DAFTAR PUSTAKA

Amjith, L. R., & Bavanish, B. (2022). A review on biomass and wind as renewable energy for sustainable environment. *Chemosphere, 293*. https://doi.org/10.1016/j.chemosphere.2022.133579.

Asif, F. C., & Saha, G. C. (2023). Graphene-like Carbon Structure Synthesis from Biomass Pyrolysis: A Critical Review on Feedstock-Process-Properties Relationship. C, 9(1), 31. https://doi.org/10.3390/c9010031.

Baerlocher, Ch, McCusker, L.B., Olson, D.H. (2007). Atlas of Zeolite Framework Types. *Elsevier*. https://doi.org/10.1016/B978-0-444-53064-6.X5186-X.

Bo, C., Sha, Y., Song, F., Zhang, M., Hu, L., Jia, P., & Zhou, Y. (2022). Renewable benzoxazine-based thermosets from cashew nut: Investigating the self-healing, shape memory, recyclability and antibacterial activity. *Journal of Cleaner Production, 341*. https://doi.org/10.1016/j.jclepro.2022.130898.

Boas, A. C. M., Tarelho, L. A. C., Moura, J. M. O., Gomes, H. G. M. F., Marques, C. C., Pio, D. T., Nunes, M. I. S., & Silvestre, A. J. D. (2025). Methodologies for bio-oil characterization from biomass pyrolysis: A review focused on GC-MS. In *Journal of Analytical and Applied Pyrolysis* (Vol. 185). Elsevier B.V. https://doi.org/10.1016/j.jaap.2024.106850.

Chang, R. (2010). CHEMISTRY (10th ed.). *McGraw-Hill*. https://chemistry.com.pk/books/chemistry-10e-raymond- chang/#google_vignette.

Chiu, S.C., Yu, H.C., Li, Y.Y. (2010). High electromagnetic wave absorption performance of silicon carbide nanowires in the gigahertz range. *The Journal of Physical Chemistry, C 114, 1947-1952*. https://doi.org/10.1021/jp905127t.

Direktorat Jenderal Energi Baru Terbarukan dan Konservasi Energi (ETBKE). (2020). *Transisi Energi Mutlak Diperlukan*. https://ebtke.esdm.go.id/post/2020/10/22/2667/menteri.arifin.transisi.energi.mutlak.diperlukan?lang=en. 15 Juni 2023 (20.45).

Dong, Q., Li, H., Niu, M., Luo, C., Zhang, J., Qi, B., Li, X., & Zhong, W. (2018). Microwave pyrolysis of moso bamboo for syngas production and bio-oil

upgrading over bamboo-based biochar catalyst. *Bioresource Technology, 266, 284-290*. https://doi.org/10.1016/j.biortech.2018.06.104.

Escalante, J., Chen, W. H., Tabatabaei, M., Hoang, A. T., Kwon, E. E., Andrew Lin, K. Y., & Saravanakumar, A. (2022). Pyrolysis of lignocellulosic, algal, plastic, and other biomass wastes for biofuel production and circular bioeconomy: A review of thermogravimetric analysis (TGA) approach. *Renewable and Sustainable Energy Reviews, 169*. https://doi.org/10.1016/j.rser.2022.112914.

Fang, Z., Liu, F., Li, Y., Li, B., Yang, T., & Li, R. (2021). Influence of microwave-assisted pyrolysis parameters and additives on phosphorus speciation and transformation in phosphorus-enriched biochar derived from municipal sewage sludge. *Journal of Cleaner Production, 287.* https://doi.org/10.1016/j.jclepro.2020.125550.

Farag, S., Mudraboyina, B. P., Jessop, P. G., & Chaouki, J. (2016). Impact of the heating mechanism on the yield and composition of bio-oil from pyrolysis of kraft lignin. *Biomass and Bioenergy, 95, 344-353*. https://doi.org/10.1016/j.biombioe.2016.07.005.

Fricler, V. Y., Nyashina, G. S., Vershinina, K. Y., Vinogrodskiy, K. V., Shvets, A. S., & Strizhak, P. A. (2023). Microwave pyrolysis of agricultural waste: Influence of catalysts, absorbers, particle size and blending components. *Journal of Analytical and Applied Pyrolysis, 171*. https://doi.org/10.1016/j.jaap.2023.105962.

Gani, A., Erdiwansyah, Desvita, H., Munawar, E., Mamat, R., Nizar, M., Darnas, Y., & Sarjono, R. E. (2024). Comparative analysis of HHV and LHV values of biocoke fuel from palm oil mill solid waste. Case Studies in *Chemical and Environmental Engineering, 9*. https://doi.org/10.1016/j.cscee.2023.100581.

