

## DAFTAR PUSTAKA

- Adeogun, A. I., Idowu, M. A., Ofudje, A. E., Kareem, S. O., & Ahmed, S. A. (2013). Comparative biosorption of Mn(II) and Pb(II) ions on raw and oxalic acid modified maize husk: Kinetic, thermodynamic and isothermal studies. *Applied Water Science*, 3(1), 167–179. <https://doi.org/10.1007/s13201-012-0070-1>
- Ahmad, A., Khatoon, A., Mohd-Setapar, S. H., Kumar, R., & Rafatullah, M. (2016). Chemically oxidized pineapple fruit peel for the biosorption of heavy metals from aqueous solutions. *Desalination and Water Treatment*, 57(14), 6432–6442. <https://doi.org/10.1080/19443994.2015.1005150>
- Aktar, J. (2020). Batch adsorption process in water treatment. In *Intelligent Environmental Data Monitoring for Pollution Management* (hal. 1–24). Elsevier Inc. <https://doi.org/10.1016/B978-0-12-819671-7.00001-4>
- APTI 415. (1999). *Chapter 1 Control Of Gaseous Emissions*.
- Arsyaka, T., Koesnarpadi, S., & Lianasari, I. Y. (2025). *Adsorpsi Ion Logam Pb<sup>2+</sup> dengan Arang Aktif Mahkota Nanas (Ananas comosus (L.) Merr) Termodifikasi Kitosan*. <https://doi.org/https://doi.org/10.30872/ja.v10i1.1436>
- Ayob, A., Zamre, N. M., Izzati, N., Ariffin, M., Hidayu, N., Rani, A., & Mohamad, N. F. (2020). *Pineapple Waste as an Adsorbent to Remove Lead from Synthetic Wastewater*. 04(10), 1–8.
- Bagali, S. S., Gowrishankar, B. S., & Roy, A. S. (2017). *Optimization , Kinetics , and Equilibrium Studies on the Removal of Lead ( II ) from an Aqueous Solution Using Banana Pseudostem as an Adsorbent*. 3, 409–415.
- Bayu, A., Nandiyanto, D., Oktiani, R., & Ragadhita, R. (2019). *Indonesian Journal of Science & Technology How to Read and Interpret FTIR Spectroscopy of Organic Material*. (1), 97–118.
- Bergamasco, R., Mantovani, D., Diório, A., Bezerra, C. de O., Quesada, H. B., Fagundes-Klen, M. R., Wernke, G., & Cusioli, L. F. (2023). *Adsorption of Atrazine from Synthetic Contaminated Water Using a Packed-Bed Column with a Low-Cost Adsorbent*.
- Bisswanger, H. (2008). *Enzyme Kinetics* (hal. 59–124).
- Borthakur, P., Boruah, P. K., Sharma, B., & Das, M. R. (2016). 5 - Nanoemulsion: preparation and its application in food industry. In *Emulsions*. Elsevier Inc. <https://doi.org/10.1016/B978-0-12-804306-6/00005-2>
- Collin, M. S., Venkatraman, S. K., Vijayakumar, N., Kanimozhi, V., Arbaaz, S. M., Stacey, R. G. S., Anusha, J., Choudhary, R., Lvov, V., Tovar, G. I., Senatov, F., Koppala, S., & Swamiappan, S. (2022). Bioaccumulation of lead (Pb) and its effects on human: A review. *Journal of Hazardous Materials Advances*, 7(June). <https://doi.org/10.1016/j.hazadv.2022.100094>
- Daochalermwong, A., Chanka, N., Songsrirote, K., Dittanet, P., Niamnuy, C., & Seubsai, A. (2020). Removal of Heavy Metal Ions Using Modified

