

- Abnisa, F. (2015). *Study on Pyrolysis of Oil Palm Solid Wastes and Co-Pyrolysis of Palm Shell With Plastic and Tyre Waste*. (First) [University Of Malaya Kuala Lumpur]. <http://studentsrepo.um.edu.my/5915/>
- Abnisa, F., & Wan Daud, W. M. A. (2014). A review on co-pyrolysis of biomass: An optional technique to obtain a high-grade pyrolysis oil. *Energy Conversion and Management*, 87, 71–85. <https://doi.org/10.1016/j.enconman.2014.07.007>
- Abnisa, F., Wan Daud, W. M. A., & Sanu, J. . (2013). Pyrolysis of Mixtures of Palm Shell and Polystyrene: An Optional Method to Produce a High-Grade of Pyrolysis Oil. *Environmental Progress & Sustainable Energy*, 33(3), 1026–1033. <https://doi.org/10.1002/ep>
- Abubakar, Z., Salema, A. A., & Ani, F. N. (2013). A new technique to pyrolyse biomass in a microwave system: Effect of stirrer speed. *Bioresource Technology*, 128, 578–585. <https://doi.org/10.1016/j.biortech.2012.10.084>
- Al-Khalid, T., & El-Naas, M. H. (2012). Aerobic biodegradation of phenols: A comprehensive review. *Critical Reviews in Environmental Science and Technology*, 42(16), 1631–1690. <https://doi.org/10.1080/10643389.2011.569872>
- An, Y., Tahmasebi, A., & Yu, J. (2017). Mechanism of synergy effect during microwave co-pyrolysis of biomass and lignite. *Journal of Analytical and Applied Pyrolysis*, 128(August), 75–82. <https://doi.org/10.1016/j.jaap.2017.10.023>
- Anonim. (2019a). *Aliphatic Hydrocarbons*. CHEMISTRY LibreTexts. [https://chem.libretexts.org/Courses/Sacramento_City_College/SCC%3A_CHEM_330_-_Adventures_in_Chemistry_\(Alviar-Agnew\)/09%3A_Organic_Chemistry/9.02%3A_Aliphatic_Hydrocarbons](https://chem.libretexts.org/Courses/Sacramento_City_College/SCC%3A_CHEM_330_-_Adventures_in_Chemistry_(Alviar-Agnew)/09%3A_Organic_Chemistry/9.02%3A_Aliphatic_Hydrocarbons)
- Anonim. (2019b). *Ethylene Glycol*. CHEMISTRY LibreTexts. https://chem.libretexts.org/Courses/Monterey_Peninsula_College/MPC_CHEM_30B_Organic_and_Biological_Chemistry_for_Health_Sciences/04%3A_Alcohols_and_Ethers/4.05%3A_Glycols_and_Glycerol
- Anonim. (2019c). *Furan*. CHEMISTRY LibreTexts. [https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Organic_Chemistry_\(McMurry\)/15%3A_Benzene_and_Aromaticity/15.05%3A_Aromatic_Heterocycles_-_Pyridine_and_Pyrrole](https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Organic_Chemistry_(McMurry)/15%3A_Benzene_and_Aromaticity/15.05%3A_Aromatic_Heterocycles_-_Pyridine_and_Pyrrole)
- Anonim. (2021a). *Aldehydes*. CHEMISTRY Libretexts.

[https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Map%3A_Organic_Chemistry_\(McMurry\)/19%3A_Aldehydes_and_Ketones-](https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Map%3A_Organic_Chemistry_(McMurry)/19%3A_Aldehydes_and_Ketones-)

[_Nucleophilic_Addition_Reactions/19.02%3A_Preparing_Aldehydes_and_Ketones](https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Map%3A_Organic_Chemistry_(McMurry)/19%3A_Aldehydes_and_Ketones-)

Anonim. (2021b). *Conversion of Alcohols into Esters*. CHEMISTRY Libretexts.

