

## DAFTAR PUSTAKA

- AbuKhadra, M. R., Basyouny, M. G., El-Sherbeeny, A. M., El-Meligy, M. A., & Abd Elgawad, A. E. E. (2020). Transesterification of commercial waste cooking oil into biodiesel over innovative alkali trapped zeolite nanocomposite as green and environmental catalysts. *Sustainable Chemistry and Pharmacy*, 17(April), 100289.
- Adhani, L., Aziz, I., Nurbayti, S., & Octavia, C. A. (2016). Pembuatan Biodiesel dengan Cara Adsorpsi dan Transesterifikasi Dari Minyak Goreng Bekas. *Jurnal Kimia Valensi*, 2(1), 71–80.
- Agustina, I. (2018). Sintesis zeolit dari limbah abu terbang (fly ash) batu bara sebagai adsorben untuk pengurangan ion logam berat dari air gambut dengan metode hidrotermal menggunakan mode kolom. In *Jurnal Pembangunan Wilayah & Kota*. 3(2), 45-53.
- Al-Sakkari, E. G., Abdeldayem, O. M., El-Sheltawy, S. T., Abadir, M. F., Soliman, A., Rene, E. R., & Ismail, I. (2020). Esterification of high FFA content waste cooking oil through different techniques including the utilization of cement kiln dust as a heterogeneous catalyst: A comparative study. *Fuel*, 279(April), 118519.
- Alimova, I., & Brito Antonio Ribeiro Ana Maria Queiroz, P. (2016). Production of Biodiesel through Esterification Catalysed by Ionic Liquids [Disertasi]. Polytechnic Institute of Bragança. 66 hal.
- Alterary, S. S., & Marei, N. H. (2021). Fly ash properties, characterization, and applications: A review. *Journal of King Saud University - Science*, 33(6), 101536.
- Andarini, N., Haryati, T., & Lutfia, Z. (2018). Sintesis zeolit A dari abu terbang (fly ash) batubara variasi rasio molar Si/Al. *Jurnal Ilmu Dasar*, 19(2), 105–110.
- Andrifar, M., Goembira, F., Ulfah, M., Putri, R., Yuliarningsih, R., & Aziz, R. (2022). Optimization of sustainable biodiesel production from waste cooking oil using heterogeneous alkali catalyst. *Jurnal Rekayasa Proses*, 16(2), 1–6.
- Angaru, G. K. R., Choi, Y. L., Lingamdinne, L. P., Choi, J. S., Kim, D. S., Koduru, J. R., Yang, J. K., & Chang, Y. Y. (2021). Facile synthesis of economical feasible fly ash-based zeolite-supported nano zerovalent iron and nickel bimetallic composite for the potential removal of heavy metals from industrial effluents. *Chemosphere*, 267, 128889.
- Antono, V. (2014). Analisa Kegagalan Platen Tube Superheater PLTU Teluk Sirih. Power Plant, 6.
- Anya, A. U., Ugwumma, C., Oriah, V. N., Ifeanyi, A., & Chioma, N. (2013). Effect of Free

- Fatty Acid Content on the Yield of Biodiesel Derived from Neem Oil. *Jurnal of Basic and Applied Chemistry*, 3(1), 1–4.
- Athar, M., & Zaidi, S. (2020). A review of the feedstocks, catalysts, and intensification techniques for sustainable biodiesel production. *Journal of Environmental Chemical Engineering*, 8(6), 104523.
- Aziyar, A., & Lisha, S. Y. (2019). Pemanfaatan Limbah Abu Dasar Batubara (Bottom Ash) Sebagai Adsorben Logam Fe Pada Limbah Cair Pltu Teluk Sirih, Sumatera Barat. *Jurnal Aerasi*, 1(1), 14.
- Babajide, O., Musyoka, N., Petrik, L., & Ameer, F. (2012). Novel zeolite Na-X synthesized from fly ash as a heterogeneous catalyst in biodiesel production. *Catalysis Today*, 190(1), 54–60.
- Badan Standardisasi Nasional. (2014). SNI 2460:2014 Spesifikasi abu terbang batubara dan pozolan alam mentah atau yang telah dikalsinasi untuk digunakan dalam beton. 16 hal.
- Bayuseno, S. O. W. dan. (2014). Analisis Kegagalan Material Pipa Ferrule Nickel Alloy N06025 Pada Waste Heat Boiler Akibat Suhu Tinggi Berdasarkan Pengujian : Mikrografi Dan Kekerasan. *Jurnal Teknik Mesin Undip*, 1(4), 33–39.