- Celluloses Prepared from Pineapple Leaf Fiber. *ACS Omega*, 5(10), 5285–5296. <https://doi.org/10.1021/acsomega.9b04326>
- Do, D. D. (1998). *Adsorption Analysis : Equilibria and kinetics* (R. T. Yang, Ed.; Vol 2, Vol. 2). Imperial College Press.
- Ginting, S. B., Syukur, S. D., & Yulia, Y. (2017). Kombinasi Adsorben Biji Kelor - Zeolit Alam Lampung untuk Meningkatkan Efektivitas Penjerapan Logam Pb dalam Air secara Kontinu pada Kolom Fixed Bed Adsorber. *Jurnal Rekayasa Proses*, 11(1), 1. <https://doi.org/10.22146/jrekpros.23154>
- Gogoi, S., Chakraborty, S., & Saikia, M. D. (2018). *Surface modified pineapple crown leaf for adsorption of Cr(VI) and Cr(III) ions from aqueous solution Swastika*. (Vi).
- Gómez-Aguilar, D. L., Rodríguez-Miranda, J. P., Baracaldo-Guzmán, D., Salcedo-Parra, O. J., & Esteban-Muñoz, J. A. (2021). Biosorption of pb(II) using coffee pulp as a sustainable alternative for wastewater treatment. *Applied Sciences (Switzerland)*, 11(13). <https://doi.org/10.3390/app11136066>
- Gusain, D., & Bux, F. (2021). *Batch Adsorption Process of Metals and Anions for Remediation of Contaminated Water* (C. P. / T. & Francis, Ed.).
- Harian, D., Indah, S., & Nur, A. (2025). Distribution of Lead (Pb) in Groundwater Around Coal Ash Landfilling Site in A Ex-Mining Area of Sawahlunto City. *Jurnal Sumberdaya Alam dan Lingkungan*, 14(2), 254–263. <https://doi.org/https://doi.org/10.23887/jst-undiksha.v14i2.84442>
- Harripersadth, C., Musonge, P., & Isa, Y. M. (2020). *Journal Pre-proof*.
- Hasanah, U., Iryani, A., Taufiq, A., & Darma Putra, D. A. (2021). Chicken Bone Based Adsorbent for Adsorption of Pb(II), Cd(II), and Hg(II) Metals Ion Liquid Waste. *Helium: Journal of Science and Applied Chemistry*, 1(1), 11–18. <https://doi.org/10.33751/helium.v1i1.2949>
- Hui, K., Hu, W., Xi, B., Yuan, Y., Lu, H., & Tan, W. (2026). Source analysis of heavy metals in groundwater of centralized drinking water sources and seasonal variations of health risks in Wuzhou City, Pearl River Delta, China. *Environmental Chemistry and Ecotoxicology*, 8(September 2025), 392–407. <https://doi.org/10.1016/j.enceco.2025.11.026>
- Ifa, L., Nurdjannah, Syarif, T., & Darningsih. (2021). *Bioadsorben dan Aplikasinya* (N. M. Pratama, Ed.).
- Indah, S., Helard, D., & Sasmita, A. (2016). Utilization of maize husk (*Zea mays* L.) as low-cost adsorbent in removal of iron from aqueous solution. *Water Science and Technology: Water Supply*, 1(4).
- Indriyati, R., Negsih, T. A., & Wijaya, E. (2024). *PENGANTAR STATISTIK (Konsep Dasar untuk Analisa Data)* (Efitra, Ed.). PT. Sonpedia Publishing Indonesia Redaksi.
- Ismiyati, M. (2020). *Pemanfaatan sabut kelapa dan tempurung kelapa sebagai bioadsorben untuk penurunan kadar besi (Fe) dengan sistem batch*.

