UNIVERSITAS
GADJAH MADA
Sintesis Adsorben Magnetik Berbasis Abu Layang Batubara untuk Adsorpsi Methylene Blue dan Ion Pb(II)
Mardiyah Kurniasih, Prof. Drs. Mudasir, M.Eng., Ph.D.; Prof. Dr.rer.nat. Nurul Hidayat Aprilita, M.Si.; Prof. Drs. Roto,
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

DAFTAR PUSTAKA

Aboussabek, A., Boukarma, L., El Qdhy, S., Ousaa, A., Zerbet, M., dan Chiban, M., 2024, Experimental investigation, kinetics and statistical modeling of methylene blue removal onto Clay@Fe3O4: Batch, fixed bed column adsorption and photo-Fenton degradation studies, Case Stud Chem Environ Eng, 9, 100580.

Acharya, A., Jeppu, G., Girish, C.R., Prabhu, B., Murty, V.R., Martis, A.S., dan Ramesh, S., 2024, Adsorption of arsenic and fluoride: Modeling of single and competitive adsorption systems, Heliyon, 10 (11), 1–25.

Ahmad, N., Suryani Arsyad, F., Royani, I., dan Lesbani, A., 2022, Adsorption of methylene blue on magnetite humic acid: Kinetic, isotherm, thermodynamic, and regeneration studies, Results Chem, 4, 100629.

Ahsaine, H.A., Zbair, M., Anfar, Z., Naciri, Y., Haouti, R.E., Alem, N.E., dan Ezahri, M., 2018, Cationic dyes adsorption onto high surface area 'almond shell' activated carbon: Kinetics, equilibrium isotherms and surface statistical modeling, Mater Today Chem, 8, 121–132.

Al-Ghouti, M.A. dan Da'ana, D.A., 2020, Guidelines for the use and interpretation of adsorption isotherm models: A review, J Hazard Mater, 393, 122383.

Alouani, M. El, Alehyen, S., Aouan, B., Mabrouki, J., dan Saufi, H., 2023, Application of mesoporous fly ash as a low-cost adsorbent for effective removal and immobilization of hazardous pollutants in aqueous environments, Model Earth Syst Environ, 9, 3539–3552.

Ameh, A.E., Fatoba, O.O., Musyoka, N.M., dan Petrik, L.F., 2017, Influence of aluminium source on the crystal structure and framework coordination of Al and Si in fly ash-based zeolite NaA, Powder Technol, 306, 17–25.

Arofah, N., Izzati, A.N., Siregar, Y.D.I., Azizah, Y.N., dan Liandi, A.R., 2024, Utilization of magnetite-supported coal fly ash as an efficient adsorbent for Pb metal removal in aqueous environments, Case Stud Chem Environ Eng, 10, 100883.

Astuti, W., Chafidz, A., Al-Fatesh, A.S., dan Fakeeha, A.H., 2021, Removal of lead (Pb(II)) and zinc (Zn(II)) from aqueous solution using coal fly ash (CFA) as a dual-sites adsorbent, Chin J Chem Eng, 34, 289–298.

Ayawei, N., Ebelegi, A.N., dan Wankasi, D., 2017, Modelling and interpretation of adsorption isotherms, J Chem, 3039817, 1–11.

Bagbi, Y., Sarswat, A., Mohan, D., Pandey, A., dan Solanki, P.R., 2016, Lead (Pb2+) adsorption by monodispersed magnetite nanoparticles: Surface analysis and effects of solution chemistry, J Environ Chem Eng, 4 (4), 4237–4247.

UNIVERSITAS
GADJAH MADA
Sintesis Adsorben Magnetik Berbasis Abu Layang Batubara untuk Adsorpsi Methylene Blue dan Ion Pb(II)
Mardiyah Kurniasih, Prof. Drs. Mudasir, M.Eng., Ph.D.; Prof. Dr.rer.nat. Nurul Hidayat Aprilita, M.Si.; Prof. Drs. Roto,
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Baidya, K.S. dan Kumar, U., 2021, Adsorption of brilliant green dye from aqueous solution onto chemically modified areca nut husk, S Afr J Chem Eng, 35, 33–43.

Bashir, A., Pandith, A.H., Malik, L.A., Qureashi, A., Ganaie, F.A., dan Dar, G.N., 2021, Magnetically recyclable L-cysteine capped Fe3O4 nanoadsorbent: A promising pH guided removal of Pb(II), Zn(II) and HCrO4- contaminants, J Environ Chem Eng, 9 (5), 105880.

Basit, A., Yaqoob, Z., Zahid, A., Ali, S., Shoukat, B., Khaliq, A., Chughtai, M.T., Batul, R., Rehman, M.A.U., dan Husain, S.W., 2025, Effective adsorbent for the removal of methylene blue using natural serpentine/magnetite nanocomposites: Isotherm and kinetic study, Heliyon, 11, e41063.

Basuki, R., Rusdiarso, B., Santosa, S.J., dan Siswanta, D., 2021, Magnetite-functionalized horse dung humic acid (HDHA) for the uptake of toxic lead(II) from artificial wastewater, Adsorpt Sci Technol, 2021, 5523513.

Benjelloun, M., Miyah, Y., Akdemir Evrendilek, G., Zerrouq, F., dan Lairini, S., 2021, Recent Advances in Adsorption Kinetic Models: Their Application to Dye Types, Arab J Chem, 14 (4), 103031.

