

DAFTAR PUSTAKA

- Aini, Nurul; aan, sugiarto. (2009). Sifat Fisis Dan Mekanis Panel Semen Pelepah Kelapa Sawit. *Jurnal Permukiman*, Vol. 5 No. 1 April 2010: 7-12, 38.
- Amin, N. A. S., et al. (2020). Catalytic upgrading of bio-oil: Recent advances and challenges. **Renewable and Sustainable Energy Reviews**, 118, 109564.
- Amin, R. R., Sova, R. R., Laily, D. I., & Kartika, M. (2020). Studi Potensi Limbah Tembakau Menjadi Bio-Oil Menggunakan Metode Fast-Pyrolysis Sebagai Energi Terbarukan. 5(2), 151–165.
- Anggoro, D. D. (n.d.). Buku Ajar Teori dan Aplikasi Rekayasa Zeolit.
- ASTM (2012). Standar Specification for Pyrolysis Liquid Biofuel (ASTM D7544). ASTM International.
- Atikah, W. S. (2017). Media Adsorben Pewarna Tekstil The Potentiality Of Activated Natural Zeolite From Gunung Kidul As Adsorben To Textile Dyes. pp. 17–24.
- Aziz, I., Nurbayti, S. and Rahman, A. (2012). Penggunaan Zeolit Alam sebagai Katalis dalam Pembuatan Biodiesel. 2(4). pp. 511–515.
- Barroso-Martín, E., et al. (2022). Upgrading of bio-oil via esterification and hydrogenation: Recent progress. **Fuel Processing Technology**, 229, 107143.
- Barroso-Martín, I., Ballesteros-Plata, D., Infantes-Molina, A., Guerrero-Pérez, M. O., Santamaría-González, J., & Rodríguez-Castellón, E. (2022). An overview of catalysts for the hydrodeoxygenation reaction of model compounds from lignocellulosic biomass. In *IET Renewable Power Generation* (Vol. 16, Issue 14, pp. 3009–3022). John Wiley and Sons Inc. <https://doi.org/10.1049/rpg2.12477>
- Biswas, B., Pandey, N., Bisht, Y., Singh, R., Kumar, J., & Bhaskar, T. (2017). Pyrolysis of agricultural biomass residues: Comparative study of corn cob, wheat straw, rice straw and rice husk. *Bioresource Technology*, 237, 57–63. <https://doi.org/10.1016/j.biortech.2017.02.046>
- Biswas, B., Singh, R., & Kumar, J. (2017). Slow pyrolysis of jute stick for bio-oil

- production. **Biomass Conversion and Biorefinery**, 7(3), 289–297.
- Bridgwater, A. V. (2012). Review of fast pyrolysis of biomass and product upgrading. **Biomass and Bioenergy**, 38, 68–94.
- Chen, D., Cen, K., Zhuang, X., Gan, Z., Zhou, J., Zhang, Y., & Zhang, H. (2022). Insight into biomass pyrolysis mechanism based on cellulose, hemicellulose, and lignin: Evolution of volatiles and kinetics, elucidation of reaction pathways, and characterization of gas, biochar and bio-oil. *Combustion and Flame*, 242. <https://doi.org/10.1016/j.combustflame.2022.112142>
- Cui, Y., et al. (2010). Hydrogenation of lignin-derived bio-oil over metal-supported catalysts. **Applied Catalysis B: Environmental**, 96(1-2), 6–12.
- Darmapatni, K. A. G., Basori, A. and Suaniti, N. M. (2016). Pengembangan Metode GC-MS untuk Penetapan Kadar Acetaminophen pada Spesimen Rambut Manusia. *Jurnal Biosains Pascasarjana*. 18(3). p. 255.
- Dickerson, T., et al. (2013). Bio-oil upgrading via HDO over HZSM-5 catalyst. **Energy & Fuels**, 27(12), 7510–7517.
- Du, K., Yu, B., Xiong, Y., Jiang, L., Xu, J., Wang, Y., Su, S., Hu, S., & Xiang, J. (2023). Hydrodeoxygenation of Bio-Oil over an Enhanced Interfacial Catalysis of Microemulsions Stabilized by Amphiphilic Solid Particles. *Catalysts*, 13(3). <https://doi.org/10.3390/catal13030573>
- Erawati, E., Sediawan, W. B. and Tengah, J. (2013). Karakteristik bio-Oil Hasil Pirolisis Ampas Tebu. 15(2). pp. 47–55.
- Fardhyanti, D. S. (2020). Monograf Bio-Oil Berbasis Biomassa. Yogyakarta: Deepublish.
- Febrian, R., Bahri, S. and Khairat (2013). Pirolisis Kulit Kayu Pinus Merkusii menjadi Bio Oil Menggunakan Katalis Cr/Lempung Cengar. *Jom Fteknik*. pp. 1–6.
- Furqon, F., Nugroho, A. K., & Anshorulloh, M. K. (2019). Kajian Penggunaan Katalis KOH pada Pembuatan Biodiesel Menggunakan Reverse Flow Biodiesel Reactor secara Batch. *Rona Teknik Pertanian*, 12(1), 22–31. <https://doi.org/10.17969/rtp.v12i1.12508>
- Gas Chromatography- mass spectrometry (gc-ms). (2011). SpringerReference. https://doi.org/10.1007/springerreference_30045

