



## DAFTAR PUSTAKA

- [1] A. D. Handoko and E. Sanjaya, “Characteristics and genesis of Rare Earth Element (REE) in western Indonesia,” *IOP Conf. Ser.: Earth Environ. Sci.*, vol. 118, p. 012077, Feb. 2018, doi: 10.1088/1755-1315/118/1/012077.
- [2] A. Golev, M. Scott, P. D. Erskine, S. H. Ali, and G. R. Ballantyne, “Rare earths supply chains: Current status, constraints and opportunities,” *Resources Policy*, vol. 41, pp. 52–59, Sep. 2014, doi: 10.1016/j.resourpol.2014.03.004.
- [3] K. A. Gschneidner, “The rare earth crisis and the critical materials institute's” *Lowa State University - 1<sup>st</sup> European Rare Earth Resources Conference*, pp. 11, Jul. 2014.
- [4] V. Balaram, “Rare earth elements: A review of applications, occurrence, exploration, analysis, recycling, and environmental impact,” *Geoscience Frontiers*, vol. 10, no. 4, pp. 1285–1303, Jul. 2019, doi: 10.1016/j.gsf.2018.12.005.
- [5] M. Simoni, E. P. Kuhn, L. S. Morf, R. Kuendig, and F. Adam, “Urban mining as a contribution to the resource strategy of the Canton of Zurich,” *Waste Management*, vol. 45, pp. 10–21, Nov. 2015, doi: 10.1016/j.wasman.2015.06.045.
- [6] B. Zhou, Z. Li, and C. Chen, “Global Potential of Rare Earth Resources and Rare Earth Demand from Clean Technologies,” *Minerals*, vol. 7, no. 11, p. 203, Oct. 2017, doi: 10.3390/min7110203.
- [7] S. Kumar, “Rare Earth Metals Market Size, Share & Trends Analysis Report by Product (Cerium, Dysposium, Erboum), by Application (Magnets, Catalysts), by Region, And Segment Forecasts, 2019-2025,” Grand View Research, Market Analysis Report 978-1-68038-075-0, 2020. Accessed: Apr. 04, 2023. [Online]. Available: <https://www.grandviewresearch.com/industry-analysis/rare-earth-elements-market>





- [8] T. Thriveni, Y. Jegal, and J. Ahn, “Occurrence and Distribution of Rare Earths with Different Coal Power Plants Ash and Recovery of Critical Rare Earths from Coal Ash for Simultaneous Utilization of CO<sub>2</sub>” *World of Coal Ash (WOMCA) Conference in Nashville*, May. 2015. Accessed: Jul. 2023. [Online]. Available: <https://worldofcoalash.org>
- [9] R. R. Kashurin, S. A. Gerasev, T. E. Litvinova, and I. T. Zhadovskiy, “Prospective recovery of rare earth elements from waste,” *J. Phys.: Conf. Ser.*, vol. 1679, no. 5, p. 052070, Nov. 2020, doi: 10.1088/1742-6596/1679/5/052070.
- [10] S. S. Alterary and N. H. Marei, “Fly ash properties, characterization, and applications: A review,” *Journal of King Saud University - Science*, vol. 33, no. 6, p. 101536, Sep. 2021, doi: 10.1016/j.jksus.2021.101536.
- [11] F. Anggara, D. H. Amijaya, A. Harijoko, T. N. Tambaria, A. A. Sahri, and Z. A. N. Asa, “Rare earth element and yttrium content of coal in the Banko coalfield, South Sumatra Basin, Indonesia: Contributions from tonstein layers,” *International Journal of Coal Geology*, vol. 196, pp. 159–172, Aug. 2018, doi: 10.1016/j.coal.2018.07.006.
- [12] R. Djamaruddin, “Laporan Kinerja 2022 Direktorat Jenderal Mineral dan Batubara, Kementerian ESDM” Jakarta:BSrE, 2022.
- [13] R. K. Taggart, J. C. Hower, and H. Hsu-Kim, “Effects of roasting additives and leaching parameters on the extraction of rare earth elements from coal fly ash,” *International Journal of Coal Geology*, vol. 196, pp. 106–114, Aug. 2018, doi: 10.1016/j.coal.2018.06.021.
- [14] J. Pan, B. V. Hassas, M. Rezaee, C. Zhou, and S. V. Pisupati, “Recovery of rare earth elements from coal fly ash through sequential chemical roasting, water leaching, and acid leaching processes,” *Journal of Cleaner Production*, vol. 284, p. 124725, Feb. 2021, doi: 10.1016/j.jclepro.2020.124725.
- [15] S. Cao *et al.*, “Study on Influence Factors of Leaching of Rare Earth Elements from Coal Fly Ash,” *Energy Fuels*, vol. 32, no. 7, pp. 8000–8005, Jul. 2018, doi: 10.1021/acs.energyfuels.8b01316.