Bibak, S. dan Marjani, A.P., 2023, Magnetically retrievable nanocatalyst Fe3O4@CPTMO@dithizone-Ni for the fabrication of 4H-benzo[h]chromenes under green medium, Sci Rep, 13 (1), 1–15.

Blissett, R.S. dan Rowson, N.A., 2012, A review of the multi-component utilisation of coal fly ash, Fuel, 97, 1–23.

Buema, G., Lupu, N., Chiriac, H., Ciobanu, G., Bucur, R.-D., Bucur, D., Favier, L., dan Harja, M., 2021, Performance assessment of five adsorbents based on fly ash for removal of cadmium ions, J Mol Liq, 333, 115932.

Chang, J., Ma, J., Ma, Q., Zhang, D., Qiao, N., Hu, M., dan Ma, H., 2016, Adsorption of methylene blue onto Fe3O4/activated montmorillonite nanocomposite, Appl Clay Sci, 119, 132–140.

Chen, Z., Wang, J., Pu, Z., Zhao, Y., Jia, D., Chen, H., Wen, T., Hu, B., Alsaedi, A., Hayat, T., dan Wang, X., 2017, Synthesis of magnetic Fe3O4/CFA composites for the efficient removal of U(VI) from wastewater, Chem Eng J, 320, 448–457.

Cornell, R.M. dan Schwertmann, U., 2003, The Iron Oxides: Structure, Properties, Reactions, Occurences and Uses, John Wiley.

Damayanti, R., 2018, Abu batubara dan pemanfaatannya: Tinjauan teknis karakteristik secara kimia dan toksikologinya, J Teknol Miner Batubara, 14 (3), 213–231.

Dilekoğlu, M.F., 2022, Malachite green adsorption from aqueous solutions onto biochar derived from sheep manure: adsorption kinetics, isotherm, thermodynamic, and mechanism, Int J Phytoremediation, 24 (4), 436–446.

UNIVERSITAS
GADJAH MADA
Sintesis Adsorben Magnetik Berbasis Abu Layang Batubara untuk Adsorpsi Methylene Blue dan Ion Pb(II)
Mardiyah Kurniasih, Prof. Drs. Mudasir, M.Eng., Ph.D.; Prof. Dr.rer.nat. Nurul Hidayat Aprilita, M.Si.; Prof. Drs. Roto,
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Ebrahimi, H., Azizi, A., dan Shabani, K.S., 2025, Enhanced adsorption of Mn(II) from wastewater using activated carbon-modified fly ash geopolymer adsorbent, Korean J Chem Eng, 42, 595–620.

El-Feky, H.H., Behiry, M.S., Amin, A.S., dan Nassar, M.Y., 2022, Facile fabrication of nano-sized SiO2 by an improved sol–gel route: as an adsorbent for enhanced removal of Cd(II) and Pb(II) ions, J Inorg Organomet Polym Mater, 32 (3), 1129–1141.

Erfani, M. dan Javanbakht, V., 2018, Methylene Blue removal from aqueous solution by a biocomposite synthesized from sodium alginate and wastes of oil extraction from almond peanut, Int J Biol Macromol, 114, 244–255.

Eteba, A., Bassyouni, M., dan Saleh, M., 2024, Modified coal fly ash for textile dye removal from industrial wastewater, Energy & Environment, 35 (2), 1004–1030.

Eteba, A., Bassyouni, M., dan Saleh, M., 2023, Utilization of chemically modified coal fly ash as cost-effective adsorbent for removal of hazardous organic wastes, Int J Environ Sci Technol, 20, 7589–7602.

Fan, S., Wang, Y., Wang, Z., Tang, Jie, Tang, Jun, dan Li, X., 2017, Removal of methylene blue from aqueous solution by sewage sludge-derived biochar: Adsorption kinetics, equilibrium, thermodynamics and mechanism, J Environ Chem Eng, 5 (1), 601–611.

Fayazi, M., Afzali, D., Ghanei-Motlagh, R., dan Iraji, A., 2019, Synthesis of novel sepiolite–iron oxide–manganese dioxide nanocomposite and application for lead(II) removal from aqueous solutions, Environ Sci Pollut Res, 26, 18893–18903.

Gao, M., Ma, Q., Lin, Q., Chang, J., dan Ma, H., 2017, A novel approach to extract SiO2 from fly ash and its considerable adsorption properties, Mater Des, 116, 666–675.

Gürsoy, S., Zeytinci, N.K., Zaman, B.T., Bakırdere, S., dan Öztürk Er, E., 2025, Study of linear and nonlinear isotherm and kinetic parameters of hexavalent chromium adsorption onto reduced graphene oxide coated iron oxide, Sci Rep, 15, 25206.

Hefnawy, M. El, Shaaban, A.F., dan Elkhawaga, H.A., 2020, Effective removal of Pb(II), Cd(II) and Zn(II) from aqueous solution by a novel hyper cross-linked nanometer-sized chelating resin, J Environ Chem Eng, 8 (3), 103788.

