DAFTAR PUSTAKA

Afin, A. P., & Kiono, B. F. T. (2021). Potensi energi batubara serta pemanfaatan dan teknologinya di Indonesia tahun 2020 – 2050 : Gasifikasi batubara. *Jurnal Energi Baru Dan Terbarukan*, *2*(2), 144–122. https://doi.org/10.14710/jebt.2021.11429

Albertus, F., & Zalukhu, Y. (2019). Dampak dan pengaruh pertambangan batubara terhadap masyarakat dan lingkungan di Kalimantan Timur. *Jurnal Legalitas*, *4*(2548–8244), 42–56.

Andrawina, Rika Ernawati, Tedy Agung Cahyadi, Waterman SB, N. A. A. (2020). Penerapan metode *constructed wetland* dalam upaya pengelolaan limbah air asam tambang pada penambangan batubara, berdasarkan *literatur review*. *Prosiding Nasional Rekayasa Teknologi Industri Dan Informasi (ReTII) XV Tahun 2020*, 201–207.

Andrews, S. C., Robinson, A. K., & Rodríguez-Quiñones, F. (2003). Bacterial iron homeostasis. *FEMS Microbiology Reviews*, *27*(2–3), 215–237. https://doi.org/10.1016/S0168-6445(03)00055-X

Anekwe, I. M. S., & Isa, Y. M. (2023). Bioremediation of acid mine drainage - Review. *Alexandria Engineering Journal*, 65, 1047–1075. https://doi.org/10.1016/j.aej.2022.09.053

Amin, B., Afriyani E., & Saputra, M. A. (2011). Distribusi spasial logam Pb dan Cu pada sedimen dan air laut permukaan di perairan tanjung buton Kabupaten Siak Provinsi Riau. *Jurnal Teknobiologi*, *2*(2087–5428), 1–8.

Anindhita, F., Sugiyono, A., Ode, L., & Abdul, M. (2018). *Outlook energi indonesia 2018: Energi berkelanjutan untuk transportasi darat* (Laporan PPIPE-BPPT; ISBN 978-602-1328-05-7. Pusat Pengkajian Industri Proses & Energi, BPPT). hhtps://doi.org/10.5281/zenodo.8216479

Biermann, R., Niemeyer, L., Rösner, L., Ude, C., Lindner, P., Bice, I., & Beutel, S. (2022). Facilitated endospore detection for *Bacillus* spp. through automated algorithm-based image processing. *Engineering in Life Sciences*, *22*(3–4), 299–307. https://doi.org/10.1002/elsc.202100137

Bonnet, M., Lagier, J. C., Raoult, D., & Khelaifia, S. (2020). Bacterial culture through selective and non-selective conditions: The evolution of culture media in clinical microbiology. *New Microbes and New Infections*, *34,* 100622. https://doi.org/10.1016/j.nmni.2019.100622

Butterfield, C. N., Lee, S. W., & Tebo, B. M. (2016). The role of bacterial spores in metal cycling and their potential application in metal contaminant bioremediation. In A. Driks & P. Eichenberger (Eds.), *The bacterial spore: From molecules to systems*, (pp. 367–386). ASM Press. https://doi.org/10.1128/9781555819323.ch18

Chandrangsu, P., Rensing, C., & Helmann, J. D. (2017). Metal homeostasis and resistance in bacteria. *Nature Reviews Microbiology*, *15*(6), 338–350. https://doi.org/10.1038/nrmicro.2017.15

Chen, D. Di, Zhang, L. L., Zhang, J. H., Ban, W. T., Li, Q., & Wu, J. C. (2025). Comparative genomic analysis of metal-tolerant bacteria reveals significant differences in metal adaptation strategies. *Microbiology Spectrum*, *0*(0). https://doi.org/https://doi.org/10.1128/spectrum.01680-24

Chen, X. L., Li, F., Xie, X. J., Li, Z., & Chen, L. (2019). Nanoscale zero-valent iron and chitosan functionalized *Eichhornia crassipes biochar* for efficient hexavalent chromium removal. *International Journal of Environmental Research and Public Health*, *16*(17), 3046. https://doi.org/10.3390/ijerph16173046

