

**DAFTAR PUSTAKA**

- Ağbulut, Ü., Sirohi, R., Lichtfouse, E., Chen, W.-H., Len, C., Show, P. L., Le, A. T., Nguyen, X. P., & Hoang, A. T. (2023). Mikroalga *bio-oil* production by pyrolysis and *hydrothermal liquefaction*: Mechanism and characteristics. *Bioresource Technology*, 376(January), 128860. <https://doi.org/10.1016/j.biortech.2023.128860>
- Al-Jabri, H., Das, P., Khan, S., AbdulQuadir, M., Thaher, M. I., Hoekman, K., & Hawari, A. H. (2022). A comparison of bio-crude oil production from five marine mikroalga – Using life cycle analysis. *Energy*, 251, 123954. <https://doi.org/10.1016/j.energy.2022.123954>
- Armaini. (2020). Mikoalga Spirulina Platensis Sebagai Suplemen Untuk Meningkatkan Gizi Dan Imunitas Balita Di Posyandu Anggrek 2 Kelurahan Seberang Padang, Kota Padang. *Text*, 69(4), 135–137.
- Basu, P. (2013). *Biomass Gasification and Pyrolysis*. Elsevier.
- Borah, D., Sharma, A., Dutta, R. R., Bhuyan, I., & Dutta, R. (2024). Recent Advances in Homogeneous Catalysts for the Acceptorless Dehydrogenation of Alcohols to Ketones and Aldehydes. *Journal of Organometallic Chemistry*, 123445. <https://doi.org/10.1016/j.jorganchem.2024.123445>
- BP. (2022). Konsumsi Minyak Indonesia 1,47 Juta Barel per Hari pada 2021. *DataIndonesia.Id*, 1–7.
- BPS. (2022). Jumlah Penduduk Pertengahan Tahun (Ribu Jiwa), 2020-2022. *Bps*, 2019–2021. <https://www.bps.go.id/indicator/12/1975/1/jumlah-penduduk-pertengahan-tahun.html>
- Demirbas, A. D. and M. F. (2010). *Algae Energy Algae as a New Source of Biodiesel*. Springer London Dordrecht Heidelberg New York.
- Gollakota, A. R. K. (2018). A review on *hydrothermal liquefaction* of biomass. *Renewable and Sustainable Energy Reviews*, 81(April 2017), 1378–1392. <https://doi.org/10.1016/j.rser.2017.05.178>
- Hao, B., Xu, D., Wei, Y., Diao, Y., Yang, L., Fan, L., & Guo, Y. (2023). Mathematical models application in optimization of *hydrothermal liquefaction* of biomass. *Fuel Processing Technology*, 243(February), 107673.



Hossain, M. R., Khalekuzzaman, M., Bin Kabir, S., Islam, M. B., & Bari, Q. H. (2022).

Production of light oil-prone biocrude through co-hydrothermal liquefaction of wastewater-grown mikroalga and peat. *Journal of Analytical and Applied Pyrolysis*, 161(December 2021), 105423. <https://doi.org/10.1016/j.jaat.2021.105423>

Hu, C. H., Sang, Y., Yang, Y. W., Li, W. W., Wang, H. L., Zhang, Z. Y., Ye, C., Wu, L.

Z., Xue, X. S., & Li, Y. (2023). Organic charge-transfer complex induces chemoselective decarboxylation to aryl radicals for general functionalization. *Chem*, 9(10), 2997–3012. <https://doi.org/10.1016/j.chempr.2023.06.022>

Jamilatun, S., Suhendra, Budhijanto, Rochmadi, Taufikurahman, Yuliestyan, A., &

Budiman, A. (2020). Catalytic and noncatalytic pyrolysis of spirulina platensis residue (spr): Effects of temperature and catalyst content on bio-oil yields and its composition. *AIP Conference Proceedings*, 2248.

<https://doi.org/10.1063/5.0013164>

Kazemi, N., Gholami Parashkoohi, M., Mohammadi, A., & Mohammad Zamani, D.

(2023). Environmental life cycle assessment and energy-economic analysis in different cultivation of mikroalga-based optimization method. *Results in Engineering*, 19(May), 101240. <https://doi.org/10.1016/j.rineng.2023.101240>

Kumar. (2023). Catalytic (copper) hydrothermal liquefaction for lignin to produce high

quality bio-oil and nano Cu carbon hybrids material. *Chemical Engineering Science*, 270, 118548. <https://doi.org/10.1016/j.ces.2023.118548>

Kusmiyati, K., Hadiyanto, H., & Fudholi, A. (2023). Treatment updates of microalgae

biomass for bioethanol production: A comparative study. *Journal of Cleaner Production*, 383(November 2022), 135236.

<https://doi.org/10.1016/j.jclepro.2022.135236>

Leca, M. A., Michelena, B., Castel, L., Sánchez-Quintero, Á., Sambusiti, C., Monlau, F.,

Le Guer, Y., & Beigbeder, J. B. (2023). Innovative and sustainable cultivation strategy for the production of Spirulina platensis using anaerobic digestates diluted with residual geothermal water. *Journal of Environmental Management*, 344(July).

