

## DAFTAR PUSTAKA

- Abid, Z., Hakiki, A., Boukoussa, B., Launay, F., Hamaizi, H., Bengueddach, A., & Hamacha, R. (2019). Preparation of highly hydrophilic PVA/SBA-15 composite materials and their adsorption behavior toward cationic dye: effect of PVA content. *Journal of Materials Science*, 54(10), 7679–7691. <https://doi.org/10.1007/s10853-019-03415-w>
- Alfredsson, V. (2015). *The Dynamic Association Processes Leading from a Silica Precursor to a Mesoporous SBA-15 Material*. <https://doi.org/10.1021/acs.accounts.5b00165>
- Banoth, P., Kandula, C., & Kollu, P. (2022). Introduction to Electrocatalysts [Chapter]. *Noble Metal-Free Electrocatalysts: New Trends in Electrocatalysts for Energy Applications. Volume 2, Part 1 - Introduction to Electrocatalysts*, 2, 1–37. <https://doi.org/10.1021/bk-2022-1432.ch001>
- Bose, S., Sarkar, N., & Jo, Y. (2024). Natural medicine delivery from 3D printed bone substitutes. *Journal of Controlled Release*, 365(September 2023), 848–875. <https://doi.org/10.1016/j.jconrel.2023.09.025>
- Bukhtiyarova, M., Vlasova, E. N., & Bukhtiyarova, G. A. (2024). Hydroprocessing of Biomass Feedstock Over Sulfided CoMo-, NiMo-, and NiW-supported Catalysts for Bio-Jet Fuel Component Production: A Review. *Sustainable Energy & Fuels*, 8(16), 3524–3544. <https://doi.org/10.1039/d4se00302k>
- Bykova, M. V. A., Rekhtina, M. A., & Lebedev, M. Y. (2018). *Hydrotreatment of 2-Methoxyphenol over High Ni-Loaded Sol-Gel Catalysts : The Influence of Mo on Catalyst Activity and Reaction Pathways*. 5153–5164. <https://doi.org/10.1002/slct.201800639>
- Datta, C., Varun Kondra, T., Miller, M., & Streltsov, A. (2023). Catalysis of entanglement and other quantum resources. *Reports on Progress in Physics*, 86(11), 116002. <https://doi.org/10.1088/1361-6633/acfbec>
- Elharati, M. A., Lee, K. M., Hwang, S., Mohammed Hussain, A., Miura, Y., Dong, S., Fukuyama, Y., Dale, N., Saunders, S., Kim, T., & Ha, S. (2022). The effect of silica oxide support on the catalytic activity of nickel-molybdenum bimetallic catalyst toward ethanol steam reforming for hydrogen production. *Chemical Engineering Journal*, 441(February). <https://doi.org/10.1016/j.cej.2022.135916>
- Farida, I., Prasetyo, K., Bhifti, E. I., Holson, N., Silalahi, M., Mesin, T., Sains, F., & Ri, U. (2025). *Tantangan Keberlanjutan dan Inovasi Green Technology*. 4(1).

