

DAFTAR PUSTAKA

- Agung M, G. F., Hanafie Sy, M. R., & Mardina, P. (2013). Ekstraksi Silika dari Abu Sekam Padi dengan Pelarut KOH. *Konversi*, 2(1), 28. <https://doi.org/10.20527/k.v2i1.125>
- Al-Muttaqii, M., Kurniawansyah, F., Prajitno, D. H., & Roesyadi, A. (2019). Bio-kerosene and bio-gasoil from coconut oils via hydrocracking process over Ni-Fe/HZSM-5 catalyst. *Bulletin of Chemical Reaction Engineering and Catalysis*, 14(2), 309–319. <https://doi.org/10.9767/bcrec.14.2.2669.309-319>
- Annenkov, V. V., Danilovtseva, E. N., Pal'shin, V. A., Verkhovina, O. N., Zelinskiy, S. N., & Krishnan, U. M. (2017). Silicic acid condensation under the influence of water-soluble polymers: from biology to new materials. Dalam *RSC Advances* (Vol. 7, Nomor 34, hlm. 20995–21027). Royal Society of Chemistry. <https://doi.org/10.1039/c7ra01310h>
- Azis, Y., Ida Zahrina, Mutamima, A., Alfarisi, C. D., & Nurfatihayati. (2024). Sintesis Natrium Silikat Menggunakan Silika dari Pasir Pantai Bengkalis. *Jurnal Riset Kimia*, 15(1), 39–47. <https://doi.org/10.25077/jrk.v15i1.640>
- Bardestani, R., Patience, G. S., & Kaliaguine, S. (2019). Experimental methods in chemical engineering: specific surface area and pore size distribution measurements—BET, BJH, and DFT. Dalam *Canadian Journal of Chemical Engineering* (Vol. 97, Nomor 11, hlm. 2781–2791). Wiley-Liss Inc. <https://doi.org/10.1002/cjce.23632>
- Bawa Susana, I. G., & Wirya Aryadi, I. G. A. K. C. A. (2025). Kajian Energi Terbarukan dan Peningkatan Ekonomi dari Pemanfaatan Limbah Sekam Padi melalui *Co-firing* Biomassa. *Energy, Materials and Product Design*, 4(2), 293–300. <https://doi.org/10.29303/n0qbf184>
- Brockner, W., Ehrhardt, C., & Gjikaj, M. (2007). Thermal decomposition of nickel nitrate hexahydrate, $\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$, in comparison to $\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ and $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$. *Thermochimica Acta*, 456(1), 64–68. <https://doi.org/10.1016/j.tca.2007.01.031>
- Burimsitthigul, T., Yoosuk, B., Ngamcharussrivichai, C., & Prasassarakich, P. (2021). Hydrocarbon biofuel from hydrotreating of palm oil over unsupported Ni–Mo sulfide catalysts. *Renewable Energy*, 163, 1648–1659. <https://doi.org/10.1016/j.renene.2020.10.044>
- Cabrera, E., & Melo de Sousa, J. M. (2022). Use of Sustainable Fuels in Aviation—A Review. Dalam *Energies* (Vol. 15, Nomor 7). MDPI. <https://doi.org/10.3390/en15072440>
- Candela-Noguera, V., Alfonso, M., Amorós, P., Aznar, E., Marcos, M. D., & Martínez-Máñez, R. (2024). In-depth study of factors affecting the formation of MCM-41-type mesoporous silica nanoparticles. *Microporous and Mesoporous Materials*, 363. <https://doi.org/10.1016/j.micromeso.2023.112840>
- Carrales-Alvarado, D. H., Rodríguez-Ramos, I., Leyva-Ramos, R., Mendoza-Mendoza, E., & Villela-Martínez, D. E. (2020). Effect of surface area and physical–chemical properties of graphite and graphene-based materials on their adsorption capacity towards metronidazole and trimethoprim antibiotics