Hernandez, J.S.T., Aragón-Muriel, A., Corrales Quintero, W., Castro Velásquez, J.C., Salazar-Camacho, N.A., Pérez Alcázar, G.A., dan Tabares, J.A., 2022, Characterization of Fe3O4 nanoparticles for applications in catalytic activity in the adsorption/degradation of methylene blue and esterification, Molecules, 27 (24), 8976.

UNIVERSITAS
GADJAH MADA
Sintesis Adsorben Magnetik Berbasis Abu Layang Batubara untuk Adsorpsi Methylene Blue dan Ion Pb(II)
Mardiyah Kurniasih, Prof. Drs. Mudasir, M.Eng., Ph.D.; Prof. Dr.rer.nat. Nurul Hidayat Aprilita, M.Si.; Prof. Drs. Roto,
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Hongo, T., Moriura, M., Hatada, Y., dan Abiko, H., 2021, Simultaneous methylene blue adsorption and pH neutralization of contaminated water by rice husk ash, ACS Omega, 6 (33), 21604–21612.

Hosseini, S., Brake, N.A., Nikookar, M., Günaydın-Şen, Ö., dan Snyder, H.A., 2021, Mechanochemically activated bottom ash-fly ash geopolymer, Cem Concr Compos, 118, 103976.

Huang, X., Zhao, H., Zhang, G., Li, J., Yang, Y., dan Ji, P., 2020, Potential of removing Cd(II) and Pb(II) from contaminated water using a newly modified fly ash, Chemosphere, 242, 125148.

Huda, B.N., Wahyuni, E.T., Kamiya, Y., dan Mudasir, M., 2022, Kinetic and thermodynamic study on adsorption of lead(II) ions in water over dithizone-immobilized coal bottom ash, Mater Chem Phys, 282, 126005.

Huda, B.N., Wahyuni, E.T., dan Mudasir, M., 2021, Eco-friendly immobilization of dithizone on coal bottom ash for the adsorption of lead(II) ion from water, Results Eng, 10, 100221.

Ibrahim, A.G., Sayed, A.Z., Abd El-Wahab, H., dan Sayah, M.M., 2020, Synthesis of a hydrogel by grafting of acrylamide-co-sodium methacrylate onto chitosan for effective adsorption of Fuchsin basic dye, Int J Biol Macromol, 159, 422–432.

Ikumapayi, O.M. dan Akinlabi, E.T., 2019, Comparative study of the variability in the compositions and the effect of milling time on coal fly ash and wood fly ash nanoparticles, Mater Today Proc, 18, 5556–5564.

Inglezakis, V.J. dan Zorpas, A.A., 2012, Heat of adsorption, adsorption energy and activation energy in adsorption and ion exchange systems, Desalin Water Treat, 39, 149–157.

Irving, H.M.N.H., 1980, The analytical applications of dithizone, CRC Crit Rev Anal Chem, 8 (4), 321–366.

Ivanets, A., Prozorovich, V., Roshchina, M., Sychova, O., Srivastava, V., dan Sillanpää, M., 2022, Methylene blue adsorption on magnesium ferrite: Optimization study, kinetics and reusability, Mater Today Commun, 31, 103594.

Jaafari, J., Barzanouni, H., Mazloomi, S., Amir Abadi Farahani, N., Sharafi, K., Soleimani, P., dan Haghighat, G.A., 2020, Effective adsorptive removal of reactive dyes by magnetic chitosan nanoparticles: Kinetic, isothermal studies and response surface methodology, Int J Biol Macromol, 164, 344–355.

Jabli, M., 2020, Synthesis, characterization, and assessment of cationic and anionic dye adsorption performance of functionalized silica immobilized chitosan bio-polymer, Int J Biol Macromol, 153, 305–316.

Ji, Y., Xu, F., Wei, W., Gao, H., Zhang, K., Zhang, G., Xu, Y., dan Zhang, P., 2021, Efficient and fast adsorption of methylene blue dye onto a nanosheet MFI zeolite, J Solid State Chem, 295 (December 2020), 121917.

UNIVERSITAS
GADJAH MADA
Sintesis Adsorben Magnetik Berbasis Abu Layang Batubara untuk Adsorpsi Methylene Blue dan Ion Pb(II)
Mardiyah Kurniasih, Prof. Drs. Mudasir, M.Eng., Ph.D.; Prof. Dr.rer.nat. Nurul Hidayat Aprilita, M.Si.; Prof. Drs. Roto,
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Jia, Z., Li, Z., Ni, T., dan Li, S., 2017, Adsorption of low-cost absorption materials based on biomass (Cortaderia selloana flower spikes) for dye removal : Kinetics, isotherms and thermodynamic studies, J Mol Liq, 229, 285–292.

Jones, K.B., Ruppert, L.F., dan Swanson, S.M., 2012, Leaching of elements from bottom ash, economizer fly ash, and fly ash from two coal-fired power plants, Int J Coal Geol, 94, 337–348.

Kajjumba, G.W., Emik, S., Öngen, A., Özcan, K.H., dan Aydın, S., 2019, Modelling of adsorption kinetic processes—errors, theory and application. Dalam, Adv Sorpt Process Appl, hlm. 1–19.

Karanac, M., Đolić, M., Veljović, Đ., Rajaković-Ognjanović, V., Veličković, Z., Pavićević, V., dan Marinković, A., 2018, The removal of Zn2+, Pb2+, and As(V) ions by lime activated fly ash and valorization of the exhausted adsorbent, Waste Manag, 78, 366–378.