- Ghaedi, H., & Zhao, M. (2022). Review on Template Removal Techniques for Synthesis of Mesoporous Silica Materials. *ACS Publications*. <https://doi.org/10.1021/acs.energyfuels.1c04435>
- Giraud, F., Geantet, C., Guilhaume, N., Loridant, S., Gros, S., Porcheron, L., Kanniche, M., & Bianchi, D. (2021). Individual amounts of Lewis and Brønsted acid sites on metal oxides from NH<sub>3</sub> adsorption equilibrium: Case of TiO<sub>2</sub> based solids. *Catalysis Today*, 373(September 2020), 69–79. <https://doi.org/10.1016/j.cattod.2020.08.015>
- Gökırmak Söğüt, E., & Gülcan, M. (2023). Chapter 1 - Adsorption: basics, properties, and classification. In C. Verma, J. Aslam, & M. E. B. T.-A. through A. N. M. Khan (Ed.), *Micro and Nano Technologies* (hal. 3–21). Elsevier. <https://doi.org/https://doi.org/10.1016/B978-0-443-18456-7.00001-8>
- Guntida, A., Suriye, K., Panpranot, J., & Praserttham, P. (2018). Comparative Study of Lewis Acid Transformation on Non-reducible and Reducible Oxides Under Hydrogen Atmosphere by In Situ DRIFTS of Adsorbed - NH<sub>3</sub>. *Topics in Catalysis*, 0(0), 0. <https://doi.org/10.1007/s11244-018-0995-1>
- Istadi, I., Riyanto, T., Buchori, L., Anggoro, D. D., Gilbert, G., Meiranti, K. A., & Kho, E. (2020). *Enhancing Brønsted and Lewis Acid Sites of the Utilized Spent RFCC Catalyst Waste for the Continuous Cracking Process of Palm Oil to Biofuels*. <https://doi.org/10.1021/acs.iecr.0c01061>
- Jamilatun, S., Rahayu, A., Studi, P., Teknik, M., Industri, F. T., & Dahlan, U. A. (2025). *Effect of NaOH Concentration on Surface Width and Pore Volume of Silica Gel From Beef Shrain as Adsorbent*. 15, 102–109.
- Jangher, A., Griffiths, P. C., Paul, A., King, S. M., Heenan, R. K., & Schweins, R. (2011). *Colloids and Surfaces A: Physicochemical and Engineering Aspects Polymeric micelle disruption by cosolvents and anionic surfactants*. 391, 88–94. <https://doi.org/10.1016/j.colsurfa.2011.08.006>
- Kemenhub. (2025). *Peta Jalan Penerbangan UK PACT*.
- Kementerian ESDM. (2024). *Statistik Minyak dan Gas Bumi Semester I 2024*.
- Kementerian ESDM. (2026). *Keputusan Menteri ESDM Nomor 113.K/EK.05/MEM.E/2026*.
- Kittel, H., Kadleček, D., Šimáček, P., & Kadle, D. (2022). Factors influencing production of JET fuel by hydrocracking. *Petroleum Science and Technology*, 40(1), 73–91. <https://doi.org/10.1080/10916466.2021.1987459>

- Kroyan, Y., Wojcieszek, M., Kaario, O., & Larmi, M. (2022). *Modeling the impact of sustainable aviation fuel properties on end- use performance and emissions in aircraft jet engines*. 255. <https://doi.org/10.1016/j.energy.2022.124470>
- Lanre, M. S., Al-Fatesh, A. S., Fakeeha, A. H., Kasim, S. O., Ibrahim, A. A., Al-Awadi, A. S., Al-Zahrani, A. A., & Abasaheed, A. E. (2020). Catalytic performance of lanthanum promoted Ni/ZrO<sub>2</sub> for carbon dioxide reforming of methane. *Processes*, 8(11), 1–15. <https://doi.org/10.3390/pr8111502>
- Liu, B., Lv, H., Cui, X., Sun, G., Zhang, X., Dong, B., Li, Y., Pan, Y., Chai, Y., & Liu, C. (2024). Preparation of presulfided oil-soluble NiMo catalyst for slurry bed hydrocracking of vacuum residue. *Chemical Engineering Journal*, 498(June), 155166. <https://doi.org/10.1016/j.cej.2024.155166>
- Liu, J., Du, G., & Chen, T. (2024). Synthesis of Ordered Mesoporous Silica with Nonionic Surfactant/Anionic Polyelectrolyte as Template under Near-Neutral pH Conditions. *Langmuir : The ACS Journal of Surfaces and Colloids*, 40(27), 14016–14026. <https://doi.org/10.1021/acs.langmuir.4c01338>
