal of Chemical Research*, 12(2), pp. 89–96. Available at: <https://doi.org/10.30598/ijcr>.
- Garinas, W. (2020) ‘Spesifikasi Bahan Mentah Kaolin Belitung (Uji Bakar Dan Besar Butir) Untuk Bahan Pembuatan Isolator Keramik Porselen’, *Prosiding Temu Profesi Tahunan PERHAPI*, pp. 989–996.
- Gasparini, E. *et al.* (2013) ‘Thermal dehydroxylation of kaolinite under isothermal



- conditions’, *Applied Clay Science*, 80–81, pp. 417–425. Available at: <https://doi.org/10.1016/j.clay.2013.07.017>.
- Geu, M.J. *et al.* (2025) ‘Optimising calcination temperature for high reactivity metakaolin: Influence on amorphous content, mineralogy and microstructure’, *Construction and Building Materials*, 489(March), p. 142431. Available at: <https://doi.org/10.1016/j.conbuildmat.2025.142431>.
- Ginting, S.B. and Nurfiqih, M.Y. (2018) ‘Sintesis Zeolit A Dari Coal Bottom Ash Dengan Metode Step Change Of Synthesis Temperature Dengan Variasi Suhu Kalsinasi Diaplikasikan Untuk Dehidrasi Etanol’, *Mechanical*, 9(1), p. 7. Available at: <https://doi.org/10.23960/mech.v9.i1.201802>.
- Gougazeh, M. and Buhl, J.C. (2014) ‘Synthesis and characterization of zeolite A by hydrothermal transformation of natural Jordanian kaolin’, *Journal of the Association of Arab Universities for Basic and Applied Sciences*, 15(1), pp. 35–42. Available at: <https://doi.org/10.1016/j.jaubas.2013.03.007>.
- Guatame-García, A. *et al.* (2018) ‘Toward an on-line characterization of kaolin calcination process using short-wave infrared spectroscopy’, *Mineral Processing and Extractive Metallurgy Review*, 39(6), pp. 420–431. Available at: <https://doi.org/10.1080/08827508.2018.1459617>.
- Hidayat, C., Wibowo, W. and Safitri, E. (2018) ‘Kajian Pengaruh Variasi Metakaolin Terhadap Kuat Tekan Beton Memadat Mandiri Mutu Tinggi’, *Matriks Teknik Sipil*, 6(3), pp. 502–507. Available at: <https://doi.org/10.20961/mateksi.v6i3.36558>.
- Ibrahim, S.S. *et al.* (2018) ‘Metakaolin as an Active Pozzolan for Cement That Improves Its Properties and Reduces Its Pollution Hazard’, *Journal of Minerals and Materials Characterization and Engineering*, 06(01), pp. 86–104. Available at: <https://doi.org/10.4236/jmmce.2018.61008>.
- Ismawati, R. (2018) ‘Zeolite: Structure and Potential in Agriculture’, *Jurnal Pena Sains*, 5(1), p. 57. Available at: <https://doi.org/10.21107/jps.v5i1.3199>.
- Jamo, H.U. (2017) ‘Structural analysis and surface morphology of quartz’, *Bayero Journal of Pure and Applied Sciences*, 9(2), p. 230. Available at: <https://doi.org/10.4314/bajopas.v9i2.40>.
-