Kassimi, A. El, Achour, Y., Himri, M. El, Laamari, M.R., dan Haddad, M. El, 2021, High efficiency of natural safiot clay to remove industrial dyes from aqueous media: kinetic, isotherm adsorption and thermodynamic studies, Biointerface Res Appl Chem, 11 (5), 12717–12731.

Kozlenko, D.P., Dubrovinsky, L.S., Kichanov, S.E., Lukin, E. V., Cerantola, V., Chumakov, A.I., dan Savenko, B.N., 2019, Magnetic and electronic properties of magnetite across the high pressure anomaly, Sci Rep, 9 (1), 1–10.

Králik, M., 2014, Adsorption, chemisorption, and catalysis, Chem Pap, 68 (12), 1625–1638.

Kurniasih, M., Aprilita, N.H., Roto, R., dan Mudasir, M., 2025, Modification of coal fly ash for high capacity adsorption of methylene blue, Case Stud Chem Environ Eng, 11, 101101.

Kusuma, F.J., Widianto, E., Wahyono, Santoso, I., Sholihun, Absor, M.A.U., Sakti, S.P., dan Triyana, K., 2025, Direct band gap prediction of single and double perovskite using cost-sensitive ensemble learning, J Alloys Compd, 1037, 182102.

Labidi, A., Ren, H., Zhu, Q., Liang, X.X., Liang, J., Wang, H., Sial, A., Padervand, M., Lichtfouse, E., Rady, A., Allam, A.A., dan Wang, C., 2024, Coal fly ash and bottom ash low-cost feedstocks for CO2 reduction using the adsorption and catalysis processes, Sci Total Environ,, 912, 169179.

Lee, J., Kim, J., Young, K., Bong, J., dan Bae, S., 2024, Enhanced and prolonged adsorption of ammonia gas by zeolites derived from coal fly ash, Chemosphere, 368, 143799.

Li, F., Zhou, C., Yang, P., Wang, B., Hu, J., Wei, J., dan Yu, Q., 2019, Direct synthesis of carbon nanotubes on fly ash particles to produce carbon nanotubes/fly ash composites, Front Struct Civ Eng, 13 (6), 1405–1414.

Liu, X. dan Lee, D.J., 2014, Thermodynamic parameters for adsorption equilibrium of heavy metals and dyes from wastewaters, Bioresour Technol, 160, 24–31.

UNIVERSITAS
GADJAH MADA
Sintesis Adsorben Magnetik Berbasis Abu Layang Batubara untuk Adsorpsi Methylene Blue dan Ion Pb(II)
Mardiyah Kurniasih, Prof. Drs. Mudasir, M.Eng., Ph.D.; Prof. Dr.rer.nat. Nurul Hidayat Aprilita, M.Si.; Prof. Drs. Roto,
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Liu, Yi, Liu, Yongfeng, Qu, R., Ji, C., dan Sun, C., 2020, Comparison of adsorption properties for anionic dye by metal organic frameworks with different metal ions, Colloids Surf A Physicochem Eng Asp, 586, 124259.

Ma, L., Han, L., Chen, S., Hu, J., Chang, L., Bao, W., dan Wang, J., 2019, Rapid synthesis of magnetic zeolite materials from fly ash and iron-containing wastes using supercritical water for elemental mercury removal from flue gas, Fuel Process Technol, 189, 39–48.

Malek, N.N.A., Jawad, A.H., Abdulhameed, A.S., Ismail, K., dan Hameed, B.H., 2020, New magnetic Schiff's base-chitosan-glyoxal/fly ash/Fe3O4 biocomposite for the removal of anionic azo dye: An optimized process, Int J Biol Macromol, 146, 530–539.

Maleki, A., Hajizadeh, Z., Sharifi, V., dan Emdadi, Z., 2019, A green, porous and eco-friendly magnetic geopolymer adsorbent for heavy metals removal from aqueous solutions, J Clean Prod, 215, 1233–1245.

Manzoor, K., Ahmad, M., Ahmad, S., dan Ikram, S., 2019, Removal of PbII and CdII from wastewater using arginine cross-linked chitosan–carboxymethyl cellulose beads as green adsorbent, RSC Adv, 9 (14), 7890–7902.

Meawad, A.S., Bojinova, D.Y., dan Pelovski, Y.G., 2010, An overview of metals recovery from thermal power plant solid wastes, Waste Manag, 30 (12), 2548–2559.

Meskel, A.G., Kwikima, M.M., Meshesha, B.T., Habtu, N.G., Naik, S.V.C.S., dan Vellanki, B.P., 2024, Malachite green and methylene blue dye removal using modified bagasse fly ash: Adsorption optimization studies, Environ Challenges, 14, 100829.

Metin, A.Ü., Doğan, D., dan Can, M., 2020, Novel magnetic gel beads based on ionically crosslinked sodium alginate and polyanetholesulfonic acid: Synthesis and application for adsorption of cationic dyes, Mater Chem Phys, 256, 123659.

Miclescu, A. dan Wiklund, L., 2014, Methylene blue, an old drug with new indications?, J Rom Anest Terap Intensivă, 17 (1), 35–41.

