



## DAFTAR PUSTAKA

- Al Muttaqii, M. A. et al. (2019). Pengaruh Aktivasi Secara Kimia Menggunakan Larutan Asam dan Basa Terhadap Karakteristik Zeolit Alam. *Jurnal Riset Teknologi Industri*, 13(2), 267 – 271.
- Astuti, R. P., Suyati, L., & Nuryanto, R. (2013). Pirolisis Kulit Jambu Mete dengan Katalis Ag/Zeolit. *Jurnal Kimia Sains dan Aplikasi*, 6(10), 6 – 10. <https://doi.org/10.14710/jksa.16.1.6-10>
- Chen, X. et. al. (2022). Effect of Calcination on the Adsorption of Chifeng Zeolite on  $Pb^{2+}$  and  $Cu^{2+}$ . *International Journal of Low-Carbon Technologies*, 17, 462 – 468. <https://doi.org/10.1093/ijlct/ctac006>
- Demisu, D. G. (2021). Factors Affecting Biodiesel Production from Non-edible Vegetable Oil Via Base-catalyzed Transesterification Process: Synthesis. *International Journal of Sustainable and Green Energy*, 10(3), 85 – 91. doi: 10.11648/j.ijrse.20211003.11
- Djimtoingar, S. S., Derkyi, N. S. A., Kuranchie, F. A., & Yankyera, J. K. (2022). A Review of Response Surface Methodology for Biogas Process Optimization, *Cogent Engineering*, 9, 2115283. <https://doi.org/10.1080/23311916.2022.2115283>
- Earlia, N., Muslem, Suhendra, R., Amin, M., Prakoeswa, C. R. S., Khairan, & Idroes, R. (2019). GC/MS Analysis of Fatty Acids on Pliek U Oil and Its Pharmacological Study by Molecular Docking to Filaggrin as a Drug Candidate in Atopic Dermatitis Treatment. *Scientific World Journal*, 2019. <https://doi.org/10.1155/2019/8605743>
- Encinar, J. M., Nogales-Delgado, S., & Sánchez, N. (2021). Pre-esterification of high acidity animal fats to produce biodiesel: A kinetic study. *Arabian Journal of Chemistry*, 14(4). <https://doi.org/10.1016/j.arabjc.2021.103048>
- Esa, F. N., & Him, N. R. N. (2023). Biodiesel Production from High Free Fatty Acid of Sludge Palm Oil. *Journal of Engineering and Science Research*, 7(5). 1 – 5. doi: 10.26666/rmp.jesr.2023.5.1
-



- Farag, H. A., El-Maghraby, A., & Taha, N. A. (2011). Optimization of factors affecting esterification of mixed oil with high percentage of free fatty acid. *Fuel Processing Technology*, 92(3), 507–510. <https://doi.org/10.1016/j.fuproc.2010.11.004>
- Farrag, N. M., Gadalla, M. A., & Fouad, M. K. (2022). Base-Catalyzed Transesterification vs. Supercritical Methanol Transesterification in the Optimization, Rigorous Model Simulation, and Heat Integration for Biodiesel Production. *Journal of Hunan University Natural Sciences*, 49(4), 193–205. <https://doi.org/10.55463/issn.1674-2974.49.4.19>
- Fitriana, N., Husin, H., Yanti, D., Pontas, K., Alam, P. N., Ridho, M., & Iskandar, I. (2018). Synthesis of K<sub>2</sub>O/Zeolite catalysts by KOH impregnation for biodiesel production from waste frying oil. *IOP Conference Series: Materials Science and Engineering*, 334(1). Institute of Physics Publishing. <https://doi.org/10.1088/1757-899X/334/1/012011>
- Garg, A., & Jain, S. (2020). Process Parameter Optimization of Biodiesel Production from Algal Oil by Response Surface Methodology and Artificial Neural Networks. *Fuel*, 277. <https://doi.org/10.1016/j.fuel.2020.118254>
- Gargazi, G., Hendrawani, H., & Hulyadi, H. (2022). Identifikasi Karakter Biodisel Minyak Jelantah Menggunakan Instrumen Gas Cromatografi Mass Spectroscopy (GC-MS). *Empiricism Journal*, 3(2), 333–340. <https://doi.org/10.36312/ej.v3i2.1083>
- Harahap, R. (2021). Penurunan Kadar Free Fatty Acid (FFA) pada Crude Palm Oil (CPO) dengan Proses Esterifikasi Menggunakan Katalis Asam Sulfat (H<sub>2</sub>SO<sub>4</sub>). *Chemical Engineering Journal Storage*, 1(2), 56 – 63
- Hastuti, Z. D., Prasetyo, D. H., & Rosyadi, E. (2015). Pemanfaatan CPO Asam Lemak Bebas Tinggi sebagai Bahan Bakar. *Jurnal Energi dan Lingkungan*, 11(1), 61 – 66. <https://doi.org/10.29122/elk.v11i1.1591>
- Herlina, I., & Fitra, E. R. (2018). Sintesis dan Karakterisasi Silika Tersulfatasi dari Sekam Padi. *Jurnal Rekayasa Proses*, 12(1), 17. <https://doi.org/10.22146/jrekpros.34362>
-



