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DAFTAR PUSTAKA

Adany, F., Priyanto, S., Mirzayanti, Y. W., Marbun, M. P., Furqon, M. I. Z., Amin, A. K., Hasanudin, H., Aziz, A., Nugraha, R. E., Sudibyo, S., Ndruru, S. T. C. L., Annas, D., Yati, I., Sulaswatty, A., Wihadi, M. N. K., Nugroho, R. W. N., dan Muttaqii, M. Al., 2025, γ-Al_2O_3-supported Cobalt and Zinc as Heterogeneous Catalyst for Biodiesel Production Assisted by Ultrasonic Wave, *Vacuum*, 240.

Afkhami, A., Tehrani, M. S., dan Bagheri, H., 2010, Simultaneous Removal of Heavy-Metal Ions in Wastewater Samples Using Nano-Alumina Modified with 2,4-dinitrophenylhydrazine, *Journal of Hazardous Materials*, 181(1–3), 836–844.

Ali, S. E., Li, J., Shen, Y., dan Chen, X., 2026, Phosphonium Ionic Liquids-ZnO Heterogeneous Catalyst for PET Glycolysis: Ultrasonication-assisted Synthesis and Performance Evaluation, *Polymer Degradation and Stability*, 247, 111993.

Ardebili, S. M. S., Babagiray, M., Aytav, E., Can, Ö., dan Boroiu, A. A., 2022, Multi-Objective Optimization of DI Diesel Engine Performance and Emission Parameters Fueled with Jet-A1 – Diesel Blends, *Energy*, 242, 122997.

Ardini, M. A., Triyono, Hara, T., Ichikuni, N., dan Trisunaryanti, W., 2025, Study of Metal Sequenced Spray Impregnation Method Towards Co-Mo/γ-Al_2O_3 Catalytic Performance in Hydrotreating of Used Coconut Oil to Liquid Biohydrocarbon, *Microporous and Mesoporous Materials*, 382, 113357.

Asnawati, D., Saviola, A. J., Wijaya, K., Kartini, I., Purwono, S., Rodiansono, R., Mara, A., Oh, W. C., Kristiani, A., Sudiyarmanto, S., dan Trisunaryanti, W., 2025, Toward Efficient Bio-jet Fuel Production via Atmospheric Hydrotreating: Insight into the Effect of Co/HZSM-5, Mo/HZSM-5, and CoMo/HZSM-5 Catalyst Arrangements, *Arabian Journal for Science and Engineering*, 50(24), 21123–21144.

Atabani, A. E., Silitonga, A. S., Badruddin, I. A., Mahlia, T. M. I., Masjuki, H. H., dan Mekhilef, S., 2012, A Comprehensive Review on Biodiesel as An Alternative Energy Resource and Its Characteristics, *Renewable and Sustainable Energy Reviews,* 16(4), 2070–2093.

Balitbang Kehutanan, 2008, *Nyamplung (*Calophyllum inophyllum *L.) Sumber Energi Biofuel yang Potensial*. Badan Penelitian dan Pengembangan Kehutanan, Pusat Penelitian dan Pengembangan Hutan Tanaman, Departemen Kehutanan.

Bauen, A., Bitossi, N., German, L., Harris, A., dan Leow, K., 2020, Sustainable Aviation Fuels: Status, Challenges, and Prospects of Drop-in Liquid Fuels,

UNIVERSITAS GADJAH MADA
Katalis Kobalt Terimpregnasi Pada Gamma-Al2O3 Teraktivasi Gelombang Ultrasonik Untuk Hydrotreatment Minyak Nyamplung (Calophyllum inophyllum L.) Menjadi Bioavtur
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Hydrogen and Electrification in Aviation, *Johnson Matthey Technology Review*, 64(3), 263–278.

Bekele, E. A., Korsa, H. A., dan Desalegn, Y. M., 2024, Electrolytic Synthesis of γ-Al_2O_3 Nanoparticle from Aluminum Scrap for Enhanced Methylene Blue Adsorption: Experimental and RSM Modeling, *Scientific Reports*, 14(1).

Bhagaskara, A., Saputra, D. A., Trisunaryanti, W., Wijaya, K., Rozana, K., Susanto, H., Pradana, R. A. P., Hartanto, H. D., Lalasari, L. H., dan Prasetyo, A. B., 2026, Investigation of Reaction Mechanism in Selective Citric Acid Leaching of Ni and Co From NMC Cathodes Via Real Time Raman Spectroscopy and RSM Optimization, *Journal of the Indian Chemical Society*, 103(2), 102410.