- [16] E. B. Leksono and A. Abidin, “Pemanfaatan Limbah Fly Ash Batubara sebagai Koagulan dengan Konsep Reverse Logistics,” *INTECH*, vol. 7, no. 1, pp. 39–44, Apr. 2021, doi: 10.30656/intech.v7i1.2736.
- [17] W. Rosita, “Pemungutan Logam Tanah Jarang dari Abu Layang Batubara Indonesia dengan Proses Sequential Leaching Menggunakan NaOH dan Asam,” *Disertasi Doktoral*. Universitas Gadjah Mada, Yogyakarta, 2021.
- [18] A. Kolker, C. Scott, J. C. Hower, J. A. Vazquez, C. L. Lopano, and S. Dai, “Distribution of rare earth elements in coal combustion fly ash, determined by SHRIMP-RG ion microprobe,” *International Journal of Coal Geology*, vol. 184, pp. 1–10, Nov. 2017, doi: 10.1016/j.coal.2017.10.002.
- [19] I. Wilińska and B. Pacewska, “Comparative investigation of reactivity of different kinds of fly ash in alkaline media,” *J Therm Anal Calorim*, vol. 138, no. 6, pp. 3857–3872, Dec. 2019, doi: 10.1007/s10973-019-08296-4.
- [20] E. Roth *et al.*, “Distributions and Extraction of Rare Earth Elements from Coal and Coal By-Products” *World of Coal Ash (WOCA) Conference in Nashville*, May. 2017. Accessed: Jul. 2023. [Online]. Available: <https://worldofcoalash.org>.
- [21] M. Gergoric, C. Ravaux, B.-M. Steenari, F. Espegren, and T. Retegan, “Leaching and Recovery of Rare-Earth Elements from Neodymium Magnet Waste Using Organic Acids,” *Metals*, vol. 8, no. 9, p. 721, Sep. 2018, doi: 10.3390/met8090721.
- [22] G. Reisdörfer, D. Bertuol, and E. H. Tanabe, “Recovery of neodymium from the magnets of hard disk drives using organic acids,” *Minerals Engineering*, vol. 143, p. 105938, Nov. 2019, doi: 10.1016/j.mineng.2019.105938.
- [23] D. E. Lazo, L. G. Dyer, R. D. Alorro, and R. Browner, “Treatment of monazite by organic acids II: Rare earth dissolution and recovery,” *Hydrometallurgy*, vol. 179, pp. 94–99, Aug. 2018, doi: 10.1016/j.hydromet.2018.05.022.
- [24] P. N. Nesterenko and P. Jones, “Ion Exchange | Chelation Ion Chromatography,” in *Reference Module in Chemistry, Molecular Sciences*





and *Chemical Engineering*, Elsevier, 2018, p. B9780124095472144000. doi:  
10.1016/B978-0-12-409547-2.14455-5.

- [25] K. Araucz, A. Aurich, and D. Kołodyńska, “Novel multifunctional ion exchangers for metal ions removal in the presence of citric acid,” *Chemosphere*, vol. 251, p. 126331, Jul. 2020, doi: 10.1016/j.chemosphere.2020.126331.
- [26] S. Kurkinen, S. Virolainen, and T. Sainio, “Recovery of rare earth elements from phosphogypsum waste in resin-in-leach process by eluting with biodegradable complexing agents,” *Hydrometallurgy*, vol. 201, p. 105569, May 2021, doi: 10.1016/j.hydromet.2021.105569.
- [27] Y. M. Khawassek, A. A. Eliwa, E. S. A. Haggag, S. A. Omar, and S. M. Abdel-Wahab, “Adsorption of rare earth elements by strong acid cation exchange resin thermodynamics, characteristics and kinetics,” *SN Appl. Sci.*, vol. 1, no. 1, p. 51, Jan. 2019, doi: 10.1007/s42452-018-0051-6.
- [28] B. Bandrabur, R.-E. Tataru-F, L. Bulgariu, and G. Gutt, “Use of Strong Acid Resin Purolite C100E for Removing Permanent Hardness of Water - Factors Affecting Catonic Exchange Capacity,” *Waste Management*, vol. 3, pp. 295-304. 2012.
- [29] R. S. Blissett, N. Smalley, and N. A. Rowson, “An investigation into six coal fly ashes from the United Kingdom and Poland to evaluate rare earth element content,” *Fuel*, vol. 119, pp. 236–239, Mar. 2014, doi: 10.1016/j.fuel.2013.11.053.
- [30] N. Dushyantha *et al.*, “The story of rare earth elements (REEs): Occurrences, global distribution, genesis, geology, mineralogy and global production,” *Ore Geology Reviews*, vol. 122, p. 103521, Jul. 2020, doi: 10.1016/j.oregeorev.2020.103521.
- [31] R. Gunradi, A. Tampubolon, and B. Pardiato, *Potensi Logam Tanah Jarang di Indonesia*, vol. Vol 1. in 1, vol. Vol 1. Bandung: Pusat Sumber Daya Mineral, Batubara dan Panas Bumi Badan Geologi, 2019.
- [32] S. Jewell and M. Suzette, “Mineral Commodity Summaries 2015,” U.S. Geological Survey U.S. Reston: Virginia, 2015.