Ge, L., Zhao, C., Zuo, M., Du, Y., Tang, J., Chu, H., Wang, Y., Xu, C. (2023). Effects of Fe addition on pyrolysis characteristics of lignin, cellulose and hemicellulose. *J. Energy Inst, 107, 101177*. https://doi.org/10.1016/J.JOEI.2023.101177.

Ge, S., Yek, P.N.Y., Cheng, Y.W., Xia, C., Wan Mahari, W.A., Liew, R.K., Peng, W., Yuan, T. Q., Tabatabaei, M., Aghbashlo, M., Sonne, C., Lam, S.S. (2023). Progress in microwave pyrolysis conversion of agricultural waste to value-added biofuels: a batch to continuous approach, Renew. Sustain. *Energy Rev. 135, 110148*. https://doi.org/10.1016/J.RSER.2020.110148.

Gomez, L. A. A., Celis-Carmona, D. D., Rodríguez-Sánchez, Y. F., Castro-Ladino, J. R., & Solarte-Toro, J. C. (2024). Biochar production from cassava waste biomass: A techno-economic development approach in the Colombian context. *Bioresource Technology Reports, 26.* https://doi.org/10.1016/j.biteb.2024.101872.

Guo F, Dong Y, Tian B, Du S, Liang S, Zhou N. (2020). Applications of microwave energy in gas production and tar removal during biomass gasification. *Sustain Energy Fuels, 4(12):5927-46*. https://doi.org/10.1039/D0SE01024C.

Halim, S. A., Mohd, N. A., & Razali, N. A. (2022). A comparative assessment of biofuel products from rice husk and oil palm empty fruit bunch obtained from conventional and microwave pyrolysis. *Journal of the Taiwan Institute of Chemical Engineers, 134*. https://doi.org/10.1016/j.jtice.2022.104305.

Hendrawati, Liandi, A. R., Solehah, M., Setyono, M. H., Aziz, I., & Siregar, Y. D. I. (2023). Pyrolysis of PP and HDPE from plastic packaging waste into liquid hydrocarbons using natural zeolite Lampung as a catalyst. *Case Studies in Chemical and Environmental Engineering*, *7*. https://doi.org/10.1016/j.cscee.2022.100290.

Hsu, C. P., Huang, A. N., & Kuo, H. P. (2015). Analysis of the rice husk pyrolysis products from a fluidized bed reactor. *Procedia Engineering, 102, 1183-1186*. https://doi.org/10.1016/j.proeng.2015.01.244.

Hu, J., He, Y., Zhang, J., Chen, L., Zhou, Y., Zhang, J., Tao, H., Zhou, N., Mi, B., & Wu, F. (2023). In-situ catalytic pyrolysis of biomass with nickel salts: Effect of nickel salt type. *Journal of Analytical and Applied Pyrolysis, 172*. https://doi.org/10.1016/j.jaap.2023.106029.

Ibraeva, K., Astafev, A., Dimitryuk, I., Tabakaev, R., Kalinich, I., & Shanenkov, I. (2024). Comparative analysis of conventional and microwave pyrolysis of

raw materials with different degree of metamorphism. *Energy Conversion and Management, 301*. https://doi.org/10.1016/j.enconman.2024.118067.

Institute for Essential Service Reform (IESR). (2024). *Indonesia Energy Transition Outlook 2024*.

Kamdem, B. M., Lemaire, R., & Nikiema, J. (2025). Insight into the production factors influencing the physicochemical properties of densified briquettes comprising wood shavings and rice husk. *Industrial Crops and Products, 223, 120134*. https://doi.org/10.1016/j.indcrop.2024.120134.

Kamruzzaman, M., Shahriyar, M., Bhuiyan, A. A., Bhattacharjya, D. K., Islam, M. K., & Alam, E. (2024). Energy potential of biomass from rice husks in bangladesh: An experimental study for thermochemical and physical characterization. *Energy Reports, 11, 3450-3460*. https://doi.org/10.1016/j.egyr.2024.03.019.

Kartal, F., & Ozveren, U. (2022). Prediction of activation energy for combustion and pyrolysis by means of machine learning. *Thermal Science and Engineering Progress, 33*. https://doi.org/10.1016/j.tsep.2022.101346.

Kementerian PPN-Bappenas. (2015). *Kajian Pengembangan Bahan Bakar Nabati.*

Kementrian Energi dan Sumber Daya Alam. 2021. *Road Map Pengembangan dan Pemanfaatan Batubara*.