Chojnacka, K. (2010). Biosorption and bioaccumulation - The prospects for practical applications. *Environment International*, *36*(3), 299–307. https://doi.org/10.1016/j.envint.2009.12.001

Das, N., Vimala, R., & Karthika, P. (2008). Biosorption of heavy metals An overview. *Indian Journal of Biotechnology*. Vol.7: 159-169

Deborah, S., & Sebastin Raj, J. (2016). Bioremediation of heavy metals from distilleries effluent using microbes. *Journal of Applied and Advanced Research*, *1*(2), 23–28. https://doi.org/10.21839/jaar.2016.v1i2.21

Demir, E. K., Yaman, B. N., Çelik, P. A., & Sahinkaya, E. (2020). Iron oxidation in a ceramic membrane bioreactor using acidophilic bacteria isolated from an acid mine drainage. *Journal of Water Process Engineering*, *38*, 101610. https://doi.org/10.1016/j.jwpe.2020.101610

Dinku, A., & Jiru, T. M. (2025). Isolation, screening, and characterization of heavy metal-resistant bacteria from solid waste dumping sites in Central Gondar, Northwest, Ethiopia. *Science Progress*, *108*(1), 1–22. https://doi.org/10.1177/00368504251315807

Farahani, S., Sepahi, A. A., Shojaosadati, S. A., & Hosseini, F. (2020). Bio-removal of heavy metalsusing iron-oxidizing bacteria: A novel approach in environmental biotechnology. *Iranian Journal of Pharmaceutical Research*, *19*(3), 421–429. https://doi.org/10.22037/ijpr.2019.112474.13779

Farisna, S. T., & Zulaika, E. (2015). Resistensi *Bacillus* endogenik Kalimas Surabaya terhadap logam besi (Fe). *Jurnal Sains Dan Seni ITS*, *4*(2337–3520), 84–87.

Febria, F. A., & Aziza, R. (2022). Exopolysaccharides-Producing Biofilm Bacteria from Submerged Seawater Substrate for Bioremediation of Heavy Metal Contamination. *Pakistan Journal of Biological Sciences*, *25*(1), 9–14. https://doi.org/10.3923/PJBS.2022.9.14

Febria, F. A., Jonesti, W., & Junaidi Zakaria, I. (2020). Energy Harvesting With Estuarine Sediment Microbial Fuel Cell. *Biotech. Env. Sc*, *22*(1), 2020–2189.

Febria, F. A., Octavelly, V., & Zakaria, I. J. (2018). Isolation and heavy metals bacterial resistant test from former of bauxite mining at bintan island. *Asian Journal of Microbiology, Biotechnology and Environmental Sciences*, *20*(1), 341–344.

Febria, F. A., Zakaria, I. J., Syukriani, L., Rahayu, S. P., & Fajri, M. A. (2016). The highest mercury resistant bacteria as a mercury remediator from gold mining soil in West Sumatera, Indonesia. *Journal of Chemical and Pharmaceutical Research*, *8*(1), 394–397. https://www.researchgate.net/publication/300449615

Febria, F. A., Zulkhairia, F., Walpajri, F., Putra, A., & Syukriani, L. (2023). Biofilm-forming heavy metal resistance bacteria from Bungus Ocean Fisheries Port (PPS) West Sumatra as a waters bioremediation agent. *Pakistan Journal of Biological Sciences*, *26*(4), 168–176. https://doi.org/10.3923/pjbs.2023.168.176

Febrina, L., & Ayuna, A. (2019). Studi penurunan kadar besi (Fe) dan mangan (Mn) dalam air tanah menggunakan saringan keramik. *Jurnal Teknologi*, *7*(1), 36–44. https://jurnal.umj.ac.id/index.php/jurtek/article/download/369/341

Fidiastuti, H. R., & Suarsini, E. (2017). Potensi bakteri indigen dalam mendegradasi limbah cair pabrik kulit secara in vitro. *Bioeksperimen: Jurnal Penelitian Biologi*, *3*(1), 1. https://doi.org/10.23917/bioeksperimen.v3i1.3665

Firliani, W., Agustien, A., Fuji, D., Febria, A., Mikrobiologi, L., & Biologi, J. (2013). Karakterisasi Bakteri Termofilik Penghasil Enzim Protease Netral Characterization of Thermophilic Bacteria in Producing Neutral Protease Enzymes. *Jurnal Biologi Universitas Andalas (J. Bio. UA.)*, *4*(1), 9–14.