- Liu, J., Li, B., Dong, Y., Liu, Q., Song, Y., Guo, Y., Zhao, Y., Li, X., & Xiong, J. (2024). Hydrolysis of Ammonia Borane for Hydrogen Generation on Bimetallic CoCu Catalysts: Regulation of Synergistic Effect. *Catalysis Letters*, 154(2), 461–472. <https://doi.org/10.1007/s10562-023-04314-1>
- Lv, Y., Xin, Z., Meng, X., Tao, M., Bian, Z., Gu, J., & Gao, W. (2017). Effect of La, Mg and Mo additives on dispersion and thermostability of Ni species on KIT-6 for CO methanation. *Applied Catalysis A: General*, 543(130), 125–132. <https://doi.org/10.1016/j.apcata.2017.05.038>
- Majodina, S., Poswayo, O., & Dembaremba, T. O. (2023). *Towards improvement of hydroprocessing catalysts - understanding the role of advanced mineral materials in hydroprocessing catalysts*. <https://doi.org/10.20517/mmm.2023.23>
- Makcharoen, M., Kaewchada, A., & Akkarawatkhoosith, N. (2021). Energy Conversion and Management : X Biojet fuel production via deoxygenation of crude palm kernel oil using Pt / C as catalyst in a continuous fixed bed reactor. *Energy Conversion and Management: X*, 12, 100125. <https://doi.org/10.1016/j.ecmx.2021.100125>
- Meng, B., Ren, S., Zhang, X., Chen, K., Wei, W., Guo, Q., & Shen, B. (2022). Microporous and Mesoporous Materials Enhancement of the strong Brønsted acidity and mesoporosity : Zr<sup>4+</sup> promoted framework modification of Zeolite Y. *Microporous and Mesoporous Materials*, 335(December 2021), 111849. <https://doi.org/10.1016/j.micromeso.2022.111849>

- Mirena, J. I., Thybaut, J. W., Marin, G. B., Martens, J. A., & Galvita, V. V. (2021). Impact of the Spatial Distribution of Active Material on Bifunctional Hydrocracking. *Industrial and Engineering Chemistry Research*, 60(18), 6357–6378. <https://doi.org/10.1021/acs.iecr.0c05528>
- Morteo-flores, F., & Roldan, A. (2022). *The Effect of Pristine and Hydroxylated Oxide Surfaces on the Guaiacol HDO Process: A DFT Study*. 202100583. <https://doi.org/10.1002/cphc.202100583>
- Nadeina, K. A., Vatutina, Y. V., Mukhacheva, P. P., Budukva, S. V., Panafidin, M. A., Danilova, I. G., Pakharukova, V. P., Gerasimov, E. Y., Krestyaninova, V. S., Klimov, O. V., & Noskov, A. S. (2025). New insights into the formation of bulk NiMo hydrotreating catalysts: Influence of the Ni / Mo molar ratio. *Fuel*, 390(January), 134750. <https://doi.org/10.1016/j.fuel.2025.134750>
- Nava, R., Ledesma, C. L. P., Romero, J. L., & Nú, G. A. (2013). *SBA-15 Mesoporous Silica as Catalytic Support for Hydrodesulfurization Catalysts — Review*. 4139–4167. <https://doi.org/10.3390/ma6094139>
- Niculescu, V. (2020). *Mesoporous Silica Nanoparticles for Bio-Applications*. 7(February), 1–14. <https://doi.org/10.3389/fmats.2020.00036>
- Okolie, J. A., Awotoye, D., Tabat, M. E., Okoye, P. U., Epelle, E. I., Ogbaga, C. C., & Gu, F. (2023). *iScience II Multi-criteria decision analysis for the evaluation and screening of sustainable aviation fuel production pathways*.
- Ortiz-bustos, J., Soares, S. F., Helena, P., & Yolanda, P. (2024). *Tuning adsorption capacities of hybrid mesoporous silica nanospheres and adsorption mechanism study for sulfamethoxazole and diclofenac removal from water*. 398(January). <https://doi.org/10.1016/j.molliq.2024.124213>
- Padang, A., Nurlaila, R., Sylvia, N., Ibrahim, I., & Padi, A. S. (2023). Analisa Suhu dan Waktu Pembakaran Abu Sekam Padi Terhadap Hasil Silika dari Proses Ekstraksi Pelarut Menggunakan NaOH. *Chemical Engineering Journal Storage*, 2(Mei), 216–225.