- Herlina, I., Puspitarum, D. L., Al Qadri, L., & Safitra, E. R. (2022). Pembuatan Biodiesel Berbahan Baku Fraksi Minyak CPO (Crude Palm Oil) Parit Terkatalisis Zeolit Alam Lampung. *Inovasi Teknik Kimia*, 7(1), 1–8.
- Irawan, A., Bindar, Y., Kurniawan, T., Alwan, H., Rosid, & Fauziah, N. A. (2021). Bayah Natural Zeolites to Upgrade the Quality of Bio Crude Oil from Empty Fruit Bunch Pyrolysis. *Journal of Engineering and Technological Sciences*, 53(3).
- Iskandar, N., Romadlon, G. F., Sulardjaka., Syaiful., & Widayat. (2021). Effect of Calcination on Mechanical Strength Characteristics of Pellet Catalysts from Bandung Natural Zeolite Materials. *AIP Conference Proceedings*. 2706, 020034. <https://doi.org/10.1063/5.0120839>
- Joshi, S., Hadiya, P., Shah, M., & Sircar, A. (2019). Techno-economical and Experimental Analysis of Biodiesel Production from Used Cooking Oil. *BioPhysical Economics and Resource Quality*, 4(1). <https://doi.org/10.1007/s41247-018-0050-7>
- Kartika, D., & Widyaningsih, S. (2012). Konsentrasi Katalis dan Suhu Optimum pada Reaksi Esterifikasi menggunakan Katalis Zeolit Alam Aktif (ZAH) dalam Pembuatan Biodiesel dari Minyak Jelantah. *Jurnal Kurniasari*, L. Aktivasi Zeolit Alam Sebagai Adsorben Pada Alat Pengering Bersuhu Rendah. *Reaktor*. 13(3). 178-184. <https://doi.org/10.14710/reaktor.13.3.178-184>
- Kurniasari, L. (2011). Aktivasi Zeolit Alam Sebagai Adsorben Pada Alat Pengering Bersuhu Rendah. *Reaktor*. 13(3). 178-184. <https://doi.org/10.14710/reaktor.13.3.178-184>
- Mardawati, E., Hidayat, M. S., Rahmah, D. M., & Rosalinda, S. (2019). Produksi Biodiesel dari Minyak Kelapa Sawit Kasar Off Grade dengan Variasi Pengaruh Asam Sulfat pada Proses Esterifikasi Terhadap Mutu Biodiesel yang Dihasilkan. *Jurnal Industri Pertanian*, 01(03), 46-60.
- Margareta, M. A. H., & Wonorahardjo, S. (2023). Optimasi Metode Penetapan Senyawa Eugenol dalam Minyak Cengkeh Menggunakan Gas Chromatography – Mass Spectrum dengan Variasi Suhu Injeksi. *Jurnal*
-



*Sains Dan Edukasi Sains*, 6(2), 95–103.  
<https://doi.org/10.24246/juses.v6i2p95-103>

Maulidan, F., Ramadhanti, F., A., & Wahyudi, B. (2020). Pemanfaatan CPO Off Grade dalam Pembuatan Biodiesel Menggunakan Katalis CaO pada Reaksi Transesterifikasi. *Journal of Chemical and Process Engineering*, 1(2). 26 – 31