Mohtasham, N.H. dan Gholizadeh, M., 2021, Magnetic horsetail plant ash (Fe3O4@HA): a novel, natural and highly efficient heterogeneous nanocatalyst for the green synthesis of 2,4,5-trisubstituted imidazoles, Res Chem Intermed, 47, 2507–2525.

Mourabet, M., El Boujaady, H., El Rhilassi, A., Ramdane, H., Bennani-Ziatni, M., El Hamri, R., dan Taitai, A., 2011, Defluoridation of water using Brushite: Equilibrium, kinetic and thermodynamic studies, Desalination, 278 (1–3), 1–9.

Mpatani, F.M., Aryee, A.A., Kani, A.N., Wen, K., Dovi, E., Qu, L., Li, Z., dan Han, R., 2020, Removal of methylene blue from aqueous medium by citrate

UNIVERSITAS
GADJAH MADA
Sintesis Adsorben Magnetik Berbasis Abu Layang Batubara untuk Adsorpsi Methylene Blue dan Ion Pb(II)
Mardiyah Kurniasih, Prof. Drs. Mudasir, M.Eng., Ph.D.; Prof. Dr.rer.nat. Nurul Hidayat Aprilita, M.Si.; Prof. Drs. Roto,
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

modified bagasse: kinetic, equilibrium and thermodynamic study, Bioresour Technol Rep, 11, 100463.

Mu, C., Zhang, L., Zhang, X., Zhong, L., dan Li, Y., 2020, Selective adsorption of Ag (I) from aqueous solutions using Chitosan/polydopamine@C@magnetic fly ash adsorbent beads, J Hazard Mater, 381, 120943.

Mudasir, M., Baskara, R.A., Suratman, A., Yunita, K.S., Perdana, R., dan Puspitasari, W., 2020, Simultaneous adsorption of Zn(II) and Hg(II) ions on selective adsorbent of dithizone-immobilized bentonite in the presence of Mg(II) ion, J Environ Chem Eng, 8, 104002.

Mudasir, M., Karelius, K., Aprilita, N.H., dan Wahyuni, E.T., 2016, Adsorption of mercury(II) on dithizone-immobilized natural zeolite, J Environ Chem Eng, 4, 1839–1849.

Muslim, A., Aprilia, S., Suha, T.A., dan Fitri, Z., 2017, Adsorption of Pb(II) ions from aqueous solution using activated carbon prepared from areca catechu shell: Kinetic, isotherm and thermodynamic studies, J Korean Chem Soc, 61 (3), 89–96.

Mussa, Z.H., Al-Ameer, L.R., Al-Qaim, F.F., Deyab, I.F., Kamyab, H., dan Chelliapan, S., 2023, A comprehensive review on adsorption of methylene blue dye using leaf waste as a bio-sorbent: isotherm adsorption, kinetics, and thermodynamics studies, Environ Monit Assess, 195, 940.

Mustafa, S., Dilara, B., Nargis, K., Naeem, A., dan Shahida, P., 2002, Surface properties of the mixed oxides of iron and silica, Colloids Surf A Physicochem Eng Asp, 205 (3), 273–282.

Nair, V., Panigrahy, A., dan Vinu, R., 2014, Development of novel chitosan-lignin composites for adsorption of dyes and metal ions from wastewater, Chem Eng J, 254, 491–502.

Nedunuri, A.S.S.S. dan Muhammad, S., 2021, Fundamental understanding of the setting behaviour of the alkali activated binders based on ground granulated blast furnace slag and fly ash, Constr Build Mater, 291, 123243.

Nergis, D.D.B., Abdullah, M.M.A.B., Sandu, A.V., dan Vizureanu, P., 2020, XRD and TG-DTA study of new alkali activated materials based on fly ash with sand and glass powder, Materials, 13, 343.

Niculescu, A.G., Chircov, C., dan Grumezescu, A.M., 2022, Magnetite nanoparticles: Synthesis methods – A comparative review, Methods, 199, 16–27.

Nipa, S.T., Shefa, N.R., Parvin, S., Khatun, M.A., Alam, M.J., Chowdhury, S., Khan, M.A.R., Shawon, S.M.A.Z., Biswas, B.K., dan Rahman, M.W., 2023, Adsorption of methylene blue on papaya bark fiber: Equilibrium, isotherm and kinetic perspectives, Results Eng, 17, 100857.

UNIVERSITAS
GADJAH MADA
Sintesis Adsorben Magnetik Berbasis Abu Layang Batubara untuk Adsorpsi Methylene Blue dan Ion Pb(II)
Mardiyah Kurniasih, Prof. Drs. Mudasir, M.Eng., Ph.D.; Prof. Dr.rer.nat. Nurul Hidayat Aprilita, M.Si.; Prof. Drs. Roto,
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Nkutha, C.S., Naidoo, E.B., dan Shooto, N.D., 2021, Adsorptive studies of toxic metal ions of Cr(VI) and Pb(II) from synthetic wastewater by pristine and calcined coral limestones, S Afr J Chem Eng, 36, 43–57.

Novais, R.M., Ascensão, G., Tobaldi, D.M., Seabra, M.P., dan Labrincha, J.A., 2018, Biomass fly ash geopolymer monoliths for effective methylene blue removal from wastewaters, J Clean Prod, 171, 783–794.