Kumar, V., Sharma, N., Abdelaal, A. S., Chakraborty, P., Thomas, J., Duhan, L., Pasrija, R., Dogra, S., & Jayaraj, I. (2025). Bio-oil production and catalytic upgrade to value added product: A review on recent technologies. In *Journal of the Energy Institute* (Vol. 118). Elsevier B.V. https://doi.org/10.1016/j.joei.2024.101880.

Li, Y., Yu, J. (2021). Emerging applications of zeolites in catalysis, separation and host–guest assembly. *Nat. Rev. Mater. 6, 1156-1174*. https://doi.org/10.1038/s41578-021-00347-3.

Liang, J., Shan, G., & Sun, Y. (2021). Catalytic fast pyrolysis of lignocellulosic biomass: Critical role of zeolite catalysts. In *Renewable and Sustainable Energy Reviews* (Vol. 139). Elsevier Ltd. https://doi.org/10.1016/j.rser.2021.110707.

Miandad, R., Barakat, M. A., Rehan, M., Aburiazaiza, A. S., Ismail, I. M. I., & Nizami, A. S. (2017). Plastic waste to liquid oil through catalytic pyrolysis using natural and synthetic zeolite catalysts. *Waste Management, 69, 66-78*. https://doi.org/10.1016/j.wasman.2017.08.032

Minh Loy, A. C., Yusup, S., Fui Chin, B. L., Wai Gan, D. K., Shahbaz, M., Acda, M. N., Unrean, P., & Rianawati, E. (2018). Comparative study of in-situ catalytic pyrolysis of rice husk for syngas production: Kinetics modelling and product gas analysis. *Journal of Cleaner Production, 197, 1231-1243*. https://doi.org/10.1016/j.jclepro.2018.06.245.

Mirza, Z. T., Anderson, T., Seadon, J., & Brent, A. (2024). A thematic analysis of the factors that influence the development of a renewable energy policy. In *Renewable Energy Focus* (Vol. 49). Elsevier Ltd. https://doi.org/10.1016/j.ref.2024.100562.

Moshoeshoe, M., Silasus Nadiye-Tabbiruka, M., & Obuseng, V. (2017). A Review of the Chemistry, Structure, Properties and Applications of Zeolites. *American Journal of Materials Science, 2017(5), 196-221*. https://doi.org/10.5923/j.materials.20170705.12

Omri, A., & Ben Jabeur, S. (2024). Climate policies and legislation for renewable energy transition: The roles of financial sector and political institutions. *Technological Forecasting and Social Change, 203.* https://doi.org/10.1016/j.techfore.2024.123347.

Ozyuguran, A., & Yaman, S. (2017). Prediction of Calorific Value of Biomass from Proximate Analysis. *Energy Procedia*, *107*, 130–136. https://doi.org/10.1016/j.egypro.2016.12.149.

Park, K. B., Chae, D. Y., Fini, E. H., & Kim, J. S. (2024). Pyrolysis of biomass harvested from heavy-metal contaminated area: Characteristics of bio-oils and biochars from batch-wise one-stage and continuous two-stage pyrolysis. *Chemosphere, 355.* https://doi.org/10.1016/j.chemosphere.2024.141715.

Park, K. B., Chae, D. Y., Fini, E. H., & Kim, J. S. (2024). Pyrolysis of biomass harvested from heavy-metal contaminated area: Characteristics of bio-oils

and biochars from batch-wise one-stage and continuous two-stage pyrolysis. *Chemosphere, 355*. https://doi.org/10.1016/j.chemosphere.2024.141715.

Peng, Z., Hwang, J. Y., & Andriese, M. (2013). Design of double-layer ceramic absorbers for microwave heating. *Ceramics International, 39(6), 6721-6725*. https://doi.org/10.1016/j.ceramint.2013.01.114

Perez-Botella, E., Valencia, S., Rey, F. (2022). Zeolites in adsorption processes: state of the art and future prospects. *Chem. Rev. 122 (24), 17647-17695*. https://doi.org/10.1021/acs.chemrev.2c00140.

Primo, A., Garcia, H. (2014). Zeolites as catalysts in oil refining. *Chem. Soc. Rev. 43 (22), 7548-7561.* https://doi.org/10.1039/C3CS60394F.

Qureshi, T., Farooq, M., Imran, S., Riaz, F., Farhan, M., & Asim, M. (2024). Thermal performance analysis of optimized biomass conversion in developing organic waste biorefinery to achieve sustainable development goals. *Case Studies in Thermal Engineering, 55*. https://doi.org/10.1016/j.csite.2024.104127.