- Belviso, C. (2018). State-of-the-art applications of fly ash from coal and biomass: A focus on zeolite synthesis processes and issues. *Progress in Energy and Combustion Science*, 65, 109–135.
- Belviso, C., Cavalcante, F., & Fiore, S. (2010). Synthesis of zeolite from Italian coal fly ash: differences in crystallization temperature using seawater instead of distilled water. *Waste Management* (New York, N.Y.), 30(5), 839–847.
- Bhandari, R., Volli, V., & Purkait, M. K. (2015a). Preparation and characterization of fly ash based mesoporous catalyst for transesterification of soybean oil. *Journal of Environmental Chemical Engineering*, 3(2), 906–914.
- Bhandari, R., Volli, V., & Purkait, M. K. (2015b). Preparation and characterization of fly ash based mesoporous catalyst for transesterification of soybean oil. *Journal of Environmental Chemical Engineering*, 3(2), 906–914.
- Bhandari, R., Volli, V., & Purkait, M. K. (2015c). Preparation and characterization of fly ash based mesoporous catalyst for transesterification of soybean oil. *Journal of Environmental Chemical Engineering*, 3(2), 906–914.
- Bhatia, S. K., Gurav, R., Choi, T. R., Kim, H. J., Yang, S. Y., Song, H. S., Park, J. Y., Park, Y. L., Han, Y. H., Choi, Y. K., Kim, S. H., Yoon, J. J., & Yang, Y. H. (2020). Conversion

- of waste cooking oil into biodiesel using heterogenous catalyst derived from cork biochar. *Bioresource Technology*, 302, 122872.
- Bhatt, A., Priyadarshini, S., Acharath Mohanakrishnan, A., Abri, A., Sattler, M., & Techapaphawit, S. (2019). Physical, chemical, and geotechnical properties of coal fly ash: A global review. *Case Studies in Construction Materials*, 11, e00263.
- Bohra, S., Kundu, D., & Naskar, M. K. (2014). One-pot synthesis of NaA and NaP zeolite powders using agro-waste material and other low cost organic-free precursors. *Ceramics International*, 40(1 PART A), 1229–1234.
- Boycheva, S., Zgureva, D., Lazarova, H., & Popova, M. (2021). Chemosphere Comparative studies of carbon capture onto coal fly ash zeolites Na-X and Na + Ca-X. *Chemosphere*, 271, 129505.
- Breeze, P. (2019). Coal-Fired Power Plants. *Power Generation Technologies*. hal 33-70
- Castro-Muñoz, R., & Boczkaj, G. (2021). Pervaporation zeolite-based composite membranes for solvent separations. *Molecules*, 26(5), 1–19.
- Chareonpanich, M., Jullaphan, O., & Tang, C. (2011). Bench-scale synthesis of zeolite A from subbituminous coal ashes with high crystalline silica content. *Journal of Cleaner Production*, 19(1), 58–63.
- Chen, G. Y., Shan, R., Shi, J. F., & Yan, B. B. (2015). Transesterification of palm oil to biodiesel using rice husk ash-based catalysts. *Fuel Processing Technology*, 133, 8–13.
- Chen, W., Song, G., Lin, Y., Qiao, J., Wu, T., Yi, X., & Kawi, S. (2021). Synthesis and catalytic performance of Linde-type A zeolite (LTA) from coal fly ash utilizing microwave and ultrasound collaborative activation method. *Catalysis Today*, July.
- Christyaningsih, R. Y. (2020). Aplikasi Fisika Kuantum-Hamburan Pada " X-Ray Diffaction ( XRD )". *Berkala Fisika*, 17(2), 2-6.
- Coker, E. N., & Rees, L. V. C. (2005). Kinetics of ion exchange in quasi-crystalline aluminosilicate zeolite precursors. *Microporous and Mesoporous Materials*, 84(1–3), 171–178.
- Collins, F., Rozhkovskaya, A., Outram, J. G., & Millar, G. J. (2020). A critical review of waste resources, synthesis, and applications for Zeolite LTA. *Microporous and Mesoporous Materials*, 291, 109667.
- Dang, T. H., Chen, B. H., & Lee, D. J. (2013). Application of kaolin-based catalysts in biodiesel production via transesterification of vegetable oils in excess methanol. *Bioresource Technology*, 145, 175–181.

- Đặng, T. H., Chen, B. H., & Lee, D. J. (2017). Optimization of biodiesel production from transesterification of triolein using zeolite LTA catalysts synthesized from kaolin clay. Journal of the Taiwan Institute of Chemical Engineers, 79(March 2017), 14–22.