Bhagaskara, A., Trisunaryanti, W., Wijaya, K., Tazkia, A. M., Saputra, D. A., Haryanto, V. M., Arfiana, A., dan Zainuddin, I., 2026, Valence State-Dependent Catalytic Behavior of Ni and Co in NiCo/Activated Carbon Derived from Spent Li-ion Batteries for Biojet Fuel Production, *Journal of the Indian Chemical Society*, 103(2), 102413.

Bhagaskara, A., Wijaya, K., Trisunaryanti, W., Saputra, D. A., Agustanhakri, A., Taqwatomo, G., Arjasa, O. P., Budiman, A. H., dan Anggaravidya, M., 2025, Upcycling Secondary Nickel From Spent Nickel-Manganese-Cobalt (NMC) Batteries as A Nanocatalyst on Sulfated Natural Zeolite for Converting LDPE Plastic Waste Into Jet-fuel Hydrocarbons, *Next Materials*, 9, 101107.

Brooks, K. P., Snowden-Swan, L. J., Jones, S. B., Butcher, M. G., Lee, G. S. J., Anderson, D. M., Frye, J. G., Holladay, J. E., Owen, J., Harmon, L., Burton, F., Palou-Rivera, I., Plaza, J., Handler, R., dan Shonnard, D., 2016, Low-Carbon Aviation Fuel Through the Alcohol to Jet Pathway, *Biofuels for Aviation: Feedstocks, Technology and Implementation,* 109–150.

Cañón, J., dan Teplyakov, A. V., 2021, XPS Characterization of Cobalt Impregnated SiO_2 and γ-Al_2O_3, *Surface and Interface Analysis*, 53(5), 475–481.

Chan, K. H., Anawati, J., Malik, M., dan Azimi, G., 2021, Closed-Loop Recycling of Lithium, Cobalt, Nickel, and Manganese from Waste Lithium-Ion Batteries of Electric Vehicles, *ACS Sustainable Chemistry dan Engineering*, 9(12), 4398–4410.

Chintakanan, P., Vitidsant, T., Reubroycharoen, P., Kuchonthara, P., Kida, T., dan Hinchiranan, N., 2021, Bio-jet fuel range in biofuels derived from hydroconversion of palm olein over Ni/zeolite catalysts and freezing point of biofuels/Jet A-1 blends, *Fuel*, 293, 120472.

Chu, W., Chernavskii, P. A., Gengembre, L., Pankina, G. A., Fongarland, P., dan Khodakov, A. Y., 2007, Cobalt Species in Promoted Cobalt Alumina-Supported Fischer–Tropsch Catalysts, *Journal of Catalysis*, 252(2), 215–230.

UNIVERSITAS
GADJAH MADA
**Katalis Kobalt Terimpregnasi Pada Gamma-Al2O3 Teraktivasi Gelombang Ultrasonik Untuk Hydrotreatment
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Davis, K., dan Demopoulos, G. P., 2023, Hydrometallurgical Recycling Technologies for NMC Li-ion Battery Cathodes: Current Industrial Practice and New RdanD Trends, *RSC Sustainability*, 1(8), 1932–1951.

Díaz-Pérez, M. A., dan Serrano-Ruiz, J. C., 2020, Catalytic Production of Jet Fuels from Biomass, *Molecules*, 25(4), 1–18.

Donnis, B., Egeberg, R. G., Blom, P., dan Knudsen, K. G., 2009, Hydroprocessing of Bio-oils and Oxygenates to Hydrocarbons. Understanding The Reaction Routes, *Topics in Catalysis*, 52(3), 229–240.

Fehr, S. M., dan Krossing, I., 2020, Spectroscopic Signatures of Pressurized Carbon Dioxide in Diffuse Reflectance Infrared Spectroscopy of Heterogeneous Catalysts, *ChemCatChem.*, 12(9), 2622–2629.

Feng, F., Wang, L., Zhang, X., dan Wang, Q., 2019, Selective Hydroconversion of Oleic Acid into Aviation-Fuel-Range Alkanes over Ultrathin Ni/ZSM-5 Nanosheets, *Industrial and Engineering Chemistry Research*, 58(14), 5432–5444.