- in aqueous solution. *Chemical Engineering Journal*, 402. <https://doi.org/10.1016/j.cej.2020.126155>
- Chareonpanich, M., Nanta-ngern, A., & Limtrakul, J. (2007). Short-period synthesis of ordered mesoporous silica SBA-15 using ultrasonic technique. *Materials Letters*, 61(29), 5153–5156. <https://doi.org/10.1016/j.matlet.2007.04.019>
- Chen, Q., Ge, Y., Granbohm, H., & Hannula, S. P. (2018). Effect of ethanol on Ag@Mesoporous silica formation by in situ modified stöber method. *Nanomaterials*, 8(6). <https://doi.org/10.3390/nano8060362>
- Chircov, C., Spoială, A., Păun, C., Crăciun, L., Ficăi, D., Ficăi, A., Andronescu, E., & Turculeț, S. C. (2020). Mesoporous Silica Platforms with Potential Applications in Release and Adsorption of Active Agents. Dalam *Molecules* (Vol. 25, Nomor 17). Multidisciplinary Digital Publishing Institute (MDPI). <https://doi.org/10.3390/molecules25173814>
- Cui, Y., Rushing, J., Seifert, S., Bedford, N. M., & Kuroda, D. G. (2019). *The Molecularly Heterogeneous Structure of Non-Ionic Deep Eutectic Solvent Composed of N-Methylacetamide and Lauric Acid*.
- Destiana, I. D., & Mukminah, N. (2021). Teknologi Minyak Lemak. Penerbit POLSUB PRESS. <https://www.researchgate.net/publication/351491961>
- Dhaneswara, D., Fatriansyah, J. F., Situmorang, F. W., & Haqoh, A. N. (2020). Synthesis of Amorphous Silica from Rice Husk Ash: Comparing HCl and CH₃COOH Acidification Methods and Various Alkaline Concentrations. *International Journal of Technology*, 11(1), 200–208. <https://doi.org/10.14716/ijtech.v11i1.3335>
- Eller, Z., Varga, Z., & Hancsók, J. (2016). Advanced production process of jet fuel components from technical grade coconut oil with special hydrocracking. *Fuel*, 182, 713–720. <https://doi.org/10.1016/j.fuel.2016.06.055>
- Fan, J., Du, P., Wang, X., Zheng, P., Zhao, Z., Duan, A., Xu, C., & Li, J. (2018). Ultrasound-assisted synthesis of ordered mesoporous silica FDU-12 with a hollow structure. *New Journal of Chemistry*, 42(4), 2381–2384. <https://doi.org/10.1039/c7nj03843g>
- Farhan, L. K., & Khuder, H. Y. (2025). The Role of Transition Metal Complexes in Catalysis: Mechanisms and Industrial Applications. *European Journal of Applied Science, Engineering and Technology*, 3(4), 132–157. [https://doi.org/10.59324/ejaset.2025.3\(4\).13](https://doi.org/10.59324/ejaset.2025.3(4).13)
- Główniak, S., Szcześniak, B., Choma, J., & Jaroniec, M. (2023a). Recent Developments in Sonochemical Synthesis of Nanoporous Materials. Dalam *Molecules* (Vol. 28, Nomor 6). MDPI. <https://doi.org/10.3390/molecules28062639>
- Główniak, S., Szcześniak, B., Choma, J., & Jaroniec, M. (2023b). Recent Developments in Sonochemical Synthesis of Nanoporous Materials. Dalam *Molecules* (Vol. 28, Nomor 6). MDPI. <https://doi.org/10.3390/molecules28062639>
- Grü, M., Unger, K. K., Matsumoto, A., & Tsutsumi, K. (1999). Novel pathways for the preparation of mesoporous MCM-41 materials: control of porosity and morphology. Dalam *Microporous and Mesoporous Materials* (Vol. 27).