- Ganzoury, M. A. et al. (2015). Introduction to Fourier Transform Infrared Spectrometry. *Renewable and Sustainable Energy Reviews*. 50. pp. 1–8.
- Gunawan, B. and Azhari, C. D. (1979). Karakteristik Spektrometri IR dan Scanning Electron Microscopy (SEM) Sensor Gas dari Bahan Polimer Poly Ethelene Glycol (PEG). *Fakultas Teknik Universitas Muria Kudus*. pp. 1–17.
- Hakim, L., Dirgantara, M. and Nawir, M. (2019). Karakterisasi Struktur Material Pasir Bongkahan Galian Golongan C Dengan Menggunakan X-Ray Diffraction (X-RD) Di Kota Palangkaraya. *Jurnal Jejaring Matematika dan Sains*. 1(1). pp. 44–51.
- Hasibuan, M. I., Husna, A. F., Febrianti, F., Adawiyah, R., Surbakti, T. A., & Pulungan, A. N. (2021). Studi Awal Konversi Limbah Pelelepah Kelapa Sawit Menjadi Bio-Oil Dengan Teknik Semi Fast Pyrolysis sebagai Sumber Bahan bakar Alternatif. *Prosiding Seminar Nasional Kimia & Pendidikan Kimia#2 - 2021 Jurusan Kimia FMIPA UNIMED*, 32–38.
- Herlambang, S. et al. (2017). Biomassa sebagai Sumber Energi Masa Depan. *Buku Ajar*. pp. 1– 51.
- Hu, C., Zhang, H., Wu, S., & Xiao, R. (2020). Molecular shape selectivity of HZSM-5 in catalytic conversion of biomass pyrolysis vapors: The effective pore size. *Energy Conversion and Management*, 210. <https://doi.org/10.1016/j.enconman.2020.112678>
- Hu, C., et al. (2020). Advances in catalytic hydrodeoxygenation for bio-oil upgrading. **Green Chemistry**, 22(5), 1356–1378.
- Hu, X., & Gholizadeh, M. (2019). Biomass pyrolysis: A review of the process development and challenges from initial researches up to the commercialisation stage. In *Journal of Energy Chemistry* (Vol. 39, Issue April). Elsevier B.V. and Science Press. <https://doi.org/10.1016/j.jechem.2019.01.024>
- Husna, A. F. et al. (2022). Conversion of Cellulose From Palm Oil Middle Waste (*Elaeis Guineensis*) Into Bio-oil Products As Alternative Fuel. 65(11). pp. 61–67.
- Juhantoro, N., Made Ariana, I., & Sanuri, S. (2012). Penentuan Properties Bahan Bakar Batubara Cair untuk Bahan Bakar Marine Diesel Engine. *Jurnal*

Teknik ITS, 1(1), G271–G275.
<http://ejurnal.its.ac.id/index.php/teknik/article/view/2005%0Ahttps://ejurnal.its.ac.id>

Kusumaningtyas, M. P. (2017). Analisis Struktur Nano Batu Apung Lombok Menggunakan Metode BET (Brunauer-Emmet Teller). pp. 14–15.

Mentri Kesehatan (2015). Laporan Kinerja Kementerian ESDM 2015. Novita, S. A. et al. (2021). Artikel Review: Parameter Operasional Pirolisis Biomassa. Agroteknika. 4(1). pp. 53–67.

Mortensen, P. M., Grunwaldt, J. D., Jensen, P. A., Knudsen, K. G., & Jensen, A. D. (2011). A review of catalytic upgrading of bio-oil to engine fuels. **Applied Catalysis A: General**, 407(1–2), 1–19.

Nugrahaningtyas, K. D., Hidayat, Y. and Prayekti, P. S. (2015). Aktivitas Dan Selektivitas Katalis Mo-Co/Usy Pada Reaksi Hidrodeoksigenasi ANISOL. Jurnal Penelitian Saintek. 20(1). pp. 19–28.

Parinduri, L. and Parinduri, T. (2020). Konversi Biomassa Sebagai Sumber Energi Terbarukan. JET (Journal of Electrical Technology). 5(2). pp. 88–92.

Peng, S., Piao, S., Wang, T., Sun, J., & Shen, Z. (2009). Temperature sensitivity of soil respiration in different ecosystems in China. *Soil Biology and Biochemistry*, 41(5), 1008–1014.
<https://doi.org/10.1016/j.soilbio.2008.10.023>

Perot, G., & Guisnet, M. (1990). Advantages And Disadvantages Of Zeolites As Catalysts In Organic Chemistry *. In *Journal of Molecular Catalysis*.