Fleischhacker, A. S., & Kiley, P. J. (2011). Iron-containing transcription factors and their roles as sensors. *Current Opinion in Chemical Biology*, *15*(2), 335–341. https://doi.org/10.1016/j.cbpa.2011.01.006

Gupta, V. K., & Rastogi, A. (2008). Biosorption of lead(II) from aqueous solutions by non-living algal biomass *Oedogonium* sp. and *Nostoc* sp.-A comparative study. *Colloids and Surfaces B: Biointerfaces*, *64*(2), 170–178. https://doi.org/10.1016/j.colsurfb.2008.01.019

Han, D., Currell, M. J., & Cao, G. (2016). Deep challenges for China's war on water pollution. *Environmental Pollution*, *218*, 1222–1233. https://doi.org/10.1016/j.envpol.2016.08.078

Helmann, J. D. (2014). Specificity of metal sensing: Iron and manganese homeostasis in *Bacillus subtilis*. *Journal of Biological Chemistry*, *289*(41), 28112–28120. https://doi.org/10.1074/jbc.R114.587071

Hengen, T. J., Squillace, M. K., O'Sullivan, A. D., & Stone, J. J. (2014). Life cycle assessment analysis of active and passive acid mine drainage treatment technologies. *Resources, Conservation and Recycling*, *86*, 160–167. https://doi.org/10.1016/j.resconrec.2014.01.003

Hidayat, L. (2017). Pengelolaan lingkunga areal tambang batubara (Studi kasus

pengelolaan air asam tambang (acid mining drainage) di PT. Bhumi Rantau). *Adhum*, *1*.

Hidayat, O., Febria, F. A., & Nasir, N. (2014). Isolasi dan Karakterisasi Bakteri pada Pasir Sarang dan Cangkang Telur Penyu Lekang (Lepidochelys olivaceae L.) yang Menetas dan Gagal Menetas. *Jurnal Biologi Universitas Andalas (J. Bio. UA.)*, *3*(2), 2303–2162.

Higgins, D., & Dworkin, J. (2012). Recent progress in *Bacillus subtilis* sporulation. *FEMS Microbiology Reviews*, *36*(1), 131–148. https://doi.org/10.1111/j.1574-6976.2011.00310.x.

Hussey, M. A., & Anne, Z. (2016). Endospore stain protocol. *American Society for Microbiology*, 1–11.

Ilahi, R. K., & Febria, F. A. (2021). Screening of cellulolytic bacteria from biological education and research forest floor andalas university, Indonesia. *Pakistan Journal of Biological Sciences*, *24*(5), 612–617. https://doi.org/10.3923/pjbs.2021.612.617

Imlay, J. A. (2015). Common mechanisms of bacterial metal homeostasis. In N. JO & S. EP (Eds.), *Trace Metals and Infectious Diseases (Chap. 12)*. MIT Press. https://doi.org/10.7551/mitpress/9780262029193.003.0012

Jones, D. S., Kohl, C., Grettenberger, C., Larson, L. N., Burgos, W. D., & Macalady, J. L. (2015). Geochemical niches of iron-oxidizing acidophiles in acidic coal mine drainage. *Applied and Environmental Microbiology*, *81*(4), 1242–1250. https://doi.org/10.1128/AEM.02919-14

Jonesti, W. P., & Febria, F. A. (2017). *Isolasi dan Karakterisasi Bakteri pada Anoda Sediment Microbial Fuell Cell (SMFC)*. *September*, 167–186.