- De, A., & Boxi, S. S. (2020). Application of Cu impregnated TiO<sub>2</sub> as a heterogeneous nanocatalyst for the production of biodiesel from palm oil. Fuel, 265(October 2019), 117019.
- Efison, H. (2022). Manfaatkan Limbah, PLN Perkenalkan Paving Blok dari FABA. Padek. <https://industri.kontan.co.id/news/penghapusan-faba-dari-daftar-limbah-b3-disebut-menutup-celah-praktik-mafia?page=2>. [diakses 26 Maret 2021].
- Elma, M., Suhendra, S. A., & Wahyuddin, W. (2018). Proses Pembuatan Biodiesel Dari Campuran Minyak Kelapa Dan Minyak Jelantah. Konversi, 5(1), 8.
- Endarwati, O. (2021). Sederet Alasan Limbah Batu Bara PLTU Keluar dari Daftar Bahan Berbahaya dan Beracun. Sindo News.Com.[diakses 26 Maret 2021].
- Kementerian ESDM. (2020). Pedoman Umum Penanganan dan Penyimpanan Biodiesel dan B30 FINAL. Jakarta 144 hal.
- Fandi, S. N. (2018). Pemanfaatan Limbah FlyAsh Sebagai Adsorben Logam Fe Pada Limbah Cair. In Analytical Biochemistry (Vol. 11, Issue 1).
- Foo, W. H., Chia, W. Y., Tang, D. Y. Y., Koay, S. S. N., Lim, S. S., & Chew, K. W. (2021). The conundrum of waste cooking oil: Transforming hazard into energy. Journal of Hazardous Materials, 417(May), 126129.
- Ginting, S. B. (2020). Sintesis dan karakterisasi zeolit LTA dari coal bottom ash teraktivasi dengan aging system. Jurnal Teknologi Dan Inovasi Industri (JTII), 1(1).
- Go, Y. W., & Yeom, S. H. (2019). Fabrication of a solid catalyst using coal fly ash and its utilization for producing biodiesel. Environmental Engineering Research, 24(2), 324–330.
- Gollakota, A. R. K., Munagapati, V. S., Volli, V., Gautam, S., Wen, J. C., & Shu, C. M. (2021). Coal bottom ash derived zeolite (SSZ-13) for the sorption of synthetic anion Alizarin Red S (ARS) dye. Journal of Hazardous Materials, 416(April), 125925.
- Hamda, T. C. (2020). Sebaran limbah panas pada pasang dan surut di area PLTU Teluk Sirih, Padang Sumatera Barat. Fakultas Perikanan, 21(1), 1–9.
- Haruna, I., Fatima, M., & Ndam, V. (2015). Effect Of High Free Fatty Acid Feedstock On Methyl Esters Yield Using Bulk Calcium Oxide Catalyst. International Journal of Scientific & Technology Research, 4(3), 186–189.

- Haryono, Natanael, C. L., Rukiah, & Yulianti, Y. B. (2018). Kalsium oksida mikropartikel dari cangkang telur sebagai katalis pada sintesis biodiesel dari minyak goreng bekas. *Jurnal Material Dan Energi Indonesia*, 8(1), 8–15.
- Hassani, M. (2013). A Two-step Catalytic Production of Biodiesel from Waste Cooking Oil. *International Journal of Engineering*, 26(6 (C)), 1–8.
- Haul, R. (1969). Adsorption, Surface Area and Porosity. Second Edition. London: Academic Press. 313P.
- Hidayati Qisthi Hanifa, N. M. (2019). Transesterifikasi Minyak Jelantah Menjadi Biodiesel Menggunakan Gelombang Ultrasonik dan Katalis Na<sub>2</sub>O/Fly Ash. Prosiding Seminar Nasional Teknik Kimia “Kejuangan,” 4(2019: PROSIDING SNTKK 2019), E3.
- Hill, A.H., Jiao, F., Bruce, P.G., Harrison, A., Kockelmann, W., Ritter, C. (2008). Calculated from ICSD using POWD-12++. *Chem.mater.*, 20.
- Hsiao, M. C., Kuo, J. Y., Hsieh, S. A., Hsieh, P. H., & Hou, S. S. (2020). Optimized conversion of waste cooking oil to biodiesel using modified calcium oxide as catalyst via a microwave heating system. *Fuel*, 266(July 2019), 117114.