Praputri, E., Sundari, E., Firdaus, F., & Sofyan, S. (2018). Penggunaan katalis homogen dan heterogen pada proses hidrolisis pati umbi singkong karet menjadi glukosa. *Jurnal Litbang Industri*, 8(2), 105.
<https://doi.org/10.24960/jli.v8i2.4189.105-110>

Pulungan, A. N., Goei, R., Kembaren, A., Nurfajriani, N., Sihombing, J. L., Gea, S., Wong, H. R., Hasibuan, M. I., Rahayu, R., & Tok, A. I. Y. (2024). Two stages upgrading of bio-oil through esterification and hydrodeoxygenation reactions using Fe₂O₃-CoO supported catalyst. *Biomass Conversion and Biorefinery*, 14(17), 20655–20664.

Purwanto, W. W., Supramono, D., Muthia, R., & Annisa, G. (2012). Konversi

Limbah Kelapa Sawit Menjadi Bio-Oil melalui Proses Catalytic Fast Konversi Limbah Kelapa Sawit Menjadi Bio-Oil melalui Proses Catalytic Fast Pyrolysis dan Upgrading- nya. July 2016.

Rahmatullah, Rizka Wulandari Putri, & Enggal Nurisman. (2019). Produksi bio-oil dari limbah kulit durian dengan proses pirolisis lambat. *Jurnal Teknik Kimia*, 25(2), 50–53. <https://doi.org/10.36706/jtk.v25i2.425>

Rhodes, C. J. (2010). Properties and applications of zeolites. *Science Progress*, 93(3), 223–284. <https://doi.org/10.3184/003685010X12800828155007>

Ridhuan, K., & Irawan, D. (2020). Energi Terbarukan Pirolisis.

Shaikh, A., et al. (2015). Catalytic esterification of bio-oils: A review. **Renewable and Sustainable Energy Reviews**, 45, 148–158.

Shaikh, I. R., Shaikh, R. A., Shaikh, A. A., War, J. A., Hangirgekar, S. P., Shaikh, A. L., Shaikh, P. R., & Shaikh, R. R. (2015). H-ZSM-5 Zeolite Synthesis by Sourcing Silica from the Wheat Husk Ash: Characterization and Application as a Versatile Heterogeneous Catalyst in Organic Transformations including Some Multicomponent Reactions. *Journal of Catalysts*, 2015, 1–14. <https://doi.org/10.1155/2015/805714>

Sharma, T., Hakeem, I. G., Gupta, A. B., Joshi, J., Shah, K., Vuppalladiyam, A. K., & Sharma, A. (2024). Parametric influence of process conditions on thermochemical techniques for biochar production: A state-of-the-art review. *Journal of the Energy Institute*, 113(August 2023), 101559. <https://doi.org/10.1016/j.joei.2024.101559>

Sharma, Y. C., et al. (2024). Recent trends in hydroprocessing of lignocellulosic bio-oil. **Bioresource Technology Reports**, 18, 101123.

Sihombing, J. L., Herlinawati, H., Pulungan, A. N., Simatupang, L., Rahayu, R., & Wibowo, A. A. (2023). Effective hydrodeoxygenation bio-oil via natural zeolite supported transition metal oxide catalyst. *Arabian Journal of Chemistry*, 16(6), 104707. <https://doi.org/10.1016/j.arabjc.2023.104707>

Subagjo, S., Reda, M., & Pangestu, G. (2014). Pengembangan Katalis NiMoP / γ - Al₂O₃ untuk Hidrodeoksigenasi Stearin Inti Sawit Menjadi Kerosin Parafinik : February, 0–8.

Subagjo, S., et al. (2014). Pemanfaatan katalis HZSM-5 dalam upgrading bio-oil

dari biomassa. **Jurnal Teknologi**, 35(2), 85–92.

Weitkamp, J., Karge, H. G., Pfeifer, H., Holderich, W., Microporous, R., Siare, M. :, Naber, J. E., De Jong ', K. P., Stork ', W. H. J., Kuipers, H. P. C. E., & Post, M. F. M. (1994). Industrial applications of zeolite catalysis. In *Studies in Surface Science and Catalysis* (Vol. 84).

Zhang, L., Xu, C. C., & Champagne, P. (2020). Catalytic esterification of bio-oil using HZSM-5: analysis of ester yield and fuel properties. **Renewable Energy**, 146, 1372–1381.

Zhu, X., Wan, Y., Zhang, J., & Chen, Z. (2021). Catalytic upgrading of biomass pyrolysis vapors using HZSM-5: influence on bio-oil composition and yield. **Renewable Energy**, 164, 1127–1135.

Zhu, Y., Xu, G., Song, W., Zhao, Y., Miao, Z., Yao, R., & Gao, J. (2021). Catalytic microwave pyrolysis of orange peel: Effects of acid and base catalysts mixture on products distribution. *Journal of the Energy Institute*, 98(May), 172–178. <https://doi.org/10.1016/j.joei.2021.06.006>