- Parahita, I. G. A. A., Mirzayanti, Y. W., Gunardi, I., Roesyadi, A., & Prajitno, D. H. (2018). Production of Biofuel via Catalytic Hydrocracking of Kapuk (Ceiba pentandra) Seed Oil with NiMo/HZSM-5 Catalyst. *MATEC Web of Conferences*, 156, 1–5. <https://doi.org/10.1051/matecconf/201815606001>
- Pezzotta, C., Marakatti, V. S., & Gaigneaux, E. M. (2020). Role of Lewis and Brønsted acid sites in resorcinol: Tert-butylation over heteropolyacid-based catalysts. *Catalysis Science and Technology*, 10(23), 7984–7997. <https://doi.org/10.1039/d0cy01030h>

- Pompe, C. E., Slagter, M., Jongh, P. E. De, & Jong, K. P. De. (2018). Impact of heterogeneities in silica-supported copper catalysts on their stability for methanol synthesis. *Journal of Catalysis*, 365, 1–9. <https://doi.org/10.1016/j.jcat.2018.06.014>
- Puello-Polo, E., & Márquez, Y. P. and E. (2020). *Effect of the Gallium and Vanadium on the Dibenzothiophene Hydrodesulfurization and*. 1–19.
- Rahmawati, F. (2022). Sintesis Katalis Ni-Cu/KA Untuk Mengkonversi Crude Palm Oil (CPO) Menjadi Biofuel Menggunakan Proses Hydrocracking. *Universitas Islam Indonesia*.
- Rasyid, R. (2011). *Perbandingan X-Ray Fluorescence (XRF) dan Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES) untuk Analisis Nikel dan Besi dalam Sampel Converter Slag pada Industri Pertambangan Nikel*.
- Reksowardojo, I. K., Duong, L. H., Zain, R., Hartono, F., & Marno, S. (2020). Performance and Exhaust Emissions of a Gas-Turbine Engine Fueled with Biojet / Jet A-1 Blends for the Development of Aviation Biofuel in Tropical Regions. *MDPI*.
- Rikiyama, K., Horiuchi, T., Koga, N., Sanada, Y., & Watanabe, K. (2018). Micellization of poly ( ethylene oxide ) -poly ( propylene oxide ) alternating multiblock copolymers in water. *Polymer*, 156(June), 102–110. <https://doi.org/10.1016/j.polymer.2018.09.047>
- Ruppert, A. M., Weinberg, K., & Palkovits, R. (2012). *Hydrogenolysis Goes Bio : From Carbohydrates and Sugar Alcohols to Platform Chemicals Angewandte*. 2564–2601. <https://doi.org/10.1002/anie.201105125>
- Salamah, S. (2021). Hydrocracking of Waste Cooking Oil into Biofuel Using Mesoporous Silica from Parangtritis Beach Sand Synthesis by Sonochemistry. *Research Square*, 1–19.
- Schulman, E., Wu, W., & Liu, D. (2020). *Two-Dimensional Zeolite Materials : Structural and Acidity Properties*. <https://doi.org/10.3390/ma13081822>
- Shen, Y., Borghard, W. G., & Tomassone, M. S. (2017). Discrete element method simulations and experiments of dry catalyst impregnation for spherical and cylindrical particles in a double cone blender. *Powder Technology*, 318, 23–32. <https://doi.org/10.1016/j.powtec.2017.05.023>
- Siegbahn, P. E. M., & Liao, R. (2020). *The Energetics of Hydrogen Molecule Oxidation in NiFe- hydrogenase*. <https://doi.org/10.1021/acscatal.0c00396>

- Steven, S., Restiawaty, E., & Bindar, Y. (2021). Routes for energy and bio-silica production from rice husk : A comprehensive review and emerging prospect. *Renewable and Sustainable Energy Reviews*, 149(June), 111329. <https://doi.org/10.1016/j.rser.2021.111329>
- Sun, K., Shao, Y., Ming, C., Fan, M., Fan, H., Zhang, L., Zhang, S., Wang, Y., Chen, G., & Hu, X. (2023). Copper-based catalysts synthesized during hydrogenation. *Chemical Engineering Science*, 276(May), 118819. <https://doi.org/10.1016/j.ces.2023.118819>
- Sundblom, A., Oliveira, C. L. P., Pedersen, J. S., & Palmqvist, A. E. C. (2010). *On the Formation Mechanism of Pluronic-Templated Mesostructured Silica*. 3483–3492.