- Jaishankar, M., Tseten, T., Anbalagan, N., Mathew, B. B., & Beeregowda, K. N. (2014). Toxicity, mechanism and health effects of some heavy metals. *Interdisciplinary Toxicology*, 7(2), 60–72. <https://doi.org/10.2478/intox-2014-0009>
- Karimi Darvanjooghi, M. H., Davoodi, S. M., Dursun, A. Y., Ehsani, M. R., Karimpour, I., & Ameri, E. (2018). Application of treated eggplant peel as a low-cost adsorbent for water treatment toward elimination of Pb<sup>2+</sup>: Kinetic modeling and isotherm study. In *Adsorption Science and Technology* (Vol. 36, Nomor 3–4). <https://doi.org/10.1177/0263617417753784>
- Karimuna, S. R. (2025). *Jurnal Kendari Kesehatan Masyarakat ( JKKM ) Vol . 4 No . 2 Tahun 2025 Analisis Kadar Timbal ( Pb ) pada Air Sumur Gali di Sekitar Bekas Tempat Pembuangan Akhir ( TPA ) Sampah Punggolaka Kota Kendari Analysis of Lead ( Pb ) Levels in Dug Well Water Around*. 4(2).
- Kementerian Kesehatan. (2023). Permenkes No. 2 Tahun 2023. *Kemenkes Republik Indonesia*, (55), 1–175.
- Keon, D. Y., Yulianti, I. M., & Jati, W. N. (2018). Kemampuan Selulosa Daun Mahkota Nanas (*Ananas comosus*) Sebagai Bioadsorben Logam Tembaga (Cu). 3 (2), 70–78.
- Keon, D. Y., Yulianti, I. M., & Jati, W. N. (2018). Ability of Cellulose by Pineapple Crown Leaf (*Ananas comosus*) Cellulose as Bio-adsorbent of Heavy Metal Copper (Cu) Desinyata. *Biota : Jurnal Ilmiah Ilmu-Ilmu Hayati*, 3(5), 70–78.
- Mangold, J. B. (2024). *Analisis Geokimia Sumber Pencemar Timbal Pada Tanah Dan Air Tanah Di Pesisir Parangtritis, Yogyakarta, Indonesia*.
- McKay, G., Blair, H. S., & Gardner, J. R. (1982). Adsorption of dyes on chitin. I. Equilibrium studies. *Journal of Applied Polymer Science*, 27(8), 3053,3055. <https://doi.org/10.1002/app.1982.070270827>
- Mohsin, T. (2022). Effects of lead on human health: a review. *Journal of Environmental and Analytical Toxicology*, 12(6), 665. <https://doi.org/10.37421/2161-0525.2022.12.665>
- Montgomery, D. C., Peck, E. A., & Vinning, G. G. (2024). *Linear Regression Analysis* (J. L. T. David J. Balding, Noel A. C. Cressie, Garrett M. Fitzmaurice, Harvey Goldstein, Iain M. Johnstone, Geert Molenberghs, David W. Scott, Adrian F. M. Smith, Ruey S. Tsay, Sanford Weisberg Editors Emeriti: Vic Barnett, J. Stuart Hunter, Joseph B. Kadane, Ed.; Fifth Edit, Vol. 2).
- Munira, M., Arman, M., Syarif, T., Gusnawati, & Darnengsih, D. (2022). Karakteristik dan Modifikasi Karbon Aktif dari Mahkota Nanas Sebagai Bioadsorben. *Jurnal of chemical Process Engineering*, 7. <https://doi.org/https://doi.org/10.5281/zenodo.7678457>
- Mutalib, M. A., Rahman, M. A., Othman, M. H. D., Ismail, A. F., & Jaafar, J. (2017). Chapter 9 - Scanning Electron Microscopy & SEM; and Energy-Dispersive X-Ray & EDX; Spectroscopy. In *Membrane*

*Characterization*. Elsevier B.V. <https://doi.org/10.1016/B978-0-444-63776-5.00009-7>