- [33] C. R. Ward, D. French, J. Jankowski, M. Dubikova, Z. Li, and K. W. Riley, “Element mobility from fresh and long-stored acidic fly ashes associated with an Australian power station,” *International Journal of Coal Geology*, vol. 80, no. 3–4, pp. 224–236, Dec. 2009, doi: 10.1016/j.coal.2009.09.001.
- [34] A. S. Meawad, D. Y. Bojinova, and Y. G. Pelovski, “An overview of metals recovery from thermal power plant solid wastes,” *Waste Management*, vol. 30, no. 12, pp. 2548–2559, Dec. 2010, doi: 10.1016/j.wasman.2010.07.010.
- [35] S. V. Vassilev and C. G. Vassileva, “A new approach for the classification of coal fly ashes based on their origin, composition, properties, and behaviour,” *Fuel*, vol. 86, no. 10–11, pp. 1490–1512, Jul. 2007, doi: 10.1016/j.fuel.2006.11.020.
- [36] S. Dai *et al.*, “Mineralogical and geochemical compositions of the coal in the Guanbanwusu Mine, Inner Mongolia, China: Further evidence for the existence of an Al (Ga and REE) ore deposit in the Jungar Coalfield,” *International Journal of Coal Geology*, vol. 98, pp. 10–40, Aug. 2012, doi: 10.1016/j.coal.2012.03.003.
- [37] J. C. Hower, “Petrographic examination of coal-combustion fly ash,” *International Journal of Coal Geology*, vol. 92, pp. 90–97, Mar. 2012, doi: 10.1016/j.coal.2011.12.012.
- [38] S. Dai *et al.*, “Abundances and distribution of minerals and elements in high-alumina coal fly ash from the Jungar Power Plant, Inner Mongolia, China,” *International Journal of Coal Geology*, vol. 81, no. 4, pp. 320–332, Apr. 2010, doi: 10.1016/j.coal.2009.03.005.
- [39] Godswill Megwai, “Kinetics of Alumina Leaching of Calcined Clay Using Acids (Chloric, nitric and sulphuric acids),” *Research Bachelor, Nnamdi Azikiwe University*, Awka, 2009, doi: 10.13140/RG.2.2.34170.18886.
- [40] L. Li *et al.*, “Sustainable Recovery of Cathode Materials from Spent Lithium-Ion Batteries Using Lactic Acid Leaching System,” *ACS Sustainable Chem. Eng.*, vol. 5, no. 6, pp. 5224–5233, Jun. 2017, doi: 10.1021/acssuschemeng.7b00571.





- [41] H. Manurung *et al.*, “Recovery of Rare Earth Elements and Yttrium from non-Magnetic Coal Fly Ash using Acetic Acid Solution,” *met. indonesia*, vol. 42, no. 1, p. 35, Jun. 2020, doi: 10.32423/jmi.2020.v42.35-42.
- [42] W. Zhang, A. Noble, X. Yang, and R. Honaker, “A Comprehensive Review of Rare Earth Elements Recovery from Coal-Related Materials,” *Minerals Review*, vol. 10, no. 451, pp.30, May. 2020.
- [43] R. Istinanda, “Presipitasi Logam Tanah Jarang dari Abu Terbang PLTU Rembang dengan Menggunakan Dinatrium Hidrogen Fosfat,” *Thesis Magister*. Universitas Gadjah Mada, Yogyakarta, 2021.
- [44] R. G. McDonald and B. I. Whittington, “Atmospheric acid leaching of nickel laterites review,” *Hydrometallurgy*, vol. 91, no. 1–4, pp. 35–55, Mar. 2008, doi: 10.1016/j.hydromet.2007.11.009.
- [45] K. Yan, Y. Guo, Z. Ma, Z. Zhao, and F. Cheng, “Quantitative analysis of crystalline and amorphous phases in pulverized coal fly ash based on the Rietveld method,” *Journal of Non-Crystalline Solids*, vol. 483, pp. 37–42, Mar. 2018, doi: 10.1016/j.jnoncrysol.2017.12.043.
- [46] M. Zabiszak, “Carboxyl groups of citric acid in the process of complex formation with bivalent and trivalent metal ions in biological systems,” *Journal of Inorganic Biochemistry*, vol. 182, pp. 37-47, 2018.
- [47] N. Ramzan, N. Feroze, M. Kazmi, M. Ashraf, and S. Hasan, “Performance analysis of cation and anion exchangers in water treatment plant: an industrial case study,” *Polish Journal of Chemical Technology*, vol. 14, no. 2, pp. 35–41, Jan. 2012, doi: 10.2478/v10026-012-0068-3.
- [48] S. Moran, *Engineering science of water treatment unit operations Chapter 4, An Applied Guide to Water and Effluent Treatment Plant Design.*, vol. 4, 20 vols. Butterworth-Heinemann, 2018. [Online]. Available: <https://doi.org/10.1016/B978-0-12-811309-7.00004-7>.
- [49] A. A. Elzoghby, “Kinetic and equilibrium studies for U(VI) and Cd(II) sorption from commercial phosphoric acid using C100H resin,” *J Radioanal Nucl Chem*, vol. 329, no. 2, pp. 899–911, Aug. 2021, doi: 10.1007/s10967-021-07832-7.