Fouda-Mbanga, B. G., Onotu, O., dan Tywabi-Ngeva, Z., 2024, Advantages of The Reuse of Spent Adsorbents and Potential Applications in Environmental Remediation: A Review, *Green Analytical Chemistry*, 11, 100156.

Gao, Y., dan Torrente-Murciano, L., 2020, Mechanistic Insights of The Reduction of Gold Salts in The Turkevich Protocol, *Nanoscale*, 12(4), 2740–2751.

Garjulli, F., de Carvalho, T. C., Tenório, J. A. S., Coleti, J. L., dan Espinosa, D. C. R., 2025, Recycling Spent Cobalt Oxide Catalysts to Obtain Metallic Cobalt: A Study of Two-Step Reduction Kinetics, *Journal of Sustainable Metallurgy*, 11(1), 601–615.

Garrido, I. V., Benítez, A. L., Lara, A. G., dan Berhault, G., 2021, Synthesis of NiMo Catalysts Supported on Mn-Al_2O_3 for Obtaining Green Diesel from Waste Soybean Oil, *Catalysis Today*, 365, 327–340.

Guan, Y., Li, L., dan Piao, H., 2025, Factors Influencing Nanoscale Catalysts Prepared Impregnation Method, *Applied and Computational Engineering*, 122(1), 35–39.

Gutiérrez-Antonio, C., Gómez-Castro, F. I., de Lira-Flores, J. A., dan Hernández, S., 2017, A Review On The Production Processes Of Renewable Jet Fuel, *Renewable and Sustainable Energy Reviews*, 79, 709–729.

Haddad, R., Zhao, Y., Miche, A., Romdhane, F. Ben, Sudheer, N., Ersen, O., Devred, F., Ribot, F., Sassoye, C., Sanchez, C., Debecker, D. P., Chaneac, C., dan Boissière, C., 2023, Solvent-free Preparation of Ru/Al_2O_3 Catalysts for CO_2 Methanation: An Example of Frugal Innovation, *Chemistry of Materials*, 35(19), 8248–8260.

UNIVERSITAS
GADJAH MADA
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Hapsari, M. T., Trisunaryanti, W., Falah, I. I., dan Permata, M. L., 2020, Coating of Pd and Co on Mordenite for a Catalyst of Hydrotreating of Cashew Nut Shell Liquid into Biofuel, *Indonesian Journal of Chemistry*, 20(5), 1092–1100.

Hasibuan, S., Sahirman, dan Yudawati, N. M. A., 2013, Karakteristik Fisikokimia dan Antibakteri Hasil Purifikasi Minyak Biji Nyamplung *(Calophyllum inoplyllum* L.), *AGRITECH,* 33(3).

Hayes, J. R., Bowker, R. H., Gaudette, A. F., Smith, M. C., Moak, C. E., Nam, C. Y., Pratum, T. K., dan Bussell, M. E., 2010, Hydrodesulfurization Properties of Rhodium Phosphide: Comparison With Rhodium Metal and Sulfide Catalysts, *Journal of Catalysis*, 276(2), 249–258.

Hoo, D. Y., Low, Z. L., Low, D. Y. S., Tang, S. Y., Manickam, S., Tan, K. W., dan Ban, Z. H., 2022, Ultrasonic Cavitation: An Effective Cleaner and Greener Intensification Technology in The Extraction and Surface Modification of Nanocellulose, *Ultrasonics Sonochemistry*, 90, 106176.

Ichikawa, M., 2008, *Organic Liquid Carriers for Hydrogen Storage*, Woodhead Publishing.

Ji, Y., Zhao, Z., Duan, A., Jiang, G., dan Liu, J., 2009, Comparative Study on the Formation and Reduction of Bulk and Al_2O_3-Supported Cobalt Oxides by H_2-TPR Technique, *The Journal of Physical Chemistry C*, 113(17), 7186–7199.

Kameswara, S. A. R., Trisunaryanti, W., Triyono, Tazkia, A. M., Bhagaskara, A., Pratiwi, P. A., dan Rozana, K., 2026, Ultrasonic-Assisted Synthesis of Ni/ZSM-5 Catalyst for Efficient Bio-jet Fuel Production Via Atmospheric Hydrotreatment of Processed Palm Oil, *Reaction Kinetics, Mechanisms and Catalysis*.