- Huirache-Acuña, R., Nava, R., Peza-Ledesma, C. L., Lara-Romero, J., Alonso-Núñez, G., Pawelec, B., & Rivera-Muñoz, E. M. (2013). SBA-15 Mesoporous Silica as Catalytic Support for Hydrodesulfurization Catalysts—Review. Dalam *Materials* (Vol. 6, Nomor 9, hlm. 4139–4167). MDPI. <https://doi.org/10.3390/ma6094139>
- Isyanti, M., & Sirait, S. D. (2021). Fraksinasi Asam Laurat, Short Chain Triglyceride (SCT) dan Medium Chain Triglyceride (MCT) dari Minyak Kelapa Murni. *Warta IHP*, 38(2), 160–168.
- Izadifar, Z., Babyn, P., & Chapman, D. (2019). Ultrasound Cavitation/Microbubble Detection and Medical Applications. Dalam *Journal of Medical and Biological Engineering* (Vol. 39, Nomor 3, hlm. 259–276). Springer Berlin Heidelberg. <https://doi.org/10.1007/s40846-018-0391-0>
- Jeon, H., Park, J. Y., Ok, M., Han, G. B., Lee, J. W., & Kim, J. K. (2023). Analysis of the Relationship between the Low-Temperature Properties and Distillation Profiles of HEFA-Processed Bio-Jet Fuel. *Sustainability (Switzerland)*, 15(1). <https://doi.org/10.3390/su15010799>
- Jeon, H., Youn, J., Park, J. Y., Yim, E. S., Ha, J. M., Park, Y. K., Lee, J. W., & Kim, J. K. (2024). Evaluation of the Properties and Compositions of Blended Bio-jet Fuels Derived from Fast Pyrolysis Bio-oil made from Wood According to Aging Test. *Korean Journal of Chemical Engineering*, 41(13), 3631–3646. <https://doi.org/10.1007/s11814-024-00309-9>
- Khairunnisa, A., Hanifah, S. N., Amalia, J., Juhana, B. B., & Primasari, A. (2025). Minyak Kelapa dan Potensi Sifat Fungsionalnya untuk Kesehatan dan Industri Pangan. *Jurnal Al-Azhar Indonesia Seri Sains dan Teknologi*, 10(3), 295. <https://doi.org/10.36722/sst.v10i3.4632>
- Kim, T. G., An, G. S., Han, J. S., Hur, J. U., Park, B. G., & Choi, S. C. (2017). Synthesis of size controlled spherical silica nanoparticles via sol-gel process within hydrophilic solvent. *Journal of the Korean Ceramic Society*, 54(1), 49–54. <https://doi.org/10.4191/kcers.2017.54.1.10>
- Koo, W. B., Yoo, K., & Kim, H. (2022). The Hydrogen Reduction Behavior of MoO₃ Powder. *Resources Recycling*, 31(1), 29–36. <https://doi.org/10.7844/kirr.2022.31.1.29>
- Kumar, S., Kumar, V., Devi, R., Sisodia, A. K., Jatrana, A., Singh, R. B., Dahiya, R., & Mishra, A. K. (2022). Sustainable and Scalable Approach for Enhancing the Electrochemical Performance of Molybdenum Disulfide (MoS₂). *Genetics Research*, 2022. <https://doi.org/10.1155/2022/1288623>
- Li, M., Ihli, J., Verheijen, M. A., Holler, M., Guizar-Sicairos, M., Van Bokhoven, J. A., Hensen, E. J. M., & Weber, T. (2022). Alumina-Supported NiMo Hydrotreating Catalysts—Aspects of 3D Structure, Synthesis, and Activity. *Journal of Physical Chemistry C*, 126(43), 18536–18549. <https://doi.org/10.1021/acs.jpcc.2c05927>
- Li, W., Han, Y. C., Zhang, J. L., Wang, L. X., & Song, J. (2006). Thermodynamic modeling of CTAB aggregation in water-ethanol mixed solvents. *Colloid Journal*, 68(3), 304–310. <https://doi.org/10.1134/S1061933X06030069>

- Maulida, F., Nursanto, E. B., & AL Islami, N. A. (2025). Pengembangan Model Bisnis Sustainable Aviation Fuel Berbasis Used Cooking Oil. *INDEF Policy Brief*, (No. 5/2025).