[https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Map%3A_Organic_Chemistry_\(McMurry\)/17%3A_Alcohols_and_Phenols/17.06%3A_Reactions_of_Alcohols](https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Map%3A_Organic_Chemistry_(McMurry)/17%3A_Alcohols_and_Phenols/17.06%3A_Reactions_of_Alcohols)

Anonim. (2021c). *Polycyclic Aromatic Hydrocarbons*. CHEMISTRY LibreTexts.

[https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Map%3A_Organic_Chemistry_\(McMurry\)/15%3A_Benzene_and_Aromaticity/15.06%3A_Polycyclic_Aromatic_Compounds](https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Map%3A_Organic_Chemistry_(McMurry)/15%3A_Benzene_and_Aromaticity/15.06%3A_Polycyclic_Aromatic_Compounds)

Aritonang, M. L. A. (2020). *Pengaruh Variasi Daya Microwave Oven Dan Temperatur Katalitik Pada Pirolisis Limbah Kemasan Aseptik (Tetrapak) Menggunakan Microwave Oven Dengan Absorber Karbon Aktif (Cangkang Kelapa)*. UGM.

Basu, P. (2013a). Biomass Handling. In *Biomass Gasification, Pyrolysis and Torrefaction* (Issue 1). Elsevier Inc. <https://doi.org/10.1016/b978-0-12-396488-5.00012-5>

Basu, P. (2013b). Pyrolysis. In *Pyrolysis: Types, Processes, and Industrial Sources and Products*. Elsevier Inc. <https://www.sciencedirect.com/science/article/pii/B9780128129920000054>

Boey, P. L., Maniam, G. P., & Hamid, S. A. (2011). Performance of calcium oxide as a heterogeneous catalyst in biodiesel production: A review. *Chemical Engineering Journal*, 168(1), 15–22. <https://doi.org/10.1016/j.cej.2011.01.009>

Bridgwater, A. V. (2012). Review of fast pyrolysis of biomass and product upgrading. *Biomass and Bioenergy*, 38, 68–94. <https://doi.org/10.1016/j.biombioe.2011.01.048>

Caroko, N., Saptoadi, H., & Rohmat, T. A. (2020a). A Review on Microwave-Assisted Co-Pyrolysis of Biomass-Polymers. *International Review of Mechanical Engineering (IREME)*, Vol 14(5), 339–350. <https://doi.org/https://doi.org/10.15866/ireme.v14i5.19002>

Caroko, N., Saptoadi, H., & Rohmat, T. A. (2020b). Kinetics of microwave co-pyrolysis of palm oil industry solid waste and polyethylene terephthalate waste. *Journal of Advanced Research in Fluid Mechanics and Thermal Sciences*, 71(1), 72–82. <https://doi.org/10.37934/ARFMTS.71.1.7282>

Chang, R. (2010). Chemistry. In *McGraw-Hill* (Vol. 10, Issue 13).

Delbecq, F., Wang, Y., Muralidhara, A., El Ouardi, K. E., Marlair, G., & Len, C. (2018).