Kementerian ESDM, 2021, Potensi Minyak Nyamplung sebagai Bahan Baku Bioenergi, *Kementerian Energi dan Sumber Daya Mineral Republik Indonesia*.

Kim, G. M., Nam, I. W., Yang, B., Yoon, H. N., Lee, H. K., dan Park, S., 2019, Carbon Nanotube (CNT) Incorporated Cementitious Composites for Functional Construction Materials: The State of The Art, *Composite Structures*, 227, 111244.

Kim, T., Song, W., Son, D.-Y., Ono, L. K., dan Qi, Y., 2019, Lithium-ion Batteries: Outlook on Present, Future, and Hybridized Technologies, *Journal of Materials Chemistry A*, 7(7), 2942–2964.

Knothe, G., 2010, Biodiesel and Renewable Diesel: A Comparison, *Progress in Energy and Combustion Science*, 36(3), 364–373.

UNIVERSITAS
GADJAH MADA
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Kohli, K., Prajapati, R., Maity, S. K., Sau, M., dan Garg, M. O., 2016, Deactivation of Hydrotreating Catalyst by Metals in Resin and Asphaltene Parts of Heavy Oil and Residues, *Fuel*, 175, 264–273.

Kosir, S., Feldhausen, J., Bell, D., Cronin, D., Boehm, R., dan Heyne, J., 2023, Quantitation of Olefins in Sustainable Aviation Fuel Intermediates Using Principal Component Analysis Coupled with Vacuum Ultraviolet Spectroscopy, *Frontiers in Fuels*, 1, 1246950.

Koul, R., Kumar, N., dan Singh, R. C., 2021, A Review On The Production and Physicochemical Properties of Renewable Diesel and Its Comparison With Biodiesel, *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects*, 43(18), 2235–2255.

Kwao, S., Vedachalam, S., Dalai, A. K., dan Adjaye, J., 2024, Review of Current Advances in Hydrotreating Catalyst Support, *Journal of Industrial and Engineering Chemistry*, 135, 1–16.

Lee, D. S., Fahey, D. W., Forster, P. M., Newton, P. J., Wit, R. C. N., Lim, L. L., Owen, B., dan Sausen, R., 2009, Aviation and Global Climate Change in The 21st Century, *Atmospheric Environment*, 43(22–23), 3520–3537.

Leksono, B., dan Putri, K. P., 2012, *Variasi Ukuran Buah-Biji dan SIfat Fisiko-Kimia Minyak Nyamplung (*Calopyllum inophyllum L.*) Dari Enam Populasi di Jawa*.

Li, H., Shi, L., Jin, C., Ye, R., dan Zhang, R., 2022, Co and Ni Incorporated γ-Al_2O_3 (110) Surface: A Density Functional Theory Study, *Catalysts*, 12(2), 111.

Li, X., Yang, X., Wang, Q., Li, S., Ye, Y., Wang, D., dan Zheng, Z., 2022, Synthesis of Pt-based TS-1 Catalysts for Selective Hydrogenation to Produce C_{15}–C_{18} Alkanes from the FAME: Effect of Rare-earth Metal Additives, *Journal of Cleaner Production*, 350, 131520.

Li, Z., Zhuang, T., Dong, J., Wang, L., Xia, J., Wang, H., Cui, X., dan Wang, Z., 2021, Sonochemical Fabrication of Inorganic Nanoparticles for Applications in Catalysis, *Ultrasonics Sonochemistry*, 71, 105384.

Lim, J. H. K., Gan, Y. Y., Ong, H. C., Lau, B. F., Chen, W.-H., Chong, C. T., Ling, T. C., dan Klemeš, J. J., 2021, Utilization Of Microalgae for Bio-Jet Fuel Production in the Aviation Sector: Challenges and Perspective, *Renewable and Sustainable Energy Reviews*, 149, 111396.

Lopez, K. A. S., Balu, A. M., Carmona, H. de P., Hájek, M., Luque, R., dan Herrador, J. M. H., 2025, A Practical Guide to Heterogeneous Catalysis in Hydrocarbon Transformations, *Chemistry - An Asian Journal,* 20(20), John Wiley and Sons Ltd.

Luidold, S., dan Antrekowitsch, H., 2007, Hydrogen as a Reducing Agent: State-of-the-Art Science and Technology, *JOM*, 59(6), 20–26.