Ntoi, L.L.A., Buitendach, B.E., dan Von Eschwege, K.G., 2017, Seven chromisms associated with dithizone, J Phys Chem A, 121 (48), 9243–9251.

Nyankson, E., Adjasoo, J., Efavi, J.K., Amedalor, R., Yaya, A., Manu, G.P., Asare, K., dan Amartey, N.A., 2019, Characterization and evaluation of zeolite A/Fe3O4 nanocomposite as a potential adsorbent for removal of organic molecules from wastewater, J Chem, 2019, 8090756.

Oladoye, P.O., Ajiboye, T.O., Omotola, E.O., dan Oyewola, O.J., 2022, Methylene blue dye: Toxicity and potential elimination technology from wastewater, Results Eng, 16, 100678.

Oliveira, J.A., Cunha, F.A., dan Ruotolo, L.A.M., 2019, Synthesis of zeolite from sugarcane bagasse fly ash and its application as a low-cost adsorbent to remove heavy metals, J Clean Prod, 229, 956–963.

Padmapriya, M., Ramesh, S.T., dan Biju, V.M., 2022, Synthesis of seawater based geopolymer: Characterization and adsorption capacity of methylene blue from wastewater, Mater Today Proc, 51, 1770–1776.

Pandey, V.C., 2020, Fly ash properties, multiple uses, threats, and management: an introduction, Dalam, Phytomanagement of Fly Ash, hlm. 1–34.

Papandreou, A.D., Stournaras, C.J., Panias, D., dan Paspaliaris, I., 2011, Adsorption of Pb(II), Zn(II) and Cr(III) on coal fly ash porous pellets, Miner Eng, 24, 1495–1501.

Pelalak, R., Heidari, Z., Khatami, S.M., Kurniawan, T.A., Marjani, A., dan Shirazian, S., 2021, Oak wood ash/GO/Fe3O4 adsorption efficiencies for cadmium and lead removal from aqueous solution: Kinetics, equilibrium and thermodynamic evaluation, Arab J Chem, 14 (3), 102991.

Petrus, H.T.B.M., Olvianas, M., Suprapta, W., Setiawan, F.A., Prasetya, A., Sutijan, dan Anggara, F., 2020, Cenospheres characterization from Indonesian coal-fired power plant fly ash and their potential utilization, J Environ Chem Eng, 8 (5), 104116.

Qu, J., Akindolie, M.S., Feng, Y., Jiang, Z., Zhang, G., Jiang, Q., Deng, F., Cao, B., dan Zhang, Y., 2020, One-pot hydrothermal synthesis of NaLa(CO3)2 decorated magnetic biochar for efficient phosphate removal from water: Kinetics, isotherms, thermodynamics, mechanisms and reusability exploration, Chem Eng J, 394, 124915.

Qureashi, A., Hussain, A., Bashir, A., Manzoor, T., Ahmad, L., dan Sheikh, F.A., 2021, Citrate coated magnetite: A complete magneto dielectric,

UNIVERSITAS
GADJAH MADA
Sintesis Adsorben Magnetik Berbasis Abu Layang Batubara untuk Adsorpsi Methylene Blue dan Ion Pb(II)
Mardiyah Kurniasih, Prof. Drs. Mudasir, M.Eng., Ph.D.; Prof. Dr.rer.nat. Nurul Hidayat Aprilita, M.Si.; Prof. Drs. Roto,
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

electrochemical and DFT study for detection and removal of heavy metal ions, Surf Interfaces, 23, 101004.

Rahmawati, R., Permana, M.G., Harison, B., Nugraha, Yuliarto, B., Suyatman, dan Kurniadi, D., 2017, Optimization of frequency and stirring rate for synthesis of magnetite (Fe3O4) nanoparticles by using coprecipitation- ultrasonic irradiation methods, Procedia Eng, 170, 55–59.

Ramutshatsha-Makhwedzha, D., Mavhungu, A., Moropeng, M.L., dan Mbaya, R., 2022, Activated carbon derived from waste orange and lemon peels for the adsorption of methyl orange and methylene blue dyes from wastewater, Heliyon, 8, e09930.

Rodwihok, C., Suwannakeaw, M., Charoensri, K., Wongratanaphisan, D., Woon Woo, S., dan Kim, H.S., 2021, Alkali/zinc-activated fly ash nanocomposites for dye removal and antibacterial applications, Bioresour Technol, 331, 125060.

Romadhona, M., Aprilita, N.H., dan Mudasir, M., 2024, Adsorption of cationic malachite green dye using easily separated adsorbent of magnetized coal Fly ash, Molekul, 19 (3), 591–603.

Ruhi, G., Bhandari, H., dan Dhawan, S.K., 2015, Corrosion resistant polypyrrole/flyash composite coatings designed for mild steel substrate, Am J Polym Sci, 5 (1A), 18–27.

Saha, P. dan Chowdhury, S., 2011, Insight into adsorption thermodynamics, Dalam, Thermodynamics, hlm. 349–364.

Sahbaz, D.A., Yakar, A., dan Gündüz, U., 2019, Magnetic Fe3O4-chitosan micro- and nanoparticles for wastewater treatment, Part Sci Technol, 37 (6), 732–740.