- Ikuta, D., Kawame, N., Banno, S., Hirajima, T., Ito, K., Rakovan, J.F., Downs, R.T., Tamada, O. (2007). First in situ X-ray identification of coesite and retrograde quartz on a glass thin section of an ultrahigh-pressure metamorphic rock and their crystal structure details. *Chem.mater.* 19–21.
- Indira, V., & Abhitha, K. (2022). A review on recent developments in Zeolite A synthesis for improved carbon dioxide capture: Implications for the water-energy nexus. *Energy Nexus*, 7(May), 100095.
- Iqbal, A., Sattar, H., Haider, R., & Munir, S. (2019). Synthesis and characterization of pure phase zeolite 4A from coal fly ash. *Journal of Cleaner Production*, 219, 258–267.
- Jamil, U., Husain Khoja, A., Liaquat, R., Raza Naqvi, S., Nor Nadyaini Wan Omar, W., & Aishah Saidina Amin, N. (2020). Copper and calcium-based metal organic framework (MOF) catalyst for biodiesel production from waste cooking oil: A process optimization study. *Energy Conversion and Management*, 215(April), 112934.
- Ju, T., Meng, Y., Han, S., Lin, L., & Jiang, J. (2021). On the state of the art of crystalline structure reconstruction of coal fly ash: A focus on zeolites. *Chemosphere*, 283(June), 131010.
- Kamaronzaman, M. F. F., Kahar, H., Hassan, N., Hanafi, M. F., & Sapawe, N. (2020).

- Biodiesel production from waste cooking oil using nickel doped onto eggshell catalyst. *Materials Today: Proceedings*, 31(1), 342–346.
- Kar, K. K. (2022). Hanbook of fly ash. In *Gastronomía ecuatoriana y turismo local*. (Vol. 1, Issue 69).
- Keera, S. T., El Sabagh, S. M., & Taman, A. R. (2018). Castor oil biodiesel production and optimization. *Egyptian Journal of Petroleum*, 27(4), 979–984.
- Kesserwan, F., Ahmad, M. N., Khalil, M., & El-Rassy, H. (2020). Hybrid CaO/Al<sub>2</sub>O<sub>3</sub> aerogel as heterogeneous catalyst for biodiesel production. *Chemical Engineering Journal*, 385, 123834.
- Klarens, K., Indranata, M., Antoni, & Hardjito, D. (2016). Pemanfaatan Bottom Ash dan Fly Ash Tipe C Sebagai Bahan Pengganti dalam Pembuatan Paving Block. *Jurnal Dimensi Pratama Teknik Sipil*, 5(2), 1–8.
- Knothe, G. (2010). Introduction. In *The Biodiesel Handbook: Second Edition*.
- Krol, M. (2020). Natural vs. Synthetic Zeolites. *Crystals*, 10(622), 1–8.
- Kunecki, P., Panek, R., Wdowin, M., & Franus, W. (2017). Synthesis of faujasite (FAU) and tschernichite (LTA) type zeolites as a potential direction of the development of lime Class C fly ash. *International Journal of Mineral Processing*, 166, 69–78.
- Kusumaningtyas, M. P. (2017). Analisis Struktur Nano Batu Apung Lombok Menggunakan Metode BET ( Brunauer-Emmet Teller).
- Lee, C. T. (2017). Synthesis of zeolite from waste LCD panel glass. *Applied Chemistry for Engineering*, 28(5), 521–528.
- Lestari, D. Y. (2010). Kajian Modifikasi dan Karakterisasi Zeolit Alam dari Berbagai Negara. Prosiding Seminar Nasional Kimia Dan Pendidikan Kimia 2010, 6.
- Li, H., Liu, F., Ma, X., Cui, P., Guo, M., Li, Y., Gao, Y., Zhou, S., & Yu, M. (2020). An efficient basic heterogeneous catalyst synthesis of magnetic mesoporous Fe@C support SrO for transesterification. *Renewable Energy*, 149, 816–827.
- Li, M., Zheng, Y., Chen, Y., & Zhu, X. (2014). Biodiesel production from waste cooking oil using a heterogeneous catalyst from pyrolyzed rice husk. *Bioresource Technology*, 154, 345–348.
- Listiawati, A. P. (2013). Pengaruh Kecepatan Sentrifugasi Terhadap Karakteristik Biodiesel Jarak Pagar (*Jatropha Curcas L.*). *Jurnal CHEMTECH*, 1, 1–476.
- Liu, F., Ma, S., Ren, K., & Wang, X. (2020). Mineralogical phase separation and leaching characteristics of typical toxic elements in Chinese lignite fly ash. *Science of the Total*

- Environment, 708(2), 135095.