UNIVERSITAS GADJAH MADA
Katalis Kobalt Terimpregnasi Pada Gamma-Al2O3 Teraktivasi Gelombang Ultrasonik Untuk Hydrotreatment Minyak Nyamplung (Calophyllum inophyllum L.) Menjadi Bioavtur
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Manto, A. A., Ramirez, I. F. T., Arnado, L. M., Damiotan, C. T., Sumalpong, E. T., Ido, A. L., dan Arazo, R. O., 2024, Oil Extraction from *Calophyllum inophyllum* L. Seeds Through Ultrasonication with n-Hexane and Petroleum Ether as Solvents, *Biomass Conversion and Biorefinery*, 14(4), 5423–5434.

Milano, J., Ong, H. C., Masjuki, H. H., Silitonga, A. S., Chen, W.-H., Kusumo, F., Dharma, S., dan Sebayang, A. H., 2018, Optimization Of Biodiesel Production by Microwave Irradiation-Assisted Transesterification for Waste Cooking Oil-*Calophyllum Inophyllum* Oil Via Response Surface Methodology, *Energy Conversion and Management*, 158, 400–415.

Moulder, J. F., Stickle, W. F., Sobol, P. E., and Bomben, K. D., 2002, Handbook of X-Ray Photoelectron Spectroscopy (Perkin-Elmer, Eden Prairie, MN, 1992). *Google Scholar*, 128.

Ong, H. C., Mahlia, T. M. I., Masjuki, H. H., dan Norhasyima, R. S., 2011, Comparison of Palm Oil, Jatropha curcas and Calophyllum inophyllum for Biodiesel: A Review, *Renewable and Sustainable Energy Reviews*, 15(8), 3501–3515.

Panarmasar, N., Hinchiranan, N., Guo, L., dan Kuchonthara, P., 2025, Biojet Production from Hydroisomerization of Palm Olein Catalyzed by Ni/Micromesoporous Zeolite Composite Supports, *ACS Omega*, 10(32), 35850–35864.

Peiris, S. D. N. S., dan Jayasundera, A. C. A., 2020, Synthesis, Characterization and Phase Transition of Highly Porous γ-Alumina Nanoparticles, *International Journal For Research in Applied Sciences and Biotechnology*, 07(01), 7–12.

Poll, D. I. A., 2017, 21st-Century Civil Aviation: Is it on Course or Is it Over-Confident and Complacent? – Thoughts on The Conundrum of Aviation and The Environment, *The Aeronautical Journal*, 121(1236), 115–140.

Prins, R., 2020, On The Structure of γ-Al_2O_3, *Journal of Catalysis*, 392, 336–346.

Rabee, A. I. M., Gaid, C. B. A., Mekhemer, G. A. H., dan Zaki, M. I., 2022, Combined TPR, XRD, and FTIR Studies on the Reduction Behavior of Co_3O_4, *Materials Chemistry and Physics*, 289(2), 126367.

Ro, I., Resasco, J., dan Christopher, P., 2018, Approaches for Understanding and Controlling Interfacial Effects in Oxide-Supported Metal Catalysts, *ACS Catalysis*, 8(8), 7368–7387.

Saviola, A. J., Vebryana, M. F., Wangsa, W., Prastyo, P., Syoufian, A., Saputra, D. A., Timuda, G. E., Hauli, L., Oh, W.C., dan Wijaya, K., 2025, Performance Comparison of Molybdenum-Impregnated Sulfated Mesoporous Silica Catalysts by Spray and Wet Impregnation in Transforming Used Palm Cooking Oil into Bio-Jet Fuel, *Chemistry Africa*, 8(4), 1539–1556.

UNIVERSITAS
GADJAH MADA
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Saviola, A. J., Wijaya, K., Syoufian, A., Vebryana, M. F., Anggraeni, W., Rozana, K., Darsono, N., Saputra, D. A., dan Saputri, W. D., 2024, Fixing Cobalt Metal Onto Mordenite Through Spray Impregnation and Its Evaluation as a Catalyst in Transforming Used Coconut Cooking Oil Into Biojet Fuel, *Communications in Science and Technology*, 9(2), 356–365.

Serrano-Ruiz, J. C., Ramos-Fernández, E. V., dan Sepúlveda-Escribano, A., 2012, From Biodiesel and Bioethanol to Liquid Hydrocarbon Fuels: New Hydrotreating and Advanced Microbial Technologies, *Energy and Environmental Science,* 5(2), 5638–5652.