- Hydrolysis of hemicellulose and derivatives-a review of recent advances in the production of furfural. *Frontiers in Chemistry*, 6(MAY). <https://doi.org/10.3389/fchem.2018.00146>
- Desideri, U., & Stroe, C. (2011). Conventional pyrolysis of spruce wood and hazelnut shell delivering oily products. *Journal of Sustainable Energy*, 2(2), 2–6.
- Dirjenbun. (2020). *Statistik Perkebunan Unggulan Nasional*. <http://ditjenbun.pertanian.go.id/?publikasi=buku-statistik-perkebunan-2019-2021>
- ESDM, K. (2019). *Outlook Energi Indonesia* (p. 5). esdm.go.id/assets/media/content/content-outlook-energi-indonesia-2019-bahasa-indonesia.pdf
- Fan, L., Chen, P., Zhou, N., Liu, S., Zhang, Y., Liu, Y., Wang, Y., Omar, M. M., Peng, P., Addy, M., Cheng, Y., & Ruan, R. (2018). In-situ and ex-situ catalytic upgrading of vapors from microwave-assisted pyrolysis of lignin. *Bioresource Technology*, 247(August 2017), 851–858. <https://doi.org/10.1016/j.biortech.2017.09.200>
- Feofilova, E. P., & Mysyakina, I. S. (2016). Lignin: Chemical structure, biodegradation, and practical application (a review). *Applied Biochemistry and Microbiology*, 52(6), 573–581. <https://doi.org/10.1134/S0003683816060053>
- Fernández, Y., Arenillas, A., Díez, M. A., Pis, J. J., & Menéndez, J. A. (2009). Pyrolysis of glycerol over activated carbons for syngas production. *Journal of Analytical and Applied Pyrolysis*, 84(2), 145–150. <https://doi.org/10.1016/j.jaap.2009.01.004>
- Gordon, E. (2020a). *Aromatics*. CHEMISTRY LibreTexts. https://chem.libretexts.org/Courses/Modesto_Junior_College/Chemistry_150_-_Bunag/Textbook_for_Chemistry_150/09%3A_Organic_Chemistry/9.09%3A_Aromatics
- Gordon, E. (2020b). *Cyclics*. CHEMISTRY LibreTexts. https://chem.libretexts.org/Courses/Modesto_Junior_College/Chemistry_150_-_Bunag/Textbook_for_Chemistry_150/09%3A_Organic_Chemistry/9.05%3A_Cyclics
- Greeves, N. (2019). Common Polymer-Polystyrene. In *ChemTube3D*. Chemistry LibreTexts. [https://chem.libretexts.org/Under_Construction/Stalled_Project_\(Not_under_Active_Development\)/Book%3A_ChemTube3D_\(Greeves\)/Polymers/Common_Polymer-Polystyrene](https://chem.libretexts.org/Under_Construction/Stalled_Project_(Not_under_Active_Development)/Book%3A_ChemTube3D_(Greeves)/Polymers/Common_Polymer-Polystyrene)
- Hambali, E., & Rivai, M. (2017). The Potential of Palm Oil Waste Biomass in Indonesia

<https://doi.org/10.1088/1755-1315/65/1/012050>

- Huang, Y. W., Chen, M. Q., Li, Q. H., & Xing, W. (2018). A critical evaluation on chemical exergy and its correlation with high heating value for single and multi-component typical plastic wastes. *Energy*, 156, 548–554. <https://doi.org/10.1016/j.energy.2018.05.116>
- Karunadasa, K. S. P., Manaratne, C. H., Pitawala, H. M. T. G. A., & Rajapakse, R. M. G. (2019). Thermal decomposition of calcium carbonate (calcite polymorph) as examined by in-situ high-temperature X-ray powder diffraction. *Journal of Physics and Chemistry of Solids*, 134(January), 21–28. <https://doi.org/10.1016/j.jpcs.2019.05.023>
- Kim, S. W., Koo, B. S., & Lee, D. H. (2014). Catalytic pyrolysis of palm kernel shell waste in a fluidized bed. *Bioresource Technology*, 167, 425–432. <https://doi.org/10.1016/j.biortech.2014.06.050>
- Kumar, S., & Singh, R. K. (2011). Recovery of hydrocarbon liquid from waste high density polyethylene by thermal pyrolysis. *Brazilian Journal of Chemical Engineering*, 28(4), 659–667. <https://doi.org/10.1590/S0104-66322011000400011>
- Lestari, P., & Trihadiningrum, Y. (2019). The impact of improper solid waste management to plastic pollution in Indonesian coast and marine environment. *Marine Pollution Bulletin*, 149(August), 110505. <https://doi.org/10.1016/j.marpolbul.2019.110505>
- Ling, J. S. J., Tan, Y. H., Mubarak, N. M., Kansedo, J., Saptoro, A., & Nolasco-Hipolito, C. (2019). A review of heterogeneous calcium oxide based catalyst from waste for biodiesel synthesis. *SN Applied Sciences*, 1(8), 1–8. <https://doi.org/10.1007/s42452-019-0843-3>
- Ma, Z., Chen, D., Gu, J., Bao, B., & Zhang, Q. (2015). Determination of pyrolysis characteristics and kinetics of palm kernel shell using TGA-FTIR and model-free integral methods. *Energy Conversion and Management*, 89, 251–259. <https://doi.org/10.1016/j.enconman.2014.09.074>
- Macosko, C. W. (1993). *Principles, Measurements, and Applications*.
- Macquarrie, D. J., Clark, J. H., & Fitzpatrick, E. (2012). Perspective: Jatropha cultivation in southern India: Assessing farmers' experiences. *Biofuels, Bioproducts and Biorefining*, 6(3), 246–256. <https://doi.org/10.1002/bbb>
- Martínez, J. D., Veses, A., Mastral, A. M., Murillo, R., Navarro, M. V., Puy, N., Artigues,