Ka-ot, A. L., & Joshi, S. R. (2022). Application of acid and heavy metal resistant bacteria from rat-hole coal mines in bioremediation strategy. *Journal of Basic Microbiology*, *62*(3–4), 480–488. https://doi.org/10.1002/jobm.202100241

Kalaimurugan, D., Balamuralikrishnan, B., Durairaj, K., Vasudhevan, P., Shivakumar, M. S., Kaul, T., Chang, S. W., Ravindran, B., & Venkatesan, S. (2020). Isolation and characterization of heavy-metal-resistant bacteria and their applications in environmental bioremediation. *International Journal of Environmental Science and Technology*, *17*(3), 1455–1462. https://doi.org/10.1007/s13762-019-02563-5

Kementerian Lingkungan Hidup. (2003). *Keputusan Menteri Lingkungan Hidup Nomor 113 Tahun tentang Baku Mutu Air Limbah bagi Usaha dan/atau Kegiatan Pertambangan Batubar*a. Jakarta: Kementerian LH.

Larasati, A. S. dan S. (2012). Kemampuan Isolat bakteri dari sedimen situ sebagai agen bioremediasi ion logam timbal (Pb) di perairan. *Limnotek*, *19*(1), 50–60.

Leiwakabessy, F. (2005). *Logam berat di perairan pantai Pulau Ambon dan korelasinya dengan kerusakan cangkang, rasio seks, ukuran cangkang,*

kepadatan individu dan indeks keanekaragaman jenis siput Nerita (Neritidae: Gastropoda) [Skripsi, Universitas Airlangga]. ADLN - Perpustakaan Universitas Airlangga.

Lutfi, S. R., Wignyanto, W., & Kurniati, E. (2018). Bioremediasi merkuri menggunakan bakteri indigenous dari limbah penambangan emas di Tumpang Pitu, Banyuwangi. *Jurnal Teknologi Pertanian*, *19*(1), 15–24. https://doi.org/10.21776/ub.jtp.2018.019.01.2

Luthfia, A., Abfertiawan, M. S., Nuraprianisandi, S., Pranoto, K., Samban, P. R., & Elistyandari, A. (2021). Penggunaan Life cycle assessment dalam penilaian resiko dampak lingkungan dan pemilihan alternatif teknologi di pertambangan batubara indonesia. *Prosiding Seminar Nasional Teknik Lingkungan Kebumian SATU BUMI*, *2*(1), 160–174. https://doi.org/10.31315/psb.v2i1.4455

Madigan, M. T., Martinko, J. M., Stahl, D. A., & Clark, D. P. (2012). *Brock Biology of Microorganisms. Pearson Education*

Mahyuni, E. T., Amran, Hedianto, Khaidir Noor, M., Faizah, A. A., & Ma'rief, F. (2023). Potensi Pembentukan air asam tambang pada batuan menggunakan analisis XRD dan mikroskopi pada tambang batubara, Blok Timur, Site Bontang, PT. Indominco Mandiri, Provinsi Kalimantan Timur. *Jurnal Teknik AMATA*, *04*(1), 63–68.

Maldonado, R. F., Sá-Correia, I., & Valvano, M. A. (2016). Lipopolysaccharide modification in gram-negative bacteria during chronic infection. *FEMS Microbiology Reviews*, *40*(4), 480–493. https://doi.org/10.1093/femsre/fuw007

Male, Y. T., Modok, D. W. S., Seumahu, C. A., & Malle, D. (2019). Isolasi mikroba dari air asam tambang pada area pertambangan tembaga di Pulau Wetar, Provinsi Maluku. *Indonesian Journal of Chemical Research*, *6*(2), 101–106. https://doi.org/10.30598/ijcr.2019.6-thi

Mao, Q., Qin, W., Yan, B., & Luo, L. (2024). Ferrous iron oxidation efficiency and kinetics by indigenous iron-oxidizing bacteria in acid mine drainage. *Environmental Technology and Innovation*, *36*, 103785. https://doi.org/10.1016/j.eti.2024.103785