- Naga Babu, A., Reddy, D. S., Kumar, G. S., Ravindhranath, K., & Krishna Mohan, G. V. (2018). Removal of lead and fluoride from contaminated water using exhausted coffee grounds based bio-sorbent. *Journal of Environmental Management*, 218, 602–612. <https://doi.org/10.1016/j.jenvman.2018.04.091>
- Nieva, A. D., Avena, L. G. S., Pascual, M. A. M., & K.R.S. Pamintuan. (2020). *Characterization of Powdered Pineapple ( Ananas comosus ) Crown Leaves as Adsorbent for Crystal Violet in Aqueous Solutions* *Characterization of Powdered Pineapple ( Ananas comosus ) Crown Leaves as Adsorbent for Crystal Violet in Aqueous Solutions*. <https://doi.org/10.1088/1755-1315/563/1/012010>
- Nurhidayati, I., Mellisani, B., Puspita, F., & Rahmawati Putri, F. A. (2022). Penentuan Isoterm dan Kinetika Adsorpsi Ion Besi oleh Sedimen Sebagai Adsorben. *Warta Akab*, 43(2). <https://doi.org/10.55075/wa.v46i1.98>
- Octaviani, V., Kadaria, U., & Asbanu, G. C. (2024). *PEMANFAATAN DAUN NANAS SEBAGAI BIOSORBEN UNTUK PERBAIKAN KUALITAS AIR GAMBUT*. 12(2), 458–465.
- Othman, Z. A. A., Hashem, A., & Habila, M. A. (2011). Kinetic, equilibrium and thermodynamic studies of cadmium (II) adsorption by modified agricultural wastes. *Molecules*, 16(12), 10443–10456. <https://doi.org/10.3390/molecules161210443>
- Oyewo, O. A., Okpuwhara, R. O., Letwaba, J. L., & Makgato, S. S. (2025a). Synthesis, characterization and application of activated pineapple crown leaf-based adsorbent in vanadium and cadmium ions removal from water. *Discover Chemistry*, 2(1). <https://doi.org/10.1007/s44371-025-00371-0>
- Oyewo, O. A., Okpuwhara, R. O., Letwaba, J. L., & Makgato, S. S. (2025b). *Synthesis , characterization and application of activated pineapple crown leaf-based adsorbent in vanadium and cadmium ions removal from water*.
- Patel, H. (2019). Fixed-bed column adsorption study: a comprehensive review. *Applied Water Science*, 9(3), 1–17. <https://doi.org/10.1007/s13201-019-0927-7>
- Prof.Dr. Kuswandi dkk. (2017). *Buku Logam Berat dan kesehatan*. 1–131.
- Putri, M. S. D., Awitdrus, & Manullang, R. K. (2020). *Penyerapan Logam Berat Pb dan Cu Menggunakan Karbon Aktif Berbasis Mahkota Nanas dengan Variasi Konsentrasi Kalium Hidroksida*. 17(1), 30–34.
- Raj, K., & Das, A. P. (2023). Lead pollution: Impact on environment and human health and approach for a sustainable solution. *Environmental Chemistry and Ecotoxicology*, 5(December 2022), 79–85. <https://doi.org/10.1016/j.enceco.2023.02.001>
- Ravindiran, G., Rajamanickam, S., & Sivarethinamohan, S. (2023). *A Review of the Status , Effects , Prevention , and Remediation of*. <https://doi.org/10.3390/w15203662>