- [50] C. B. Boss and K. J. Fredeen, “Concepts, Instrumentation and Techniques in Inductively Coupled Plasma Optical Emission Spectrometry” 3<sup>rd</sup> edition, USA: Perkin Elmer, 2004.
- [51] L. N. Makmun, “Analisis Merkuri dalam Kosmestik Krim Sarang Burung Walet (*Collocalia Fuciphago*) yang Diperoleh Melalui Internet,” *Skripsi Sarjana. UIN Syarif Hidayatullah Jakarta*, 10/15.
- [52] X. Hou and B. T. Jones, “Inductively Coupled Plasma-Optical Emission Spectrometry,” in *Encyclopedia of Analytical Chemistry*, R. A. Meyers, Ed., Chichester, UK: John Wiley & Sons, Ltd, 2008, p. a5110.pub2. doi: 10.1002/9780470027318.a5110.pub2.
- [53] D. Zhu, Q. Chen, T. Qiu, G. Zhao, and X. Fang, “Optimization of rare earth carbonate reactive-crystallization process based on response surface method,” *Journal of Rare Earths*, vol. 39, no. 1, pp. 98–104, Jan. 2021, doi: 10.1016/j.jre.2020.03.011.
- [54] F. Chen *et al.*, “Investigation of colloidal biogenic sulfur flocculation: Optimization using response surface analysis,” *Journal of Environmental Sciences*, vol. 42, pp. 227–235, Apr. 2016, doi: 10.1016/j.jes.2015.07.007.
- [55] S. Oza, P. Kodgire, and S. S. Kachhwaha, “Analysis of RSM Method for Optimization of Ultrasound-Assisted KOH Catalyzed Biodiesel Production from Waste Cotton-Seed Cooking Oil,” in *Applied Mathematical Modeling and Analysis in Renewable Energy*, 1st ed. Boca Raton: CRC Press, 2021, pp. 132–148. doi: 10.1201/9781003159124-9.
- [56] S. F. Sawyer, “Analysis of Variance: The Fundamental Concepts,” *Journal of Manual & Manipulative Therapy*, vol. 17, no. 2, pp. 27E-38E, Apr. 2009, doi: 10.1179/jmt.2009.17.2.27E.
- [57] A. Efendi, D. Djumhariyanto, and M. E. Ramadhan, “Analisa RSM (*Respon Surfcae Methode*) dengan Variasi *Wire Speed*, *Interpulse*, dan Arus Terhadap *Material Removal Rate* dan Kekasaran Permukaan pada Proses *Wire-EDM*” *Jurnal Universitas Jember*, 2020, doi: 10.19184/ROTOR.V12I2.16448.
- [58] S. Virolainen, E. Repo, and T. Sainio, “Recovering rare earth elements from phosphogypsum using a resin-in-leach process: Selection of resin, leaching





- agent, and eluent," *Hydrometallurgy*, vol. 189, p. 105125, Nov. 2019, doi: 10.1016/j.hydromet.2019.105125.
- [59] B. Ji, Q. Li, and W. Zhang, "Leaching recovery of rare earth elements from the calcination product of a coal coarse refuse using organic acids," *Journal of Rare Earths*, vol. 40, no. 2, pp. 318–327, Feb. 2022, doi: 10.1016/j.jre.2020.11.021.
- [60] I. Rahayu, *Praktis Belajar Kimia*. Jakarta: Visindo Media Persada, 2007.
- [61] S. D. Suryohendrasworo, "Penyisihan Kontaminan dari Air Limbah Hasil Daur Ulang Baterai LiFePO<sub>4</sub> (LFP) Menggunakan Penukar Ion Resin Kation Amberlite HPR1100 Na dan Resin Anion Dowex Marathon A," *J. Rek. Pros.*, vol. 15, no. 2, p. 231, Dec. 2021, doi: 10.22146/jrekpros.69847.