Shi, L., Zeng, C., Lin, Q., Lu, P., Niu, W., dan Tsubaki, N., 2014, Citric Acid Assisted One-Step Synthesis of Highly Dispersed Metallic Co/SiO_2 Without Further Reduction: As-Prepared Co/SiO_2 Catalysts for Fischer-Tropsch Synthesis, *Catalysis Today*, 228, 206–211.

Srifa, A., Viriya-Empikul, N., Assabumrungrat, S., dan Faungnawakij, K., 2015, Catalytic Behaviors of $Ni/\gamma\text{-}Al_2O_3$ and $Co/\gamma\text{-}Al_2O_3$ During The Hydrodeoxygenation of Palm Oil, *Catalysis Science dan Technology*, 5(7), 3693–3705.

Sudalai, S., Ishwaryarani, S., Philip, J. F., Devanesan, M. G., dan Arumugam, A., 2024, Potential Use *Calophyllum inophyllum* Oil as Biodiesel Feedstock: A Scientometric Analysis and Review of the Production Process, *Journal of The Institution of Engineers (India): Series E*, 105(1), 89–102.

Susila, I. W. W., 2018, *Nyamplung Tanaman Multifungsi: Potensi Sebaran Dan Manfaatnya Di Nusa Tenggara Barat Dan Bali* (R. de Lina, Ed.). PT Kanisius.

Tang, C., Zhai, Z., Li, X., Sun, L., dan Bai, W., 2016, Sustainable Production of Acetaldehyde from Lactic Acid Over The Magnesium Aluminate Spinel, *Journal of the Taiwan Institute of Chemical Engineers*, 58, 97–106.

Tepelus, A., Elena Dragomir, R., dan Rosca, P., 2021, Biojet from Sugar Derivatives, *Rev. Roum. Chim.*, 66(4), 313–320.

Trinh, Q. T., Golio, N., Cheng, Y., Cha, H., Tai, K. U., Ouyang, L., Zhao, J., Tran, T. S., Nguyen, T. K., Zhang, J., An, H., Wei, Z., Jerome, F., Amaniampong, P. N., dan Nguyen, N. T., 2025, Sonochemistry and Sonocatalysis: Current Progress, Existing Limitations, and Future Opportunities in Green and Sustainable Chemistry, *Green Chemistry*, 27(18), 4926–4958.

Trisunaryanti, W., Larasati, S., Bahri, S., Ni'mah, Y. lailun, Efiyanti, L., Amri, K., Nuryanto, R., dan Sumbogo, S. D., 2020, Performance Comparison of Ni-Fe Loaded on NH_2-Functionalized Mesoporous Silica and Beach Sand in the Hydrotreatment of Waste Palm Cooking Oil, *Journal of Environmental Chemical Engineering*, 8(6), 104477.

UNIVERSITAS
GADJAH MADA
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Trisunaryanti, W., Triyono, Wijaya, K., Kartini, I., Purwono, S., Rodiansono, Mara, A., dan Budiansyah, A., 2023, Preparation of Mo-Impregnated Mordenite Catalysts for The Conversion of Refined Kernel Palm Oil Into Bioavtur, *Communications in Science and Technology*, 8(2), 226–234.

Trisunaryanti, W., Wijaya, K., dan Tazkia, A. M., 2024, Preparation of Ni/ZSM-5 and Mo/ZSM-5 Catalysts for Hydrotreating Palm Oil Into Biojet Fuel, *Communications in Science and Technology*, 9(1), 161–169.

Triyono, Trisunaryanti, W., Purbonegoro, J., dan Aksanti, S. I., 2024, Effect of Cobalt Impregnation Methods on Parangtritis Sand Towards Catalysts Activity in Hydrocracking of Degummed Low-Quality Ujung Kulon Malapari Oil into Biohydrocarbons, *Reaction Kinetics, Mechanisms and Catalysis*, 137(1), 303–321.

Trujillo, C. A., Ramírez-Marquez, N. T., dan Valencia-Rios, J. S., 2020, An Affordable Ammonia Temperature-Programmed Desorption Equipment and Its Calibration Using The Thermal Decomposition of Ammonium Dihydrogen Phosphate, *Thermochimica Acta*, 689, 178651.