- Medeiros Leão, G. S., Silva Ribeiro, M. D., Filho, R. L. de F., Saraiva, L. B., Peña-Garcia, R. R., Teixeira, A. P. de C., Lago, R. M., Freitas, F. A., de Sá Barros, S., Junior, S. D., Ruiz, Y. L., & Nobre, F. X. (2024). The Synergic Effect of h-MoO₃, α -MoO₃, and β -MoO₃ Phase Mixture as a Solid Catalyst to Obtain Methyl Oleate. *ACS Applied Materials and Interfaces*, 16(44), 60103–60121. <https://doi.org/10.1021/acsami.4c08804>
- Monteiro, R. R. C., Dos Santos, I. A., Arcanjo, M. R. A., Cavalcante, C. L., de Luna, F. M. T., Fernandez-Lafuente, R., & Vieira, R. S. (2022). Production of Jet Biofuels by Catalytic Hydroprocessing of Esters and Fatty Acids: A Review. Dalam *Catalysts* (Vol. 12, Nomor 2). MDPI. <https://doi.org/10.3390/catal12020237>
- Mussa, N. S., Toshtay, K., & Capron, M. (2024). Catalytic Applications in the Production of Hydrotreated Vegetable Oil (HVO) as a Renewable Fuel: A Review. Dalam *Catalysts* (Vol. 14, Nomor 7). Multidisciplinary Digital Publishing Institute (MDPI). <https://doi.org/10.3390/catal14070452>
- Padang, A., Nurlaila, R., Sylvia, N., & Ibrahim, I. (2022). Analisis Suhu dan Waktu Pembakaran Abu Sekam Padi terhadap Hasil Silika dari Proses Ekstraksi Menggunakan Pelarut NaOH. Dalam *Chemical Engineering Journal Storage* (Vol. 1, Nomor 1).
- Patterson, H. B. W. (2009). Chapter 1 - Basic Components and Procedures. Dalam G. R. List (Ed.), *Bleaching and Purifying Fats and Oils (Second Edition)* (hlm. 1–52). AOCS Press. [https://doi.org/https://doi.org/10.1016/B978-1-893997-91-2.50007-9](https://doi.org/10.1016/B978-1-893997-91-2.50007-9)
- Purnawira, B., Purwaningsih, H., Ervianto, Y., Pratiwi, V. M., Susanti, D., Rochiem, R., & Purniawan, A. (2019). Synthesis and characterization of mesoporous silica nanoparticles (MSNp) MCM 41 from natural waste rice husk. *IOP Conference Series: Materials Science and Engineering*, 541(1). <https://doi.org/10.1088/1757-899X/541/1/012018>
- Rajput, G., Gosu, V., & Subbaramaiah, V. (2025). Synthesis of copper-impregnated MCM-41 from synthetic and rice husk-derived silica for efficient adsorption of levofloxacin: A machine learning approach. *Journal of Environmental Chemical Engineering*, 13(2). <https://doi.org/10.1016/j.jece.2025.115634>
- Rizzi, F., Castaldo, R., Latronico, T., Lasala, P., Gentile, G., Lavorgna, M., Striccoli, M., Agostiano, A., Comparelli, R., Depalo, N., Curri, M. L., & Fanizza, E. (2021). High surface area mesoporous silica nanoparticles with tunable size in the sub-micrometer regime: Insights on the size and porosity control mechanisms. *Molecules*, 26(14). <https://doi.org/10.3390/molecules26144247>
- Roushdy, N., Elnouby, M. S., Farag, A. A. M., Ramadan, M., El-Shazly, O., & El-Wahidy, E. F. (2024). Structural and electrical characterization of nickel sulfide nanoparticles. *Optical and Quantum Electronics*, 56(11). <https://doi.org/10.1007/s11082-024-07585-z>
- Sabarman, J. S., Legowo, E. H., Widiputri, D. I., & Siregar, A. R. (2019). Bioavtur Synthesis from Palm Fatty Acid Distillate through Hydrotreating and

- Hydrocracking Processes. Dalam *Indonesian Journal of Energy* (Vol. 2, Nomor 2).