- A., Bartolí, J., & García, T. (2014). Co-pyrolysis of biomass with waste tyres: Upgrading of liquid bio-fuel. *Fuel Processing Technology*, 119, 263–271. <https://doi.org/10.1016/j.fuproc.2013.11.015>
- 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>
- Migdał, A. R., Kijęński, J., Kawalec, A., Kędziora, A., Rejewski, P., & Śmigiera, E. (2014). *Energy recovery from waste plastics*. Chemik.
- Mishra, R. R., & Sharma, A. K. (2016). Microwave-material interaction phenomena: Heating mechanisms, challenges and opportunities in material processing. *Composites Part A: Applied Science and Manufacturing*, 81, 78–97. <https://doi.org/10.1016/j.compositesa.2015.10.035>
- Mushtaq, F., Mat, R., & Ani, F. N. (2014). A review on microwave assisted pyrolysis of coal and biomass for fuel production. *Renewable and Sustainable Energy Reviews*, 39, 555–574. <https://doi.org/10.1016/j.rser.2014.07.073>
- Panda, A. K., Singh, R. K., & Mishra, D. K. (2010). Thermolysis of waste plastics to liquid fuel. A suitable method for plastic waste management and manufacture of value added products-A world prospective. *Renewable and Sustainable Energy Reviews*, 14(1), 233–248. <https://doi.org/10.1016/j.rser.2009.07.005>
- Plastic Europe-Association of Plastics Manufactures. (2020). *Plastics – the Facts 2020*. PlasticEurope, 1–64. <https://www.plasticseurope.org/en/resources/publications/4312-plastics-facts-2020>
- Ren, S., Lei, H., Wang, L., Bu, Q., Chen, S., Wu, J., Julson, J., & Ruan, R. (2012). Biofuel production and kinetics analysis for microwave pyrolysis of Douglas fir sawdust pellet. *Journal of Analytical and Applied Pyrolysis*, 94, 163–169. <https://doi.org/10.1016/j.jaap.2011.12.004>
- Rex, P., Masilamani, I. P., & Miranda, L. R. (2020). Microwave pyrolysis of polystyrene and polypropylene mixtures using different activated carbon from biomass. *Journal of the Energy Institute*, 93(5), 1819–1832. <https://doi.org/10.1016/j.joei.2020.03.013>
- Sajjadi, B., Abdul Aziz, A. R., & Ibrahim, S. (2014). Investigation, modelling and reviewing the effective parameters in microwave-assisted transesterification. *Renewable and Sustainable Energy Reviews*, 37, 762–777. <https://doi.org/10.1016/j.rser.2014.05.021>