<https://doi.org/10.1016/j.jenvman.2023.118349>

Lim, H. R., Khoo, K. S., Chew, K. W., Tao, Y., Xia, A., Ma, Z., Munawaroh, H. S. H.,



Huy, N. D., & Show, P. L. (2023). Upstream bioprocessing of Spirulina platensis microalgae using rainwater and recycle medium from post-cultivation for C-phycocyanin production. *Journal of the Taiwan Institute of Chemical Engineers*, June. <https://doi.org/10.1016/j.jtice.2023.104986>

Liu, Y., Du, H., Meng, Y., Lu, S., Zhang, J., & Wang, H. (2023). Catalytic hydrothermal liquefaction of mikroalga over reduced graphene oxide support Ni catalyst. *Fuel Processing Technology*, 242(January), 107653. <https://doi.org/10.1016/j.fuproc.2023.107653>

Ma, X., Li, Z., Yang, Q., Wu, R., Ben, H., & Wu, J. (2023). Microwave-assisted two-stage hydrothermal liquefaction of Spirulina to produce high-quality bio-oil with low-carbon ketones. *Journal of Analytical and Applied Pyrolysis*, 171(March), 105955. <https://doi.org/10.1016/j.jaat.2023.105955>

Mahadevan, V., Kannaiyan, S., & Panchamoorthy, G. K. (2024). Beneficial synergetic effect of feedstock characteristics and reaction conditions on bio crude production from hydrothermal liquefaction of mixed residential waste. *Chinese Journal of Chemical Engineering*, 75, 46–61. <https://doi.org/10.1016/j.cjche.2024.09.002>

Nautiyal, P., Subramanian, K. A., Dastidar, M. G., & Kumar, A. (2020). Experimental assessment of performance, combustion and emissions of a compression ignition engine fuelled with Spirulina platensis biodiesel. *Energy*, 193, 116861. <https://doi.org/10.1016/j.energy.2019.116861>

Peterson, A. A., Vogel, F., Lachance, R. P., Fröling, M., Antal, M. J., & Tester, J. W. (2008). Thermochemical biofuel production in hydrothermal media: A review of sub- and supercritical water technologies. *Energy and Environmental Science*, 1(1), 32–65. <https://doi.org/10.1039/b810100k>

Prasakti, L., Rochmadi, R., & Budiman, A. (2019). The Effect of Biomass-Water Ratio on Bio-crude Oil Production from Botryococcus braunii using Hydrothermal liquefaction Process. *Jurnal Rekayasa Proses*, 13(2), 132. <https://doi.org/10.22146/jrekpros.48963>

Qu, S., Chen, C., Guo, M., Jiang, W., Lu, J., Yi, W., & Ding, J. (2021). Microwave-assisted in-situ transesterification of Spirulina platensis to biodiesel using PEG/MgO/ZSM-5 magnetic catalyst. *Journal of Cleaner Production*, 311(April),



Raikova, S., Wagner, J. L., Le, C. D., Ting, V. P., & Chuck, C. J. (2019). Towards an Aviation Fuel Through the *Hydrothermal liquefaction* of Algae. *Biofuels for Aviation: Feedstocks, Technology and Implementation*, May 2019, 217–239. <https://doi.org/10.1016/B978-0-12-804568-8.00009-3>

Rosero-Chasoy, G., Rodríguez-Jasso, R. M., Aguilar, C. N., Buitrón, G., Chairez, I., & Ruiz, H. A. (2022). Growth kinetics and quantification of carbohydrate, protein, lipids, and chlorophyll of *Spirulina platensis* under aqueous conditions using different carbon and nitrogen sources. *Bioresource Technology*, 346(December 2021). <https://doi.org/10.1016/j.biortech.2021.126456>

Saral, J. S., & Ranganathan, P. (2022). A *hydrothermal co-liquefaction* of *spirulina platensis* with rice husk, coconut shell and HDPE for biocrude production. *Bioresource Technology*, 363(August), 127911. <https://doi.org/10.1016/j.biortech.2022.127911>

Singh, R., Bux, F., & Sharma, Y. C. (2020). Optimization of biodiesel synthesis from microalgal (*Spirulina platensis*) oil by using a novel heterogeneous catalyst, β -strontium silicate (β -Sr₂SiO₄). *Fuel*, 280(December 2019), 118312. <https://doi.org/10.1016/j.fuel.2020.118312>

Specht, E., Miyake-Stoner, S., & Mayfield, S. (2019). Micro-algae come of age as a platform for recombinant protein production. *Biotechnology Letters*, 32(10), 1373–1383. <https://doi.org/10.1007/s10529-010-0326-5>

Suryaningtyas, I. T. (2019). Senyawa Bioaktif Mikroalga Dan Prospeknya Di Masa Depan. *Oseana*, 44(1), 15–25. <https://doi.org/10.14203/oseana.2019.vol.44no.1.28>

Vaz, S. A., Badenes, S. M., Pinheiro, H. M., & Martins, R. C. (2023). Recent reports on domestic wastewater treatment using mikroalga cultivation: Towards a circular economy. *Environmental Technology & Innovation*, 30, 103107. <https://doi.org/10.1016/j.eti.2023.103107>

Zhang, B., He, Z., Chen, H., Kandasamy, S., Xu, Z., Hu, X., & Guo, H. (2018). Effect of acidic, neutral and alkaline conditions on product distribution and biocrude oil chemistry from *hydrothermal liquefaction* of microalgae. *Bioresource Technology*, 270(July), 129–137. <https://doi.org/10.1016/j.biortech.2018.08.129>



**Studi Kinetika Reaksi Pembentukan Produk dari Hydrothermal Liquefaction Residu Spirulina platensis
(SPR)**

Pradipta Aji Sadewa, Prof. Dr.Eng. Ir. Arief Budiman, M.S., IPU.; Prof. Ir. Rochmadi, S.U., Ph.D., IPU.

UNIVERSITAS
GADJAH MADA

Universitas Gadjah Mada, 2025 | Diunduh dari <http://etd.repository.ugm.ac.id/>