- Liu, Z., Li, S., Li, L., Wang, J., Zhou, Y., & Wang, D. (2019a). One-step high efficiency crystallization of zeolite A from ultra-fine circulating fluidized bed fly ash by hydrothermal synthesis method. *Fuel*, 257(August).
- Liu, Z., Li, S., Li, L., Wang, J., Zhou, Y., & Wang, D. (2019b). One-step high efficiency crystallization of zeolite A from ultra-fine circulating fluidized bed fly ash by hydrothermal synthesis method. *Fuel*, 257(April).
- Ma, Z., Zhang, X., Guo, Y., & Cheng, F. (2020). Extraction of Valuable Metals and Preparation of Mesoporous Materials from Circulating Fluidized Bed-Derived Fly Ash via an Acid-Alkali-Based Alternate Method. *ACS Omega*, 5(48), 31295–31305.
- Mahesar, S. A., Sherazi, S. T. H., Khaskheli, A. R., Kandhro, A. A., & Uddin, S. (2014). Analytical approaches for the assessment of free fatty acids in oils and fats. *Analytical Methods*, 6(14), 4956–4963.
- Maheshwari, P., Haider, M. B., Yusuf, M., Klemeš, J. J., Bokhari, A., Beg, M., Al-Othman, A., Kumar, R., & Jaiswal, A. K. (2022). A review on latest trends in cleaner biodiesel production: Role of feedstock, production methods, and catalysts. *Journal of Cleaner Production*, 355(April).
- Mahlia, T. M. I., Syazmi, Z. A. H. S., Mofijur, M., Abas, A. E. P., Bilad, M. R., Ong, H. C., & Silitonga, A. S. (2020). Patent landscape review on biodiesel production: Technology updates. *Renewable and Sustainable Energy Reviews*, 118(October 2019), 109526.
- Maneerung, T., Kawi, S., Dai, Y., & Wang, C. H. (2016). Sustainable biodiesel production via transesterification of waste cooking oil by using CaO catalysts prepared from chicken manure. *Energy Conversion and Management*, 123, 487–497.
- Manique, M. C., Lacerda, L. V., Alves, A. K., & Bergmann, C. P. (2017). Biodiesel production using coal fly ash-derived sodalite as a heterogeneous catalyst. *Fuel*, 190, 268–273.
- Marchetti, J. M. (2010). Biodiesel production technologies. *Biodiesel Production Technologies*, July, 1–166.
- Mgbemere, H. E., Ekpe, I. C., & Lawal, G. I. (2017). Zeolite Synthesis, Characterisation and Application Areas: A Review. *International Research Journal of Environmental Sciences*, 6(10), 45–59.
- Milton, R. M. (1959). Molecular Sieve Adsorbents. United States Patent No. 2882243.
- Munir, S. (2010). Penggunaan Bahan Pengisi Abu Terbang Dalam Industri Karet. *Penggunaan Bahan Pengisi Abu Terbang Dalam Industri Karet*, Prosiding SNAPP 2010. Edisi

- Eksakta.49–53.
- Murayama, N., Yamamoto, H., & Shibata, J. (2002). Zeolite synthesis from coal fly ash by hydrothermal reaction using various alkali sources. *Journal of Chemical Technology and Biotechnology*, 77(3), 280–286.
- Murukutti, M. K., & Jena, H. (2021). Synthesis of nano-crystalline zeolite-A and zeolite-X from Indian coal fly ash, its characterization and performance evaluation for the removal of Cs<sup>+</sup> and Sr<sup>2+</sup> from simulated nuclear waste. *Journal of Hazardous Materials*, 423(PA), 127085.
- Nasrullah, H. (2019). Automotive Experiences. *Automotive Experiences*, 2(2), 41–46.
- Ningsih, S. widya. (2021). Laporan kegiatan magang program magang mahasiswa bersertifikat batch 1 Tahun 2021 PT Semen Padang oleh: Selviyah Widiya Nengsih program magang mahasiswa bersertifikat batch 1 Tahun 2021.
- NPTEL. (2015). Lecture 1: Introduction to catalysis. *Chemical Engineering: Catalyst Science and Technology*, 1–30.
- Ojha, K., Pradhan, N. C., & Samanta, A. N. (2004). Zeolite from fly ash: Synthesis and characterization. *Bulletin of Materials Science*, 27(6), 555–564.