- Safitri, A., Nurmadilla, N., & Gayatri, W. (2022). Peranan Virgin Coconut Oil pada Pelayanan Gizi Klinik. *Hospital Journal*, 03(02), 207.
- Salsabila. (2025). Analisis Kadar Natrium Klorida (NaCl) Pada Garam Konsumsi Beriodium. *Jurnal Penelitian Ilmiah Multidisipliner*, 02(03), 2442–2447.
- Setyaningsih, D., Hambali, E., Permatasari, S., & Muna, N. (2013). Bioavtur Production Process from Palm Oil through Hydrogenation and Catalytic Cracking. Dalam J. M. Munandar, M. Nakhjib, D. Saputra, I. Sulaeman, & Elviana (Ed.), *Penguatan penelitian dan pengembangan industri kelapa sawit yang berkelanjutan* (hlm. 256–261). Masyarakat Perkelapa-Sawitan Indonesia (MAKSI).
- Shaaban, E. R., Kaid, M. A., & Ali, M. G. S. (2014). X-ray analysis and optical properties of nickel oxide thin films. *Journal of Alloys and Compounds*, 613, 324–329. <https://doi.org/10.1016/j.jallcom.2014.06.057>
- Shi, Y., Wang, G., Mei, J., Xiao, C., Hu, D., Wang, A., Song, Y., Ni, Y., Jiang, G., & Duan, A. (2020). The Influence of Pore Structure and Acidity on the Hydrodesulfurization of Dibenzothiophene over NiMo-Supported Catalysts. *ACS Omega*, 5(25), 15576–15585. <https://doi.org/10.1021/acsomega.0c01783>
- Shinde, P. S., Suryawanshi, P. S., Patil, K. K., Belekar, V. M., Sankpal, S. A., Delekar, S. D., & Jadhav, S. A. (2021). A brief overview of recent progress in porous silica as catalyst supports. Dalam *Journal of Composites Science* (Vol. 5, Nomor 3). MDPI AG. <https://doi.org/10.3390/jcs5030075>
- Singh, A., & Singh, B. (2020). Characterization of rice husk ash obtained from an industrial source. *Journal of Sustainable Cement-Based Materials*, 1–20. <https://doi.org/10.1080/21650373.2020.1789010>
- Suyanta, S., Eko, S. K., Bambang, R., Drita, A. C., Efa, R., & Mika, K. (2019). Rapid synthesis of mcm-41 from rice husk using ultrasonic wave: Optimization of sonication time. *Materials Science Forum*, 948 MSF, p 198-205. <https://doi.org/10.4028/www.scientific.net/MSF.948.198>
- Tanimu, A., Ganiyu, S. A., Kozhevnikov, I., & Alhooshani, K. (2021). In-situ activation of NiMo catalyst based on support surface-bound thiols: A green approach to catalyst sulfidation and improved activity. *Arabian Journal of Chemistry*, 14(4). <https://doi.org/10.1016/j.arabjc.2021.103030>
- Tao, L., Milbrandt, A., Zhang, Y., & Wang, W. C. (2017). Techno-economic and resource analysis of hydroprocessed renewable jet fuel. *Biotechnology for Biofuels*, 10(1). <https://doi.org/10.1186/s13068-017-0945-3>
- Tian, L., Wang, H., Wu, T., Yang, H., Xu, S., Chai, X., & Zhang, K. (2022). In-depth analysis of ultrasonic-induced geological pore re-structures. *Ultrasonics Sonochemistry*, 85. <https://doi.org/10.1016/j.ultsonch.2022.105990>
- Trommer, A., Hessling, J., Schreiner, P. R., Schönhoff, M., & Smarsly, B. M. (2025). Influence of the Mesoporosity of Silica Carrier Materials on the Performance of an Immobilized Organocatalyst in Heterogeneous Catalysis. *ACS Applied Materials and Interfaces*, 17(16), 24283–24299. <https://doi.org/10.1021/acsami.4c19398>