Verma, V., Mishra, A., Anand, M., Farooqui, S. A., dan Sinha, A. K., 2023, Catalytic Hydroprocessing of Waste Cooking Oil for the Production of Drop-in Aviation Fuel and Optimization for Improving Jet Biofuel Quality in a Fixed Bed Reactor, *Fuel*, 333, 126348.

Visiamah, F., Trisunaryanti, W., dan Triyono, 2024, Microwave-assisted Coconut Wood Carbon-based Catalyst Impregnated by Ni and/or Pt for Bio-jet Fuel Range Hydrocarbons Production from *Calophyllum inophyllum* L. Oil Using Modified-Microwave Reactor, *Case Studies in Chemical and Environmental Engineering*, 9, 100722.

Vosooghi, N., Askari, S., Rashidzadeh, M., dan Sadighi, S., 2022, Promotion of the Acidity and Textural Properties of NiMo/γ-Al_2O_3 Catalyst by Applying Fluorine, Boron and Phosphorus in Hydrodesulfurization of Diesel Fuel, *Journal of Molecular Structure*, 1270, 133911.

Wang, H., Yang, W., Tian, P., Zhou, J., Tang, R., dan Wu, S., 2017, A highly Active and Anti-coking Pd-Pt/SiO_2 Catalyst for Catalytic Combustion of Toluene at Low Temperature, *Applied Catalysis A: General*, 529, 60–67.

Wang, L., Guo, P., Kong, L., dan Zhao, P., 2022, Industrial Application Prospects and Key Issues of the Pure-Hydrogen Reduction Process, *International Journal of Minerals, Metallurgy and Materials*, 29(10), 1922–1931.

Wu, D., Chen, T., Zhou, Y., Tan, X., Shang, X., Ding, J., dan Zhong, Q., 2026, Promotion of Acid Sites Over Al_2O_3 Via Regulation of Crystal Structures for Enhancing Hydrogenation-Acetalization Reactions, *Chemical Engineering Journal*, 528, 172512.

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GADJAH MADA
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Minyak Nyamplung (Calophyllum inophyllum L.) Menjadi Bioavtur**
Rachel Geovani Jatmika, Prof. Dra. Wega Trisunaryanti, M.S., Ph.D., Eng.; Prof. Dr. Triyono, S.U.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Wulandari, P., Li, X., Tamada, K., dan Hara, M., 2008, Conformational Study of Citrates Adsorbed on Gold Nanoparticles Using Fourier Transform Infrared Spectroscopy, *Journal of Nonlinear Optical Physics dan Materials*, 17(02), 185–192.

Xiang, L., Fu, M., Wang, T., Wang, D., Xv, H., Miao, W., Le, T., Zhang, L., dan Hu, J., 2024, Application and Development of Ultrasound in Industrial Crystallization, *Ultrasonics Sonochemistry*, 111(12), 107062.

Xu, H., Fan, X., Li, G. S., Xu, Y. Y., Mo, W. L., Kuznetsov, P. N., Ma, F. Y., dan Wei, X. Y., 2021, Preparation of Co-Mo/γ-Al_2O_3 Catalyst and the Catalytic Hydrogenation Effects on Coal-Related Model Compounds, *Journal of the Energy Institute*, 96(8), 52–60.

Zarezadeh-Mehrizi, M., Ebrahimi, A. A., dan Rahimi, A., 2019, Comparison of γ and δ-Al_2O_3 Supported CoMo Catalysts in The Hydrodesulfurization of Straight-run Gas Oil, *Scientia Iranica*, 26(3), 1555–1565.

Zhang, N., Zhang, G., Chong, S., Zhao, H., Huang, T., dan Zhu, J., 2018, Ultrasonic Impregnation of MnO_2CeO_2 and its Application in Catalytic Sono-degradation of Methyl Orange, *Journal of Environmental Management*, 205, 134–141.

Zhang, Z., Wang, Q., Chen, H., dan Zhang, X., 2017, Hydroconversion of Waste Cooking Oil into Green Biofuel over Hierarchical USY-Supported NiMo Catalyst: A Comparative Study of Desilication and Dealumination, *Catalysts,* 7(10), 281.

Zhdanov, V. P., 2025, Sintering of Catalytic Metal Nanoparticles Under Exothermic Conditions in A Continuous Stirred Tank Reactor, *Chemical Engineering Research and Design*, 221, 308–312.