- Patchimpet, J., Simpson, B. K., Sangkharak, K., & Klomklao, S. (2020). Optimization of process variables for the production of biodiesel by transesterification of used cooking oil using lipase from Nile tilapia viscera. *Renewable Energy*, 153, 861–869.
- Pedrolo, D. R. S., De Menezes Quines, L. K., De Souza, G., & Marcilio, N. R. (2017). Synthesis of zeolites from Brazilian coal ash and its application in SO<sub>2</sub> adsorption. *Journal of Environmental Chemical Engineering*, 5(5), 4788–4794.
- Permadi, R. 2014. Identifikasi Kualitas (ditinjau dari Kematangan) Batubara untuk Pengolahan CBM. SM IAGI UNDIP.
- Republik Indonesia. 2021. Peraturan Pemerintah Nomor 22 Tahun 2021 Tentang Penyelenggaraan Perlindungan dan Pengelolaan Lingkungan Hidup, Jakarta.
- Prihanto, A., & Irawan, T. A. B. 2018. Pengaruh Temperatur, Konsentrasi Katalis Dan Rasio Molar Metanol-Minyak Terhadap Yield Biodisel Dari Minyak Goreng Bekas Melalui Proses Netralisasi-Transesterifikasi. *Metana*, 13(1), 30.
- Putra, I. M. W. A. 2017. Production of Biodiesel From Waste Cooking Oil by Transesterification Reaction Using CaO/Natural Zeolite Catalyst. *Cakra Kimia*, 5(2), 51–57.
- Putri, R. D., Taufiq, I., & Norokhim. 2019. Analisis radionuklida pada Fly Ash dan Bottom

- Ash PLTU Teluk Sirih menggunakan spektrometer gamma. *Jurnal Fisika Unand*, 8(4), 387–393.
- Rahman, W. U., Fatima, A., Anwer, A. H., Athar, M., Khan, M. Z., Khan, N. A., & Halder, G. 2019. Biodiesel synthesis from eucalyptus oil by utilizing waste egg shell derived calcium based metal oxide catalyst. *Process Safety and Environmental Protection*, 122, 313–319.
- Ramírez Verduzco, L. F. 2013. Density and viscosity of biodiesel as a function of temperature: Empirical models. *Renewable and Sustainable Energy Reviews*, 19, 652–665.
- Ran. 2018. Komisi VII Tinjau Pengelolaan PLTU Teluk Sirih. Dewan Perwakilan Rakyat Republik Indonesia. <https://www.dpr.go.id/berita/detail/id/23395>. [diakses 26 Maret 2021].
- Rasyid, R. 2011. Perbandingan X-Ray Fluorescence (Xrf) Dan Inductively Coupled Plasma-Optical Emission Spectrophotometer (Icp-Oes) Untuk Analisis Nikel Dan Besi Dalam Sampel Converter Slag Pada Industri Pertambangan Nikel. [Skripsi]. Fakultas Matematika dan Ilmu Pengetahuan Alam. Universitas Islam Yogyakarta. 64 hal.
- Ren, X., Liu, S., Qu, R., Xiao, L., Hu, P., Song, H., Wu, W., Zheng, C., Wu, X., & Gao, X. 2020. Synthesis and characterization of single-phase submicron zeolite Y from coal fly ash and its potential application for acetone adsorption. *Microporous and Mesoporous Materials*, 295, 109940.
- Renilaili. 2022. Pemanfaatan minyak jelantah menjadi biodiesel bahan bakar cair alternatif. *Jurnal Tekno*. 19(April), 11–19.
- Retum, C., & Regime, B. 1980. *Hydrodynamics*. Chapter 2. 35 hal.
- Rizky Fitri Febrianti, Titin Anita Zaharah, A. 2022. Sintesis zeolit A berbahan dasar abu terbang limbah PT. Indonesia Chemical Alumina (ICA) menggunakan metode alkali hidrotermal. *Indonesian Journal of Pure and Applied Chemistry*. 5(1).
- Roschat, W., Siritanon, T., Yoosuk, B., Sudyoedsuk, T., & Promarak, V. 2017. Rubber seed oil as potential non-edible feedstock for biodiesel production using heterogeneous catalyst in Thailand. *Renewable Energy*, 101, 937–944.
- Roy, T., Sahani, S., Madhu, D., & Chandra Sharma, Y. (2020). A clean approach of biodiesel production from waste cooking oil by using single phase BaSnO<sub>3</sub> as solid base catalyst: Mechanism, kinetics & E-study. *Journal of Cleaner Production*, 265(2020), 121440.