- Wang, Z. D., Yoshida, M., & George, B. (2013). Theoretical study on the thermal decomposition of thiourea. *Computational and Theoretical Chemistry*, 1017, 91–98. <https://doi.org/10.1016/j.comptc.2013.05.007>
- Wijaya, K., Setyono, R. D. P., Pratika, R. A., Heraldry, E., Suseno, A., Hakim, L., Tahir, I., Oh, W. C., & Saviola, A. J. (2024a). Dual metal NiMo dispersed on silica derived from rice husk ash as a catalyst for hydrocracking of used palm cooking oil into liquid biofuels. *Communications in Science and Technology*, 9(2), 219–226. <https://doi.org/10.21924/cst.9.2.2024.1480>
- Wijaya, K., Setyono, R. D. P., Pratika, R. A., Heraldry, E., Suseno, A., Hakim, L., Tahir, I., Oh, W. C., & Saviola, A. J. (2024b). Dual metal NiMo dispersed on silica derived from rice husk ash as a catalyst for hydrocracking of used palm cooking oil into liquid biofuels. *Communications in Science and Technology*, 9(2), 219–226. <https://doi.org/10.21924/cst.9.2.2024.1480>
- Xiong, F., Rother, G., Gong, Y., & Moortgat, J. (2021). Reexamining supercritical gas adsorption theories in nano-porous shales under geological conditions. *Fuel*, 287. <https://doi.org/10.1016/j.fuel.2020.119454>
- Xu, J., Tang, S., Zhong, S., Song, L., Wu, P., Jiang, W., Wu, K., Hu, Q., Liu, C., Yue, H., Liang, B., & Yang, Y. (2023). Solution combustion synthesis of CoSx, MoSx, CoSx-MoSx and their catalytic activity in H₂ production from H₂S decomposition. *International Journal of Hydrogen Energy*, 48(24), 8807–8818. <https://doi.org/10.1016/j.ijhydene.2022.11.066>
- Xu, S., Zhou, C., Fang, H., Zhu, W., Shi, J., & Liu, G. (2023). Synthesis of ordered mesoporous silica from biomass ash and its application in CO₂ adsorption. *Environmental Research*, 231. <https://doi.org/10.1016/j.envres.2023.116070>
- Yang, J., Xin, Z., He, Q. (Sophia), Corscadden, K., & Niu, H. (2019). An overview on performance characteristics of bio-jet fuels. Dalam *Fuel* (Vol. 237, hlm. 916–936). Elsevier Ltd. <https://doi.org/10.1016/j.fuel.2018.10.079>
- Yoo, K., Koo, W. B., Kim, H., & Lee, S. H. (2023). The Self-Reduction during the Thermal Decomposition of an Ammonium Molybdate. *Minerals*, 13(2). <https://doi.org/10.3390/min13020133>
- Zhang, B., Wang, H., Sun, B., Ouyang, Z., Dou, W., Wang, B., Lai, P., Hu, Z., Luo, B., Yang, M., & Zeng, Z. (2024). Pore Size Distribution and Fractal Characteristics of Deep Coal in the Daning-Jixian Block on the Eastern Margin of the Ordos Basin. *ACS Omega*. <https://doi.org/10.1021/acsomega.4c03510>
- Zhang, D., Duan, A., Zhao, Z., Wang, X., Jiang, G., Liu, J., Wang, C., & Jin, M. (2011). Synthesis, characterization and catalytic performance of meso-microporous material Beta-SBA-15-supported NiMo catalysts for hydrodesulfurization of dibenzothiophene. *Catalysis Today*, 175(1), 477–484. <https://doi.org/10.1016/j.cattod.2011.03.060>
- Zhang, R., Zhong, P., Arandiyana, H., Guan, Y., Liu, J., Wang, N., Jiao, Y., & Fan, X. (2020). Using ultrasound to improve the sequential post-synthesis modification method for making mesoporous Y zeolites. *Frontiers of Chemical Science and Engineering*, 14(2), 275–287. <https://doi.org/10.1007/s11705-019-1905-1>