- Saptoadi, H., & Pratama, N. N. (2015). Utilization of Plastics Waste Oil as Partial Substitute for Kerosene in Pressurized Cookstoves. *International Journal of Environmental Science and Development*, 6(4), 363–368. <https://doi.org/10.7763/ijesd.2015.v6.619>
- Schaller, C. (2020). *Acid-Base Extraction*. CHEMISTRY LibreTexts. https://chem.libretexts.org/Courses/BethuneCookman_University/B-CU%3A_CH-345_Quantitative_Analysis/CH345_Labs/Demonstrations_and_Techniques/General_Lab_Techniques/Acid-Base_Extraction
- Scheirs, J., & Kaminsky, W. (2006). *Wiley Series in Polymer Science Metallocene-based polyolefins Preparations, Properties and Technology Polymer-Clay Nanocomposites Dendrimers and Other Dendritic Polymers Modern Styrenic Polymers Polystyrenes and Styrenic Copolymers Forthcoming Titles Ligh*.
- Shang, H., Lu, R. R., Shang, L., & Zhang, W. H. (2015). Effect of additives on the microwave-assisted pyrolysis of sawdust. *Fuel Processing Technology*, 131, 167–174. <https://doi.org/10.1016/j.fuproc.2014.11.025>
- Sharuddin, S. D. A., Abnisa, F., Wan Daud, W. M. A., & Aroua, M. K. (2016). A review on pyrolysis of plastic wastes. *Energy Conversion and Management*, 115, 308–326. <https://doi.org/10.1016/j.enconman.2016.02.037>
- Sheng, J. (2020). *Alcohols*. CK-12 Foundation. <https://flexbooks.ck12.org/cbook/cbse-chemistry-class-10/section/4.8/related/lesson/alcohols-chem/>
- Shukla, S. K., Mangwani, N., Rao, T. S., & Das, S. (2014). Biofilm-Mediated Bioremediation of Polycyclic Aromatic Hydrocarbons. In *Microbial Biodegradation and Bioremediation*. Elsevier Inc. <https://doi.org/10.1016/B978-0-12-800021-2.00008-X>
- Stančin, H., Šafář, M., Růžicková, J., Mikulčić, H., Raclavská, H., Wang, X., & Duić, N. (2021). Co-pyrolysis and synergistic effect analysis of biomass sawdust and polystyrene mixtures for production of high-quality bio-oils. *Process Safety and Environmental Protection*, 145, 1–11. <https://doi.org/10.1016/j.psep.2020.07.023>
- State, R. N., Volceanov, A., Muley, P., & Boldor, D. (2019). A review of catalysts used in microwave assisted pyrolysis and gasification. *Bioresource Technology*, 277(November 2018), 179–194. <https://doi.org/10.1016/j.biortech.2019.01.036>
- 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>

Wang, J., Zhong, Z., Ding, K., Zhang, B., Deng, A., Min, M., Chen, P., & Ruan, R.

(2017). Co-pyrolysis of bamboo residual with waste tire over dual catalytic stage of CaO and co-modified HZSM-5. *Energy*, 133, 90–98. <https://doi.org/10.1016/j.energy.2017.05.146>

Whyte, H. E., Loubar, K., Awad, S., & Tazerout, M. (2015). Pyrolytic oil production by catalytic pyrolysis of refuse-derived fuels: Investigation of low cost catalysts. *Fuel Processing Technology*, 140, 32–38. <https://doi.org/10.1016/j.fuproc.2015.08.022>

Zhang, X., Rajagopalan, K., Lei, H., Ruan, R., & Sharma, B. K. (2017). An overview of a novel concept in biomass pyrolysis: microwave irradiation. *Sustainable Energy and Fuels*, 1(8), 1664–1699. <https://doi.org/10.1039/C7SE00254H>

Zhang, Y., Chen, P., Liu, S., Peng, P., Min, M., Cheng, Y., Anderson, E., Zhou, N., Fan, L., Liu, C., Chen, G., Liu, Y., Lei, H., Li, B., & Ruan, R. (2017). Effects of feedstock characteristics on microwave-assisted pyrolysis – A review. *Bioresource Technology*, 230, 143–151. <https://doi.org/10.1016/j.biortech.2017.01.046>

Zhao, X., Wang, M., Liu, H., Li, L., Ma, C., & Song, Z. (2012). A microwave reactor for characterization of pyrolyzed biomass. *Bioresource Technology*, 104, 673–678. <https://doi.org/10.1016/j.biortech.2011.09.137>