Rahman, A., Farrok, O., & Haque, M. M. (2022). Environmental impact of renewable energy source based electrical power plants: Solar, wind, hydroelectric, biomass, geothermal, tidal, ocean, and osmotic. In *Renewable and Sustainable Energy Reviews* (Vol. 161). Elsevier Ltd. https://doi.org/10.1016/j.rser.2022.112279.

Rajamanikandan, T., Banumathi, S., Karthikeyan, B., Palanisamy, R., Bajaj, M., Zawbaa, H. M., & Kamel, S. (2023). Investigation of dielectric and mechanical properties of Lignocellulosic Rice Husk Fibril for high and medium voltage electrical insulation applications. *Journal of Materials Research and Technology, 22, 865–878*. https://doi.org/10.1016/j.jmrt.2022.11.145.

Remya, N., & Lin, J. G. (2011). Current status of microwave application in wastewater treatment-A review. In *Chemical Engineering Journal* (Vol. 166, Issue 3, pp. 797-813). https://doi.org/10.1016/j.cej.2010.11.100.

Ren, X., Huang, L., Yuan, H., Yin, H., Fan, H., Liu, Y., Xin, Y., Tang, Y., & Wang, C. (2024). Sodium alginate derived SiC-carbon composite aerogel for

effective microwave absorption. *Journal of Magnetism and Magnetic Materials, 596*. https://doi.org/10.1016/j.jmmm.2024.171970

Rocha, M. V., Vinuesa, A. J., Pierella, L. B., & Renzini, M. S. (2020). Enhancement of bio-oil obtained from co-pyrolysis of lignocellulose biomass and LDPE by using a natural zeolite. *Thermal Science and Engineering Progress, 19, 100654*. https://doi.org/10.1016/j.tsep.2020.100654.

Ruiz, B., Fuente, E., Pérez, A., Taboada-Ruiz, L., Sanz, J. M., Calvo, L. F., & Paniagua, S. (2023). Employment of conventional and flash pyrolysis for biomass wastes from the textile industry with sustainable prospects. *Journal of Analytical and Applied Pyrolysis, 169*. https://doi.org/10.1016/j.jaap.2023.105864.

Sahoo, D., & Remya, N. (2020). Influence of operating parameters on the microwave pyrolysis of rice husk: biochar yield, energy yield, and property of biochar. https://doi.org/10.1007/s13399-020-00914-8/Published.

Schanche JS. (2003). Microwave synthesis solutions from Personal Chemistry. *Mol Divers*. 7(2-4):293-300.

Sezer, S., Kartal, F., & Özveren, U. (2021). The investigation of co-combustion process for synergistic effects using thermogravimetric and kinetic analysis with combustion index. *Thermal Science and Engineering Progress, 23*. https://doi.org/10.1016/j.tsep.2021.100889.

Sharifishourabi, M., Dincer, I., & Mohany, A. (2024). Performance and environmental impact evaluations of a novel multigeneration system with sonic hydrogen production and energy storage options. *Journal of Energy Storage, 78*. https://doi.org/10.1016/j.est.2023.109987.

Siddique, I. J., Salema, A. A., Antunes, E., & Vinu, R. (2022). Technical challenges in scaling up the microwave technology for biomass processing. In *Renewable and Sustainable Energy Reviews* (Vol. 153). Elsevier Ltd. https://doi.org/10.1016/j.rser.2021.111767.

Singh, B. (2018). Rice husk ash. Indian Institute of Technology Roorkee. https://doi.org/10.1016/B978-0-08-102156-9.00013-4.

Singh, S., Bhaskar, R., Narayanan, K. B., Kumar, A., & Debnath, K. (2024). Development of silicon carbide (SiC)-based composites as microwave-absorbing materials (MAMs): a review. *Journal of the European Ceramic Society*. https://doi.org/10.1016/j.jeurceramsoc.2024.05.032

Sui, H., Hu, Q., Chen, W., Chang, C., Pang, S., & Li, P. (2024). Microwave-assisted catalytic pyrolysis with char-supported Fe-Mn catalysts: A new method for utilizing furfural residue. *Fuel, 362*. https://doi.org/10.1016/j.fuel.2023.130820.

Szostak, R. (1998). Molecular Sieves. *Blackie Academic & Professional, p. 2*. https://doi.org/10.1002/(SICI)1099-0739(199903)13:3<209::AID-AOC817>3.0.CO.