Mathivanan, K., Chandirika, J. U., Vinothkanna, A., Yin, H., Liu, X., & Meng, D. (2021). Bacterial adaptive strategies to cope with metal toxicity in the contaminated environment – A review. *Ecotoxicology and Environmental Safety*, *226*, 112863. https://doi.org/10.1016/j.ecoenv.2021.112863

Maulidyana, F., Apriani, I., & Jumiati, J. (2024). Potensi bakteri indigenous pada air limbah pencucian bijih bauksit untuk meremediasi air tercemar logam besi (Fe). *Jurnal Teknologi Lingkungan Lahan Basah*, *12*(2), 414. https://doi.org/10.26418/jtllb.v12i2.76775

Menteri Lingkungan Hidup. (2014). *Peraturan Menteri Lingkungan Hidup dan Kehutanan Republik Indonesia Nomor 5 Tahun 2014 tentang Baku Mutu Air*

Limbah., Berita Negara Republik Indonesia No. 1815. https://ditjenpp.kemenkumham.go.id/arsip/bn/2014/bn1815-2014.pdf

Nadhirawaty, R., Santo, Y., Wicaksono, D. A., Azilla, M. A., Ari, M. R., & Kaiya, R. E. W. (2022). Potensi *Bacillus cereus* dan *Bacillus subtilis* menurunkan kandungan logam Fe dan Mn pada Air Asam Tambang. *Jurnal Agriment*, *7*(2), 106–111. https://doi.org/10.51967/jurnalagriment.v7i2.1834

Nuñez, H., Covarrubias, P. C., Moya-Beltrán, A., Issotta, F., Atavales, J., Acuña, L. G., Johnson, D. B., & Quatrini, R. (2016). Detection, identification and typing of *Acidithiobacillus* species and strains: A review. *Research in Microbiology*, *167*(7), 555–567. https://doi.org/10.1016/j.resmic.2016.05.006

Octavelly, V., & Febria, F. A. (2017). *Uji Resistensi Isolat Bakteri Resisten Kromium sebagai Isolat Potensial Agen Bioremediasi Lahan Tercemar Limbah Krom*. *September*, 167–186.

Pitri, R. E., Agustien, A., Fuji, D., Febria, A., Mikrobiologi, L., & Biologi, J. (2015). Isolasi dan Karakterisasi Bakteri Amilotermofilik Dari Sumber Air Panas Sungai Medang. *Jurnal Biologi Universitas Andalas (J. Bio. UA.)*, *4*(2), 119–122.

Polapa, F. S., Annisa, R. N., Annisa, R. N., Yanuarita, D., Yanuarita, D., Ali, S. M., & Ali, S. M. (2022). Quality indeks dan konsentrasi logam berat dalam perairan dan sedimen di Perairan Kota Makassar. *Jurnal Ilmu Lingkungan*, *20*(2), 271–278. https://doi.org/10.14710/jil.20.2.271-278

Prescott, L.M., Harley, J.P., & Klein, D.A. (2008). Microbiology (7th ed.). McGraw-Hill.

Priadie, B. (2012). Teknik bioremediasi sebagai alternatif dalam upaya. *Jurnal Ilmu Lingkungan*, *10*(1), 38–48.

Prianto, E., & Husnah. (2017). Penambangan timah inkonvensional: Dampaknya terhadap kerusakkan biodiversitas perairan umum di Pulau Bangka. *BAWAL: Widya Riset Perikanan Tangkap*, *2*(5), 193. https://doi.org/10.15578/bawal.2.5.2009.193-198

Puspitasari, D., Pramono, H., & Oedjijono, O. (2014). Identifikasi bakteri pengoksidasi besi dan sulfur berdasarkan geN 16S rRNA dari lahan tambang timah di Belitung. *Scripta Biologica*, *1*(1), 10. https://doi.org/10.20884/1.sb.2014.1.1.12

Qiu, Y., Zhou, Y., Chang, Y., Liang, X., Zhang, H., Lin, X., Qing, K., Zhou, X., & Luo, Z. (2022). The effects of ventilation, humidity, and temperature on bacterial growth and bacterial genera distribution. *International Journal of Environmental Research and Public Health*, *19*(22). https://doi.org/10.3390/ijerph192215345

Reiner, K. (2016). Catalase test protocol. *American Society for Microbiology*, 1–9.