- Jumaeri et al. (2013) ‘Sintesis Zeolit a Dari Abu Layang Batubara Melalui Modifikasi Proses Hidrotermal’, *Sintesis Zeolit a Dari Abu Layang Batubara Melalui Modifikasi Proses Hidrotermal*, 11(2), pp. 155–166.
- Khaled, Z. et al. (2023) ‘Optimization of kaolin into Metakaolin: Calcination Conditions, mix design and curing temperature to develop alkali activated binder’, *Ain Shams Engineering Journal*, 14(6), p. 102142. Available at: <https://doi.org/10.1016/j.asej.2023.102142>.
- Khaleque, A. et al. (2020) ‘Zeolite synthesis from low-cost materials and environmental applications: A review’, *Environmental Advances*, 2(August). Available at: <https://doi.org/10.1016/j.envadv.2020.100019>.
- Kharisma, W.N. (2023) ‘SINTESIS MATERIAL ZEOLIT NAA UNTUK KOMPOSISI $\text{SiO}_2/\text{Al}_2\text{O}_3$ BERVARIASI DENGAN METODE HIDROTERMAL’, *Jurnal Inovasi Fisika Indonesia (IFI)*, 12, pp. 14–23.
- Kianfar, E. and Mahler, A. (2020) ‘Zeolites: properties, applications, modification and selectivity. Zeolites: advances in research and applications, 1.’, (April). Available at: <https://www.researchgate.net/publication/337928117>.
- Kim, B. and Lee, S. (2020) ‘Review on characteristics of metakaolin-based geopolymer and fast setting’, *Journal of the Korean Ceramic Society*, 57(4), pp. 368–377. Available at: <https://doi.org/10.1007/s43207-020-00043-y>.
- Krongkrachang, P. et al. (2019) ‘Synthesis of Zeolite Y from Kaolin via hydrothermal method’, *Materials Today: Proceedings*, 17, pp. 1431–1436. Available at: <https://doi.org/10.1016/j.matpr.2019.06.164>.
- Li, C.X., Zhang, Q.W. and Li, L. (2022) ‘Synthesis of NaA Zeolite from Blast Furnace Slag (BFS) and Its Utilization for Adsorption of Basic Dye (Methylene Blue)’, *Journal of Physics: Conference Series*, 2224(1). Available at: <https://doi.org/10.1088/1742-6596/2224/1/012068>.
- M. Auerbach, S., A. Carrado, K. and K. Dutta, P. (2003) *Handbook of Zeolite Science*.
- Madhu, J. et al. (2022) ‘CO₂ adsorption performance of template free zeolite A and X synthesized from rice husk ash as silicon source’, *RSC Advances*, 12(36), pp. 23221–23239. Available at: <https://doi.org/10.1039/d2ra04052b>.
-



- Maia, A.Á.B. *et al.* (2014) ‘Use of ^{29}Si and ^{27}Al MAS NMR to study thermal activation of kaolinites from Brazilian Amazon kaolin wastes’, *Applied Clay Science*, 87, pp. 189–196. Available at: <https://doi.org/10.1016/j.clay.2013.10.028>.
- Martínez Galeano, Y. *et al.* (2019) ‘Pt encapsulated into NaA zeolite as catalyst for the WGS reaction’, *Applied Catalysis A: General*, 572(September 2018), pp. 176–184. Available at: <https://doi.org/10.1016/j.apcata.2018.12.034>.
- Marvila, M.T. *et al.* (2021) ‘Materials for production of high and ultra-high performance concrete: Review and perspective of possible novel materials’, *Materials*, 14(15). Available at: <https://doi.org/10.3390/ma14154304>.
- Maryani, Y. *et al.* (2024) ‘The Utilization of Zeolite from Laundry Waste Processing as a Soil-zeolite Growing Media for Corn Plant’, *World Chemical Engineering Journal*, 8(1), p. 6. Available at: <https://doi.org/10.62870/wcej.v8i1.25895>.
- Menteri Energi dan Sumber Daya Mineral Republik Indonesia (2024) ‘Keputusan Menteri ESDM Republik Indonesia Nomor: 132.K/GL.01/MEM.G/2024 tentang Neraca Sumber Daya dan Cadangan Mineral dan Batubara Nasional pada Tahun 2023’.
- Mohamed, R.M., Mkhallid, I.A. and Barakat, M.A. (2015) ‘Rice husk ash as a renewable source for the production of zeolite NaY and its characterization’, *Arabian Journal of Chemistry*, 8(1), pp. 48–53. Available at: <https://doi.org/10.1016/j.arabjc.2012.12.013>.
- Nadjib, M. *et al.* (2016) ‘Sintesis Zeolitic Imidazolate Framework-8 (Zif-8) Secara Solvothermal: Pengaruh Perbandingan Logam-Ligan Synthesis Zeolitic Imidazolate Framework-8 (Zif-8) In Solvothermal: The Effect Comparison of Metal-Ligand’, *Jurnal ILMU DASAR*, 17(1), pp. 53–58.
- Nasiri, S., Madandoust, R. and Ranjbar, M.M. (2023) ‘Investigating the Calcination Temperature and Grinding Time of Calcined Clay on the Mechanical Properties and Durability of LC3 Concrete’, *Infrastructures*, 8(10). Available at: <https://doi.org/10.3390/infrastructures8100139>.
- Nur, F. *et al.* (2023) ‘Sintesis Zeolite Y dengan Menggunakan Metode Sol-Gel’,