Salazar-Rabago, J.J., Leyva-Ramos, R., Rivera-Utrilla, J., Ocampo-Perez, R., dan Cerino-Cordova, F.J., 2017, Biosorption mechanism of Methylene Blue from aqueous solution onto White Pine (Pinus durangensis) sawdust: Effect of operating conditions, Sustain Environ Res, 27 (1), 32–40.

Sánchez-Bulás, T., Cruz-Vásquez, O., Hernández-Obregón, J., dan Rojas, A., 2017, Enthalpies of fusion, vaporisation and sublimation of crown ethers determined by thermogravimetry and differential scanning calorimetry, Thermochim Acta, 650, 123–133.

Sciubidło, A. dan Nowak, W., 2012, Novel sorbents for flue gas purification, J Power Technol, 92 (2), 115–126.

Setyaningtyas, T., Kurniasih, M., Azizi, A.D.A.N., Riyani, K., dan Kartika, D., 2022, Synthesis of chitosan for removal of methyl orange and malachite green dyes, AIP Conf Proc, 2553, 020005.

Shooto, N.D., 2020, Removal of toxic hexavalent chromium (Cr(VI)) and divalent lead (Pb(II)) ions from aqueous solution by modified rhizomes of Acorus calamus, Surf Interfaces, 20, 100624.

UNIVERSITAS
GADJAH MADA
Sintesis Adsorben Magnetik Berbasis Abu Layang Batubara untuk Adsorpsi Methylene Blue dan Ion Pb(II)
Mardiyah Kurniasih, Prof. Drs. Mudasir, M.Eng., Ph.D.; Prof. Dr.rer.nat. Nurul Hidayat Aprilita, M.Si.; Prof. Drs. Roto,
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Shyam, R., Puri, J.K., Kaur, H., Amutha, R., dan Kapila, A., 2013, Single and binary adsorption of heavy metals on fly ash samples from aqueous solution, J Mol Liq, 178, 31–36.

Siddique, S. dan Jang, J.G., 2021, Acid and sulfate resistance of seawater based alkali activated fly ash: A sustainable and durable approach, Constr Build Mater, 281, 122601.

Sims, R.A., Harmer, S.L., dan Quinton, J.S., 2019, The role of physisorption and chemisorption in the oscillatory adsorption of organosilanes on aluminium oxide, Polymers (Basel), 11 (3), 410.

Singh, K., Dixit, U., dan Mohan, S., 2024, Comparative study of adsorption, kinetics, and thermodynamics of selected cationic and anionic surfactants on ultrasound-assisted bagasse, Water Air Soil Pollut, 235, 10.

Sireesha, S., Agarwal, A., Sopanrao, K.S., Sreedhar, I., dan Anitha, K.L., 2022, Modified coal fly ash as a low-cost, efficient, green, and stable adsorbent for heavy metal removal from aqueous solution, Biomass Convers Biorefin.

Su, Q., Zhang, J., Wang, X., Li, Y., Lin, S., dan Han, J., 2024, Adsorption removal of copper (II) and chromium (VI) from wastewater by Fe3O4-loaded granular activated carbon, Water Pract Technol, 19 (1), 99–112.

Supelano, G.I., Gómez Cuaspud, J.A., Moreno-Aldana, L.C., Ortiz, C., Trujillo, C.A., Palacio, C.A., Parra Vargas, C.A., dan Mejía Gómez, J.A., 2020, Synthesis of magnetic zeolites from recycled fly ash for adsorption of methylene blue, Fuel, 263, 116800.

Susiana, C.A., Rusdiarso, B., dan Mudasir, M., 2024, Enhanced Capacity and Easily Separable Adsorbent of Dithizone-immobilized Magnetite Zeolite for Pb(II) Adsorption, Indones J Chem, 24 (4), 1058–1070.

Tan, Y., Chen, M., dan Hao, Y., 2012, High efficient removal of Pb (II) by amino-functionalized Fe3O4 magnetic nano-particles, Chem Eng J, 191, 104–111.

Tomasz, K., Anna, K., dan Ryszard, C., 2019, Effective adsorption of lead ions using fly ash obtained in the novel circulating fluidized bed combustion technology, Microchem J, 145, 1011–1025.

Türk, F.N., Eren, M.Ş.A., dan Arslanoğlu, H., 2025, Adsorption of Reactive Black 5 dye from aqueous solutions with a clay halloysite having a nanotubular structure: Interpretation of mechanism, kinetics, isotherm and thermodynamic parameters, Inorg Chem Commun, 171, 113600.

Ul Haq, E., Kunjalukkal Padmanabhan, S., dan Licciulli, A., 2014, Synthesis and characteristics of fly ash and bottom ash based geopolymers-A comparative study, Ceram Int, 40 (2), 2965–2971.

Vesali-Naseh, M., Vesali Naseh, M.R., dan Ameri, P., 2021, Adsorption of Pb (II) ions from aqueous solutions using carbon nanotubes: A systematic review, J Clean Prod, 291, 125917.

UNIVERSITAS
GADJAH MADA
Sintesis Adsorben Magnetik Berbasis Abu Layang Batubara untuk Adsorpsi Methylene Blue dan Ion Pb(II)
Mardiyah Kurniasih, Prof. Drs. Mudasir, M.Eng., Ph.D.; Prof. Dr.rer.nat. Nurul Hidayat Aprilita, M.Si.; Prof. Drs. Roto,
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Wang, C., Yu, J., Feng, K., Wang, L., dan Huang, J., 2022, Synthesis of porous magnetic zeolite-based material and its performance on removal of Cd2+ ion and methylene blue from aqueous solution, Microporous Mesoporous Mater, 345, 112256.