- Ryu, T., Ahn, N. H., Seo, S., Cho, J., Kim, H., Jo, D., Park, G. T., Kim, P. S., Kim, C. H., Bruce, E. L., Wright, P. A., Nam, I. S., & Hong, S. B. (2017). Fully Copper-Exchanged High-Silica LTA Zeolites as Unrivaled Hydrothermally Stable NH<sub>3</sub>-SCR Catalysts.

- Angewandte Chemie - International Edition, 56(12), 3256–3260.
- Sahu, O. (2021). Characterisation and utilization of heterogeneous catalyst from waste rice-straw for biodiesel conversion. Fuel, 287(May), 119543.
- Samik, Ediati, R., & Prasetyoko, D. (2014). Review : Pengaruh Kebasaan dan Luas Permukaan Katalis Terhadap Aktivitas Katalis Basa Heterogen untuk Produksi Biodiesel. Prosiding Seminar Nasional Kimia UNESA. 1–6.
- Sanjiwani, N., Suaniti, N., & Rustini, N. (2015). Bilangan Peroksida, Bilangan Asam, Dan Kadar FFA Biodiesel Dengan Penambahan Antioksidan Dari Kulit Buah Pisang Kepok (Musa Paradisiaca Linn.). Jurnal Kimia, 9(2), 259–266.
- Scholze. (1955). Observation of ordering in silicon and germanium mullites. 381.
- Setiawati, E., & Edwar, F. (2012). Teknologi Pengolahan Biodiesel Dari Minyak Goreng Bekas dengan Teknik Mikrofiltrasi dan Transesterifikasi sebagai Alternatif Bahan Bakar Mesin Diesel. Riset Industri, VI(2), 117–127.
- Shan, R., Lu, L., Shi, Y., Yuan, H., & Shi, J. (2018). Catalysts from renewable resources for biodiesel production. Energy Conversion and Management, 178(July), 277–289.
- Sharma, Y. C., Singh, B., & Upadhyay, S. N. (2008). Advancements in development and characterization of biodiesel: A review. Fuel, 87(12), 2355–2373.
- Sholeha, N. A. (2017). Karakteristik pori pada zeolit: modifikasi dan aplikasi Novia Amalia Sholeha. Jurnal Ilmiah. 4-12.
- Simatupang, R. (2019). Pengaruh Penyaluhan Terhadap Perilaku Ibu Rumah Tangga Tentang Penggunaan Minyak Goreng Lebih dari 2 Kali Pemakaian di Desa Kebun Pisang Tahun 2017. Jurnal Ilmiah Simantek, 3(1), 1–6.
- Singh, D., Sharma, D., Soni, S. L., Inda, C. S., Sharma, S., Sharma, P. K., & Jhalani, A. 2021. A comprehensive review of biodiesel production from waste cooking oil and its use as fuel in compression ignition engines: 3rd generation cleaner feedstock. Journal of Cleaner Production, 307(April), 127299.
- Singh, N., Shehnazdeep, & Bhardwaj, A. (2020). Reviewing the role of coal bottom ash as an alternative of cement. Construction and Building Materials, 233, 117276.
- Situmorang, B. N. 2014. Sintesis ZSM-5 dari abu terbang batu bara PLTU PT.Bukit Asam (persero) dengan variasi waktu kristalisasi dan waktu kristalisasi dan rasio SiO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub>. [Skripsi]. Jurusan Teknik Kimia. Politeknik Sriwijaya. 51 hal.
- Badan Standarisasi Nasional. 2015. SNI 7182: 2015 Tentang Standar Mutu Biodiesel. Jakarta.
- Suarsa, I. W. 2017. Teori Tumbukan Pada Laju Reaksi Kimia. [Skripsi]. Fakultas Matematika

- dan Ilmu Pengetahuan Alam. Universitas Udayana. 65 hal.
- Subagyono. 2006. Penggunaan Zeolit Alam yang Telah Diaktivasi dengan Larutan HCl untuk Menjerap Logam-Logam Penyebab Kesadahan Air. [Skripsi]. Fakultas Matematika dan Ilmu Pengetahuan Alam. Universitas Negeri Semarang. 81 hal.
- Suh, J. K., Jeong, S. Y., Park, C. H., Hwan, J., Examiner, P., Griffin, S. P., & Firm-finnegan, O. (2000). United States Patent ( 19 ).
- Supelano, G. I., Gómez Cuaspud, J. A., Moreno-Aldana, L. C., Ortiz, C., Trujillo, C. A., Palacio, C. A., Parra Vargas, C. A., & Mejía Gómez, J. A. (2020). Synthesis of magnetic zeolites from recycled fly ash for adsorption of methylene blue. Fuel, 263(September 2019), 116800.