Turns, S.R. (2012). *An Introduction to Combustion 3rd Edition, McGraw-Hill Publishing Co.*

Tursi, A. (2019). A review on biomass: Importance, chemistry, classification, and conversion. *Biofuel Research Journal, 6(2), 962–979*. https://doi.org/10.18331/BRJ2019.6.2.3.

Ullah, H. A. S., Salam, B., Islam, M. N., & Islam. M. S. (2014). Alternative fuel from pyrolysis of rice husk. https://www.researchgate.net/publication/286376613.

Vollmer, M. (2003). Physics of a microwave oven. https://doi.org/10.1088/0031-9120/39/1/006.

Wang, S., Wan, Z., Han, Y., Jiao, Y., Li, Z., Fu, P., Li, N., Zhang, A., Yi, W. (2023). A review on lignin waste valorization by catalytic pyrolysis: catalyst, reaction system, and industrial symbiosis mode. *J. Environ. Chem. Eng. 11, 109113*. https://doi.org/10.1016/J.JECE.2022.109113.

Wang, W., Wang, M., Huang, J., Li, X., Cai, L., Shi, S. Q., Cui, Y., Chen, L., & Ni, Y. (2020). High efficiency pyrolysis of used cigarette filters for ester-rich bio-oil through microwave-assisted heating. *Journal of Cleaner Production, 257*. https://doi.org/10.1016/j.jclepro.2020.120596.

WorldBank. (2018). *Agricultural land.*

Yana, S., Nizar, M., Irhamni, & Mulyati, D. (2022). Biomass waste as a renewable energy in developing bio-based economies in Indonesia: A review. In *Renewable and Sustainable Energy Reviews* (Vol. 160). Elsevier Ltd. https://doi.org/10.1016/j.rser.2022.112268.

Yokoyama, S. (2008). Buku Panduan Biomassa Asia: Panduan untuk Produksi dan Pemanfaatan Biomassa. *The Japan Institute of Energy*. https://www.jie.or.jp/relays/download/?file=/files/libs/732/20170830090127 1178.pdf.

Yu, Z., Jiang, L., Wang, Y., Li, Y., Ke, L., Yang, Q., Peng, Y., Xu, J., Dai, L., Wu, Q., Liu, Y., Ruan, R., Xia, D., & Jiang, L. (2020). Catalytic pyrolysis of woody oil over SiC foam-MCM41 catalyst for aromatic-rich bio-oil production in a dual microwave system. *Journal of Cleaner Production, 255*. https://doi.org/10.1016/j.jclepro.2020.120179.

Yuzer, N., Cinar, Z., Akoz, F., Biricik, H., Gurkan, Y. Y., Kabay, N., & Kizilkanat, A. B. (2013). Influence of raw rice husk addition on structure and properties of concrete. *Construction and Building Materials*, *44*, 54–62. https://doi.org/10.1016/j.conbuildmat.2013.02.070.

Zhang, Y., Fu, W., Cui, L., Maqsood, T., & Li, B. (2023). Experimental microwave-assisted air gasification of biomass for syngas production. *Fuel, 339*. https://doi.org/10.1016/j.fuel.2022.126954.

Zhang, Y., Zhou, C., Deng, Z., Li, X., Liu, Y., Qu, J., Li, X., Wang, L., Dai, J., Fu, J., Zhang, C., Yu, M., & Yu, H. (2022). Influence of corn straw on distribution and migration of nitrogen and heavy metals during microwave-assisted pyrolysis of municipal sewage sludge. *Science of the Total Environment, 815*. https://doi.org/10.1016/j.scitotenv.2021.152303

Zhao, D. L., Zhang, J. M., Li, X., & Shen, Z. M. (2010). Electromagnetic and microwave absorbing properties of Co-filled carbon nanotubes. *Journal of Alloys and Compounds, 505(2), 712-716*. https://doi.org/10.1016/j.jallcom.2010.06.122

Zhou, Y., Lin, F., Ling, Z., Zhan, M., Zhang, G., & Yuan, D. (2024). Comparative study by microwave pyrolysis and conventional pyrolysis of pharmaceutical

sludge: Resourceful disposal and antibiotic adsorption. *Journal of Hazardous Materials, 468*. https://doi.org/10.1016/j.jhazmat.2024.133867.

Zong, P., Jiang, Y., Tian, Y., Li, J., Yuan, M., Ji, Y., Chen, M., Li, D., & Qiao, Y. (2020). Pyrolysis behavior and product distributions of biomass six group components: Starch, cellulose, hemicellulose, lignin, protein and oil. *Energy Conversion and Management, 216*. https://doi.org/10.1016/j.enconman.2020.112777.