Mohamed, R. M., Kadry, G. A., Abdel-Samad, H. A., & Awad, M. E. (2020). High operative heterogeneous catalyst in biodiesel production from waste cooking oil. *Egyptian Journal of Petroleum*, 29(1), 59–65.  
<https://doi.org/10.1016/j.ejpe.2019.11.002>

Mukaromah, A. H., Azizah, I. H., & Ariyadi, T. (2018). Karakterisasi Membran Zeolit ZSM-5 Berdasarkan Variasi Jenis dan Ukuran Kasa dengan Pre-Treatment Direndam dalam NaOH, HCl, dan elektro-oksidasi Dengan H<sub>2</sub>SO<sub>4</sub>. *Prosiding Seminar Nasional Unimus*, 1(2018)

Muzakhar, S. S. A., Assidiqie, G. I., Siregar, A. S. B., Aparamarta, H. W., Fahmi, F., & Gunawan, S. (2023). Optimization of Esterification in the Synthesis of Surfactants Feedstock from Polar Lipid Fraction of Crude Palm Oil. *Journal of Fundamentals and Applications of Chemical Engineering (JFACHE)*, 4(2), 30.

Mohyuddin, G., Mohyuddin, A., Salamat., A., & Munawar, K. S. (2016). Effect of Reaction Time and Strength of Hydrolyzing Agent on Acid Hydrolysis of Triglycerides of Natural Origin. *Sci.Int.(Lahore)*, 28(4), 3881 – 3883.

Pal, S., & Gauri, S. K. (2018). A Desirability Functions-Based Approach for Simultaneous Optimization of Quantitative and Ordinal Response Variables in Industrial Processes. *International Journal of Engineering, Science and Technology*, 10(1), 76 – 87. doi:  
<http://dx.doi.org/10.4314/ijest.v10i1.6>

Patntirapong, S., Charoensukpatana, P. & Thaksinawong, T. (2022). Changes in Cell Size and Dimension Characterized by Crystal Violet Staining and



Simple ImageJ Analysis. *Journal of International Dental and Medical Research*, 15(1), 1–6. <http://www.jidmr.com>

Pranata, D.I. & Husin, H. (2023). Analisis Mutu *Crude Palm Oil* (CPO) dengan Parameter Kadar Asam Lemak Bebas (ALB) dan Kadar Air yang Terdapat pada Daily Tank di PT. Socfin Rahman, M., Aziz, Y., & Setia

Utama, P. (2021). Optimasi Kondisi Proses Sintesis Biodiesel Berbasis Reaksi Esterifikasi Palm Fatty Acid Distillate Dengan Katalis Cu-Hidroksiapatit Dari Limbah Tulang Ikan. *Journal of the Bioprocess, Chemical, and Environmental Engineering Science*, 1(1), 2021.

Putranti, M. L. T., Wirawan, S. K., & Bendiyasa, I. M. (2018). Adsorption of Free Fatty Acid (FFA) in Low-Grade Cooking Oil Used Activated Natural Zeolite as Adsorbent. *IOP Conference Series: Materials Science and Engineering*, 299(1). <https://doi.org/10.1088/1757-899X/299/1/012085>

Qazi, M. I. *et. al.* (2021). Experimental Investigation and Multi-Response Optimization of Machinability of AA5005H34 Using Composite Desirability Coupled with PCA. *Metals*, 11(2), 235. <https://doi.org/10.3390/met11020235>

Rahardja, I. (2019) Analisis Kalori Biodiesel *Crude Palm Oil* (CPO) dengan Katalis Abu Tandan Kosong Kelapa Sawit (ATKKS). *Seminar Nasional Sains dan Teknologi Fakultas Teknik Universitas Muhammadiyah Jakarta*

Rahma, F. N., & Hidayat, A. (2023). Biodiesel Production from Free Fatty Acid using  $ZrO_2$ /Bagasse Fly Ash Catalyst. *International Journal of Technology*, 14(1), 206 – 218. doi: 10.14716/ijtech.v14i1.4873

Rahman, M., Aziz, Y., & Setia Utama, P. (2021). Optimasi Kondisi Proses Sintesis Biodiesel Berbasis Reaksi Esterifikasi Palm Fatty Acid Distillate Dengan Katalis Cu-Hidroksiapatit Dari Limbah Tulang Ikan. *Journal of the Bioprocess, Chemical, and Environmental Engineering Science*, 1(1), 2021.