- Jurnal MIPA dan Pembelajarannya*, 3(7), pp. 330–338. Available at: <https://doi.org/10.17977/um067v3i7p330-338>.
- Nurhadini *et al.* (2019) ‘Pengaruh Metode Aktivasi Kimia Terhadap Sifat Kaolin’, *Prosiding Seminar Nasional Penelitian & Pengabdian Pada Masyarakat*, pp. 2–4.
- Ondruška, J. *et al.* (2021) ‘Thermophysical properties of kaolin–zeolite blends up to 1100°C’, *Crystals*, 11(2), pp. 1–17. Available at: <https://doi.org/10.3390/cryst11020165>.
- Onyutha, C. *et al.* (2024) ‘Improving household water treatment: using zeolite to remove lead, fluoride and arsenic following optimized turbidity reduction in slow sand filtration’, *Sustainable Environment Research*, 34(1). Available at: <https://doi.org/10.1186/s42834-024-00209-x>.
- Otieno, S.O. *et al.* (2023) ‘Hydrothermal synthesis of zeolites using silica extracted from tropical volcanic ash’, *Materials Advances*, 4(10), pp. 2292–2300. Available at: <https://doi.org/10.1039/d3ma00065f>.
- Pakpahan, J.K. (2017) ‘Studi Luas Permukaan Spesifik Zeolit Akibat Pengaruh Mikrostruktur dan Potensinya Sebagai Elektrode Superkapasitor’, *Jurnal Teori dan Aplikasi Fisika*, 5(1), pp. 19–24.
- Putri, R. *et al.* (2024) ‘Synthesis of Zeolite from Fly Ash and Bottom Ash and Application for Biodiesel Transesterification’, *Journal of Chemical Engineering and Environment*, 19(1), pp. 45–53.
- Sabilu, Y. (2016) ‘Aplikasi Zeolit Meningkatkan Hasil Tanaman pada Tanah Ultisol APLIKASI ZEOLIT MENINGKATKAN HASIL TANAMAN PADA TANAH ULTISOL’, *Jurnal Biowallacea*, 3(2), pp. 396–407.
- Saraswati, I. (2015) ‘Zeolite-A Synthesis from Glass’, *Jurnal Sains dan Matematika*, 23(4), pp. 112–115.
- Setiawan, Y. *et al.* (2017) ‘Preparasi dan Karakterisasi Nanozeolit dari Zeolit Alam Gunungkidul dengan Metode Top-Down’, *Indonesian Journal of Chemical Science*, 6(2), pp. 1–8.
- Setyaningsih, S. and Dewanti, A. (2022) ‘Sintesis dan Karakterisasi Zeolit Mordenit (Mor) Secara Hidrotermal Menggunakan Kaolin dan Abu Sekam



- Padi sebagai Sumber Silika’, *Molluca Journal of Chemistry Education*, 12(1), pp. 23–32. Available at: <https://ojs3.unpatti.ac.id/index.php/mjoce/article/view/4865>.
- Sperinck, S. *et al.* (2011) ‘Dehydroxylation of kaolinite to metakaolin - A molecular dynamics study’, *Journal of Materials Chemistry*, 21(7), pp. 2118–2125. Available at: <https://doi.org/10.1039/c0jm01748e>.
- Sun, Z., Jollands, M. and Palke, A.C. (2024) ‘CHEMICAL ANALYSIS IN THE GEOLOGICAL LABORATORY : XRF AND LA-ICP-MS’, 60(4), pp. 536–559.
- Thommes, M. *et al.* (2015) ‘Physisorption of gases , with special reference to the evaluation of surface area and pore size distribution (IUPAC Technical Report)’, 87, pp. 1051–1069. Available at: <https://doi.org/10.1515/pac-2014-1117>.
- Treacy, M.M.J. (2001) *Collection of Simulated XRD Powder Patterns for Zeolites*. 4th edn. New York: Elsevier.
- Wulan Sari, T.I., Muhsin, M. and Wijayanti, H. (2018) ‘PENGARUH METODE AKTIVASI PADA KEMAMPUAN KAOLIN SEBAGAI ADSORBEN BESI (Fe) AIR SUMUR GARUDA’, *Konversi*, 5(2), p. 20. Available at: <https://doi.org/10.20527/k.v5i2.4768>.
- Xu, H. *et al.* (2020) ‘Advances in the synthesis of ferrierite zeolite’, *Molecules*, 25(16), pp. 19–25. Available at: <https://doi.org/10.3390/molecules25163722>.