- Razali, N. M., & Wah, Y. B. (2011). Power comparisons of Shapiro-Wilk , Kolmogorov-Smirnov, Lilliefors and Anderson-Darling tests. *Journal of Statistical Modeling and Analytics*, 2(1), 21–33.  
<https://doi.org/doi:10.1515/bile-2015-0008>
- Reynolds, T. D., & Richards, P. A. (1996). Unit operations and processes in environmental engineering 2nd ed. In *PWS series in engineering*.
- Rizqiati, H., Nugraheni, A., Susanti, S., Fatmawati, L., Nuryanto, N., & Arifan, F. (2021). Characteristic of isolated crude bromelain extract from cayenne pineapple. *Science agricultural*, 5(October), 72–78.
- Sahabuddin, E. S. (2015). Filosofi Cemaran Air. In B. K. (Ed.), *Filosofi Cemaran Air* (Cetakan Pe). PTK PRESS [bagian penerbitan Jurusan PTK FKIP Undana].
- Silalahi, S. A. (2022). Efektivitas Mahkota Nanas Sebagai Adsorben Menggunakan Aktivator KOH Untuk Penyisihan Air Limbah Industri Karet. In *Tugas Akhir Program Studi Teknik Lingkungan, Universitas Batanghari Jambi*.
- Silva, A. I. C., Paranha, G., Maia, L. S., Daniella, R., Andressa, I. C., Paranha, G., Maia, L. S., & Mulinari, D. R. (2021). *Development of Activated Carbon from Pineapple Crown Wastes and Its Potential Use for Removal of Methylene Blue Development of Activated Carbon from Pineapple Crown Wastes and Its Potential Use for Removal of Methylene Blue*.  
<https://doi.org/10.1080/15440478.2021.1875365>
- Sirajuddin, Harjanto, & Trijuniarti, P. (2019). *Characteristics of Activated Carbon From Pineapple Crown Waste*. 2019(L), 22–27.
- Siregar, P. H. (2017). Pemanfaatan Limbah Mahkota Nanas (Ananas Comosus (L.) Merr) Sebagai Karbon Aktif Sebagai Sumber Belajar Pembelajaran Koloid di Sekolah Menengah Kejuruan Negeri 2. In *UIN Suka Riau*.
- Sudarmanto, H., Farpina, E., & Kusumawati, N. (2023). Analisis Kadar Timbal pada Air Sumur Petani Di Desa Sumber Sari Kecamatan Loa Kulu. *Jurna; Kesehatan Tambusai*, 4(3), 3463–3472.
- Suryadi Ismadji. (2021). *Adsorpsi Pada Fase Cair*. <http://www.ukwms.ac.id/>
- Susilawaty, A. D. (2022). *5.3 Bukti kinerja Penyakit.pdf*.
- Tchobanoglous, G., P.E., J. H. B., Howe, K. J., W, D., R. Rhodes Trussell Ph.D., & Crittenden, J. C. (2012). *MWH's Water Treatment Principles and Design* (Third Edit). John Wiley & Sons, Inc.
- Tóth, J. (2001). *Adsorption Theory, Modeling, and Analysis*.
- Umar1, H. Z., Rahmahwati1, C. A., & Samsul2, S. A. and S. (2019). *Effect of particles size adsorbent of sugarcane bagasse and contact time on removal Pb ( II ) ions in wastewater by using vertical series column method Effect of particles size adsorbent of sugarcane bagasse and contact time on removal Pb ( II ) ions in w. (Ii)*. <https://doi.org/10.1088/1742-6596/1375/1/012024>
- Vimala, R., & Das, N. (2009). Biosorption of cadmium (II) and lead (II) from

aqueous solutions using mushrooms: A comparative study. *Journal of Hazardous Materials*, 168(1), 376–382.  
<https://doi.org/10.1016/j.jhazmat.2009.02.062>

Vivian, Z. T., Ping, T. Y., & Abdullah, A. H. (2019). Removal of pb(II) from aqueous solution by pineapple plant stem. *Malaysian Journal of Analytical Sciences*, 23(2), 219–228. <https://doi.org/10.17576/mjas-2019-2302-06>

Wang, Q., Wang, Y., Yang, Z., Han, W., Yuan, L., Zhang, L., & Huang, X. (2022). Efficient removal of Pb ( II ) and Cd ( II ) from aqueous solutions by mango seed biosorbent. 11(February).

Widiyanto, A. F., Yuniarno, S., & Kuswanto. (2015). Polusi Air Tanah Akibat Limbah Industri dan Limbah Rumah Tangga. *Jurnal Kesehatan Masyarakat*, 10(2), 246–254. <http://journal.unnes.ac.id/nju/index.php/kemas%0APOLUSI>

Yuvaraja, G., Krishnaiah, N., Subbaiah, M. V., & Krishnaiah, A. (2014). Biosorption of Pb(II) from aqueous solution by Solanum melongena leaf powder as a low-cost biosorbent prepared from agricultural waste. *Colloids and Surfaces B: Biointerfaces*, 114, 75–81.  
<https://doi.org/10.1016/j.colsurfb.2013.09.039>