- Tanimu, A., & Alhooshani, K. (2019). Advanced Hydrodesulfurization Catalysts: A Review of Design and Synthesis [Review-article]. *Energy and Fuels*, 33(4), 2810–2838. <https://doi.org/10.1021/acs.energyfuels.9b00354>
- 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), 103030. <https://doi.org/10.1016/j.arabjc.2021.103030>
- Thahir, R., Wahab, A. W., Nafie, N. La, & Raya, I. (2019). *Synthesis of high surface area mesoporous silica SBA-15 by adjusting hydrothermal treatment time and the amount of polyvinyl alcohol*. 963–971.
- Tumurbaatar, O., Popova, M., Mitova, V., Shestakova, P., & Koseva, N. (2023). Engineering of Silica Mesoporous Materials for CO<sub>2</sub> Adsorption. *Materials*, 16(11), 1–16. <https://doi.org/10.3390/ma16114179>
- Tye, C. T. (2019). Catalysts for Hydroprocessing of Heavy Oils and Petroleum Residues. *IntechOpen*, 1–17.
- Urata, C., Yamauchi, Y., Mochizuki, D., & Kuroda, K. (2007). *One-pot Preparation of Mesoporous Silica Particles Having Mesopore Surface Functionalized with Poly ( propylene oxide ) Chains*. 36(7), 850–851. <https://doi.org/10.1246/cl.2007.850>
- Wang, W., Li, L., Wu, K., Zhang, K., Jie, J., & Yang, Y. (2015). *Applied Catalysis A : General Preparation of Ni – Mo – S catalysts by hydrothermal method and their hydrodeoxygenation properties*. 495, 8–16. <https://doi.org/10.1016/j.apcata.2015.01.041>
- 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>

- Widiyanti, R. A. (2015). Pemanfaatan Kelapa Menjadi VCO (Virgin Coconut Oil) Sebagai Antibiotik Kesehatan Dalam Upaya Mendukung Visi Indonesia Sehat 2015. *Prosiding Seminar Nasional Pendidikan Biologi 2015, yang diselenggarakan oleh Prodi Pendidikan Biologi FKIP Universitas Muhammadiyah Malang, tema: "Peran Biologi dan Pendidikan Biologi dalam Menyiapkan Generasi Unggul dan Berdaya Saing Global"*, Malang, 21, 577–584.
- Wijaya, K., Ahan, M., Dita, W., Trisunaryanti, W., Mirzan, M., Loekitowati, P., & Daniel, A. (2021). Journal of Environmental Chemical Engineering Synthesis of nickel catalyst supported on ZrO<sub>2</sub> / SO<sub>4</sub> pillared bentonite and its application for conversion of coconut oil into gasoline via hydrocracking process. *Journal of Environmental Chemical Engineering*, 9(4), 105399. <https://doi.org/10.1016/j.jece.2021.105399>
- Wijaya, K., Dwijayanti, R., Setyono, P., Ayu, R., Herald, E., Hakim, L., Tahir, I., Oh, W., & Javier, A. (2024). Dual metal NiMo dispersed on silica derived from rice husk ash as a catalyst for hydrocracking of used palm cooking oil into liquid biofuels. 9(2), 219–226.
- Xiong, Q., Duan, Y., Liang, D., Li, T., & Luo, H. (2024). *Biofuels and Their Blends — A Review of the Effect of Low Carbon Fuels on Engine Performance*.
- Yotsomnuk, P. (2018). *Effect of Process Parameters on Yield of Biofuel Production from Waste Virgin Coconut Oil*. 22(6), 21–35. <https://doi.org/10.4186/ej.2018.22.6.21>
- Yu, J., Qiu, H., Yin, S., Wang, H., & Li, Y. (2021). Polymeric drug delivery system based on pluronic for cancer treatment. *Molecules*, 26(12), 1–23. <https://doi.org/10.3390/molecules26123610>