- Tanaka, H., Eguchi, H., Fujimoto, S., & Hino, R. (2006). Two-step process for synthesis of a single phase Na – A zeolite from coal fly ash by dialysis. Fuel. 85, 1329–1334.
- Tao, Y., Kanoh, H., Abrams, L., & Kaneko, K. (2006). Mesopore-modified zeolites: Preparation, characterization, and applications. Chemical Reviews, 106(3), 896–910.
- Taufik, L. 2020. Adsorpsi Nitrit Menggunakan Abu Dasar (Bottom Ash) Batubara Teraktivasi NaOH Dan HCL. [Skripsi]. Universitas Islam Indonesia, Yogyakarta.
- Thomas, M., Jewell, R., & Jones, R. 2017. Coal fly ash as a pozzolan. In Coal Combustion Products (CCPs): Characteristics, Utilization and Beneficiation. Canada: University of New Brunswick.
- Van Gerpen, J., Knothe, G., Haas, M. J., Schultz, A. K., Banavali, R., Topp, K. D., & Vandersall, M. T. (2010). Biodiesel Production. In The Biodiesel Handbook: Second Edition.
- Vargas, E. M., Ospina, L., Neves, M. C., Tarelho, L. A. C., & Nunes, M. I. (2021). Optimization of FAME production from blends of waste cooking oil and refined palm oil using biomass fly ash as a catalyst. Renewable Energy, 163, 1637–1647.
- Volli, V., & Purkait, M. K. (2015). Selective preparation of zeolite X and A from flyash and its use as catalyst for biodiesel production. Journal of Hazardous Materials, 297, 101–111.
- Wang, C. F., Li, J. S., Wang, L. J., & Sun, X. Y. (2008). Influence of NaOH concentrations on synthesis of pure-form zeolite A from fly ash using two-stage method. Journal of Hazardous Materials, 155(1–2), 58–64.
- Wongsa, A., Wongkvanklom, A., Tanangteerapong, D., & Chindaprasirt, P. (2020). Comparative study of fire-resistant behaviors of high-calcium fly ash geopolymers mortar

- containing zeolite and mullite. *Journal of Sustainable Cement-Based Materials*, 9(5), 307–321.
- Wongwichien, J., Asavapisit, S., & Sombatsompop, K. (2014). Synthesis and use of zeolite na-A from waste sludge of water treatment plant for ammonium removal. *Chiang Mai Journal of Science*, 41(5–2), 1262–1273.
- Xiang, Y., Xiang, Y., & Wang, L. (2017). Microwave radiation improves biodiesel yields from waste cooking oil in the presence of modified coal fly ash. *Journal of Taibah University for Science*, 11(6), 1019–1029.
- Yaakob, Z., Mohammad, M., Alherbawi, M., Alam, Z., & Sopian, K. (2013). Overview of the production of biodiesel from Waste cooking oil. *Renewable and Sustainable Energy Reviews*, 18, 184–193.
- Zakaria, A., Djasmasari, W., & Purwamargapratala, Y. (2011). Karakterisasi Zeolit Sintetis dari Abu Terbang Batu Bara Menggunakan Difraksi Sinar - X. Prosiding Seminar Nasional Hamburan Neutron Dan Sinar-X Ke 8, 41–44.
- Zalfiatri, Y., Restuhadi, F., & Zulhardi, R. (2019). Karakteristik Biodiesel dari Minyak Jelantah menggunakan Katalis Abu Gosok dengan Variasi Penambahan Metanol. *Chempublish Journal*, 4(1), 1–8.
- Zhang, P., Chen, X., Leng, Y., Dong, Y., Jiang, P., & Fan, M. (2020a). Biodiesel production from palm oil and methanol via zeolite derived catalyst as a phase boundary catalyst: An optimization study by using response surface methodology. In *Fuel* (Vol. 272, Issue January). Elsevier.
- Zhang, P., Chen, X., Leng, Y., Dong, Y., Jiang, P., & Fan, M. (2020b). Biodiesel production from palm oil and methanol via zeolite derived catalyst as a phase boundary catalyst: An optimization study by using response surface methodology. *Fuel*, 272(January), 117680.
- Zhang, Y., Dubé, M. A., McLean, D. D., & Kates, M. (2003). Biodiesel production from waste cooking oil: 1. Process design and technological assessment. *Bioresource Technology*, 89(1), 1–16.