Wang, H., Li, Z., Yahyaoui, S., Hanafy, H., Seliem, M.K., Bonilla-Petriciolet, A., Luiz Dotto, G., Sellaoui, L., dan Li, Q., 2021, Effective adsorption of dyes on an activated carbon prepared from carboxymethyl cellulose: Experiments, characterization and advanced modelling, Chem Eng J, 417, 128116.

Wang, K., Peng, N., Sun, J., Lu, G., Chen, M., Deng, F., Dou, R., Nie, L., dan Zhong, Y., 2020, Synthesis of silica-composited biochars from alkali-fused fly ash and agricultural wastes for enhanced adsorption of methylene blue, Sci. Total Environ, 729 (139), 139055.

Wang, X.S., 2014, Mineralogical and chemical composition of magnetic fly ash fraction, Environ Earth Sci, 71 (4), 1673–1681.

Wang, Y., Hu, L., Zhang, G., Yan, T., Yan, L., Wei, Q., dan Du, B., 2017, Removal of Pb(II) and methylene blue from aqueous solution by magnetic hydroxyapatite-immobilized oxidized multi-walled carbon nanotubes, J Colloid Interface Sci, 494, 380–388.

Wekoye, J.N., Wanyonyi, W.C., Wangila, P.T., dan Tonui, M.K., 2020, Kinetic and equilibrium studies of Congo red dye adsorption on cabbage waste powder, Environ Chem Ecotoxicol, 2, 24–31.

Xie, X., Lei, C., Dai, W., Zhao, Z., dan Wang, W., 2025, Enhanced adsorption of Pb (II) ions using a magnetic mesoporous molecular sieves derived from coal fly ash and Nano-Fe3O4 particles, J Ind Eng Chem, 146, 684–696.

Yazdani, F. dan Seddigh, M., 2016, Magnetite nanoparticles synthesized by co-precipitation method: The effects of various iron anions on specifications, Mater Chem Phys, 184, 318–323.

You, S., Ho, S.W., Li, T., Maneerung, T., dan Wang, C.H., 2019, Techno-economic analysis of geopolymer production from the coal fly ash with high iron oxide and calcium oxide contents, J Hazard Mater, 361, 237–244.

You, X., Wang, R., Zhu, Y., Sui, W., dan Cheng, D., 2021, Comparison of adsorption properties of a cellulose-rich modified rice husk for the removal of methylene blue and aluminum (III) from their aqueous solution, Ind Crops Prod, 170, 113687.

Yuan, M., Xie, T., Yan, G., Chen, Q., dan Wang, L., 2018, Effective removal of Pb 2+ from aqueous solutions by magnetically modified zeolite, Powder Technol, 332, 234–241.

Zbair, M., El Hadrami, A., Bellarbi, A., Monkade, M., Zradba, A., dan Brahmi, R., 2020, Herbicide diuron removal from aqueous solution by bottom ash: Kinetics, isotherm, and thermodynamic adsorption studies, J Environ Chem Eng, 8 (2), 103667.

UNIVERSITAS
GADJAH MADA
Sintesis Adsorben Magnetik Berbasis Abu Layang Batubara untuk Adsorpsi Methylene Blue dan Ion Pb(II)
Mardiyah Kurniasih, Prof. Drs. Mudasir, M.Eng., Ph.D.; Prof. Dr.rer.nat. Nurul Hidayat Aprilita, M.Si.; Prof. Drs. Roto,
Universitas Gadjah Mada, 2025 | Diunduh dari http://etd.repository.ugm.ac.id/

Zein, R., Satrio Purnomo, J., Ramadhani, P., Safni, Alif, M.F., dan Putri, C.N., 2023, Enhancing sorption capacity of methylene blue dye using solid waste of lemongrass biosorbent by modification method, Arab J Chem, 16, 104480.

Zhang, X., Zhang, P., Wu, Z., Zhang, L., Zeng, G., dan Zhou, C., 2013, Adsorption of methylene blue onto humic acid-coated Fe3O4 nanoparticles, Colloids Surf A Physicochem Eng Asp, 435, 85–90.

Zhao, Huang, X., Zhao, H., Wang, L., Liu, F., Hu, X., Li, J., Zhang, G., dan Ji, P., 2021, Effect and mechanisms of synthesis conditions on the cadmium adsorption capacity of modified fly ash, *Ecotoxicol Environ Saf*, 223, 112550.

Zhao, W., Wang, B., Zhang, T., dan Liu, T., 2024, Study on the modification of fly ash from domestic waste incineration and its adsorption performance on Pb^{2+}, *Int J Environ Sci Technol*, 21, 1235–1244.

Zhao, X., Wang, X., dan Lou, T., 2021, Preparation of fibrous chitosan/sodium alginate composite foams for the adsorption of cationic and anionic dyes, *J Hazard Mater*, 403, 124054.

Zhou, X., 2017, Minor correction to the thermodynamic calculation using the distribution constant by Shan et al. and Rahmani-Sani et al., *J Hazard Mater*, 323, 735–736.