Rodgers, K., McLellan, I., Cuthbert, S., Torres, V. M., & Hursthouse, A. (2019). The potential of remedial techniques for hazard reduction of steel process by products:

Impact on steel processing, waste management, the environment and risk to human health. *International Journal of Environmental Research and Public Health*, *16*(12). https://doi.org/10.3390/ijerph16122093

Said. (2018). Teknologi pengolahan air asam tambang batubara "Alternatif pemilihan teknologi." *Jurnal Air Indonesia*, *7*(2), 119–138. https://doi.org/10.29122/jai.v7i2.2411

Seo, S. W., Kim, D., Latif, H., O'Brien, E. J., Szubin, R., & Palsson, B. O. (2014). Deciphering Fur transcriptional regulatory network highlights its complex role beyond iron metabolism in *Escherichia coli*. *Nature Communications*, *5*. https://doi.org/10.1038/ncomms5910

Sheramati, I. & Varma, A. (Eds.). (2010). *Soil Biology* (Vol. 21). *Springer Heidelberg Dordrecht* (ISS: 2196–4831).

Shields, P., & Cathcart, L. (2016). Motility test medium protocol. *American Society for Microbiology*, 1–7.

Shylla, L., Barik, S. K., & Joshi, S. R. (2021). Characterization and bioremediation potential of native heavy-metal tolerant bacteria isolated from rat-hole coal mine environment. *Archives of Microbiology*, *203*(5), 2379–2392. https://doi.org/10.1007/s00203-021-02218-5

Smith, A. C., & Hussey, M. A. (2016). Gram stain protocols. *American Society for Microbiology*.

Standar Nasional Indonesia. (2009). *Cara Uji Besi (Fe) Secara Spektrofotometri Serapan Atom (SSA)–nyala*.

Thomas, M., & Benov, L. (2018). The contribution of superoxide radical to cadmium toxicity in *E. coli*. *Biological Trace Element Research*, *181*(2), 361–368. https://doi.org/10.1007/s12011-017-1048-5

Waldron, K. J., Rutherford, J. C., Ford, D., & Robinson, N. J. (2009). Metalloproteins and metal sensing. *Nature*, *460*(7257), 823–830. https://doi.org/10.1038/nature08300

Ye, H., Li, Q., Yu, H., Xiang, L., Wei, J., & Lin, F. (2022). Pyrolysis behaviors and residue properties of iron-rich rolling sludge from steel smelting. *International Journal of Environmental Research and Public Health*, *19*(4). https://doi.org/10.3390/ijerph19042152

Yi, Y., Yang, Z., & Zhang, S. (2011). Ecological risk assessment of heavy metals in sediment and human health risk assessment of heavy metals in fishes in the middle and lower reaches of the Yangtze River basin. *Environmental Pollution*, *159*(10), 2575–2585. https://doi.org/10.1016/j.envpol.2011.06.011

Yin, K., Wang, Q., Lv, M., & Chen, L. (2019). Microorganism remediation strategies towards heavy metals. *Chemical Engineering Journal*, *360*(November 2018), 1553–1563. https://doi.org/10.1016/j.cej.2018.10.226

Yua, C., & Genco, C. A. (2012). Fur-mediated activation of gene transcription in the human pathogen Neisseria gonorrhoeae. *Journal of Bacteriology*, *194*(7), 1730–1742. https://doi.org/10.1128/JB.06176-11

Zulaika, E., Luqman A., Arindah T., & Suryawan, U. (2012). Bakteri resisten logam berat yang berpotensi sebagai biosorben dan bioakumulator. *Prosiding Seminar Nasional Waste Management for Sustainable Urban Development*, 1–5.