- Rosyadi, I., Ketut Caturwati, N., & Ivandy, S. (2021). The Effect of Zeolite Catalysis Size on Biodiesel Characteristics of Bio-Oil from Tuna Waste. *VANOS Journal Of Mechanical Engineering Education*, 6(1). <https://jurnal.untirta.ac.id/index.php/vanos>
- Ulfa, S. N. S., & Samik, S. (2022). Artikel Review: Pemanfaatan Katalis Zeolit Alam Teraktivasi dalam Sintesis Biodiesel dengan Metode Esterifikasi dan Transesterifikasi. *UNESA Journal of Chemistry*, 11(3), 165-181.
- Santoso, A., Sumari, Urfa Zakiyya, U., & Tiara Nur, A. (2019). Methyl Ester Synthesis of Crude Palm Oil off Grade Using the  $K_2O/Al_2O_3$  Catalyst and Its Potential as Biodiesel. *IOP Conference Series: Materials Science and Engineering*, 515(1). <https://doi.org/10.1088/1757-899X/515/1/012042>
- Sari, N. K., Purbasari, I. Y., Anggoro, P. W., Jamari, J., & Bayuseno, A. P. (2022). Reuse of Wheat Flour Liquid Waste for Enzymatic Hydrolysis to Yield Glucose-Derived Bioethanol. *Cogent Engineering*, 9(1). <https://doi.org/10.1080/23311916.2022.2101229>
- Suleman, N., Abas, & Papatungan, M. (2019). Esterifikasi dan Transesterifikasi Stearin Sawit untuk Pembuatan Biodiesel. *Jurnal Teknik*, 17(1), 66–77. <https://doi.org/10.37031/jt.v17i1.54>
- Sumari, S., Santoso, A., & Asrori, M. R. (2021). A review: Synthesis of biodiesel from low/off grade crude palm oil on pretreatment, transesterification, and characteristics. In *Orbital* (Vol. 13, Issue 4, pp. 385–391). Universidade Federal de Mato Grosso do Sul, Departamento de Quimica. <https://doi.org/10.17807/ORBITAL.V13I4.1632>
- Venkatachalam, M., Shum-Chéong-Sing, A., Caro, Y., Dufossé, L., & Fouillaud, M. (2021). OVAT Analysis and Response Surface Methodology Based on Nutrient Sources for Optimization of Pigment Production in the Marine-Derived Fungus *Talaromyces albobiverticillius* 30548 Submerged Fermentation. *Marine Drugs*, 19, 1 – 22. <https://doi.org/10.3390/md19050248>
- Wang, C., Leng, S., Guo, H., Yu, J., Li, W., Cao, L., & Huang, J. (2019). Quantitative Arrangement of Si/Al Ratio of Natural Zeolite Using Acid
-



Treatment. *Applied Surface Science*, 498.  
<https://doi.org/10.1016/j.apsusc.2019.143874>

Wiyantoko, B. (2017) Pengaruh Aktivasi Fisika pada Zeolit Alam dan Lempug Alam terhadap Daya Adsorpsinya. Prosiding Seminar Nasional; Kimia dan Pembelajarannya 2017. *Jurusan Kimia FMIPA UM*.

Yuliusman, Purwanto, W. W., & Nugroho, Y. S. (2013). Pemilihan Adsorben untuk Penjerapan Karbon Monoksida Menggunakan Model Adsorpsi Isotermis Langmuir. *Reaktor*, 14(3), 225 – 233.  
<https://doi.org/10.14710/reaktor.14.3.225-233>

Yusuf, B. O., Oladepo., S. A., & Ganiyu., S. A. (2023). Biodiesel Production from Waste Cooking Oil via  $\beta$ -Zeolite Supported Sulfated Metal Oxide Catalyst Systems. *ACS Omega*, 8, 23720 – 23732.  
<https://doi.org/10.1021/acsomega.3c01892>

Winarni, S., Sunengsih, N., & Ginanjar, I. (2021). Multi responses taguchi optimization using overlaid contour plot and desirability function. *Journal of Physics: Conference Series*, 1776(1). IOP Publishing Ltd.  
<https://doi.org/10.1088/1742-6596/1776/1/012061>