

DAFTAR PUSTAKA

- Achmadi, A., 2009, *Kajian Beton Mutu Tinggi Menggunakan Slag Sebagai Agregat Halus dan Agregat Kasar dengan Aplikasi Superplasticizer dan Silicafume*, Universitas Diponegoro, Semarang.
- Adamson, A.W., 1990, *Physical Chemistry of Surface*, 5th Ed., John Wiley and Son Inc., New York.
- Addai, M.K., 2014, Removal and Recovery of Heavy Metals by Nickel Smelter Slag, *Thesis*, The University of Western Ontario, Ontario.
- Arini, T.D., 2015, Adsorpsi Simultan Ion Logam Zn(II) dan Ca(II) pada Abu Dasar Batubara Terimobilisasi Ditizon, *Skripsi*, Universitas Gadjah Mada, Yogyakarta.
- Atar, N., Olgun, A., and Wang, S., 2012, Adsorption of Cadmium(II) and Zinc(II) on Boron Enrichment Process Waste in Aqueous Solutions: Batch and Fixed-bed System Studies, *Chem. Eng. J.*, 192(3), 1–7.
- Atkins, 1999, *Kimia Fisika*, Jilid 1 Edisi Keempat, Erlangga, Jakarta.
- Basset, J., Denney, R.C., Jeffery, G.H., and Mendham, J., 1989, *Vogel's Text Book of Quantitative Chemical Analysis*, 5thb, Longman Group, United Kingdom.
- Beh, C.L., Chuah, T.G., Nourozi, M.N., and Chong, T.S.Y., 2012, Removal of Heavy Metals from Steel Making Waste Water by Using Electric Arc Furnace Slag, *E-J. Chem.*, 9(4), 2557-2564.
- Bernardo, M., Mendes, S., Lapa, N., Gonçalves, M., Mendes, B., Pinto, F., and Fonseca, I., 2013, Removal of Lead (Pb²⁺) from Aqueous Medium by Using Chars, *J. Colloid And Interface Sci.*, 409, 158–165.
- Bhattacharya, A. K., Mandal, S. N., and Das, S. K., 2006, Adsorption of Zn(II) from Aqueous Solution by Using Different Adsorbents, *J. Chem. Eng.*, 123, 43–51.
- Brower, J.R., 1993, *Inorganic Chemistry*, Brooks Cole Publishing, California.
- Chen, X., Hou, W.H., Song, G.L., and Wang, Q.H., 2011, Adsorption of Cu, Cd, Zn, and Pb Ions from Aqueous Solutions by Electric Arc Furnace Slag and the Effects of pH and Grain Size, *Chem. Biochem. Eng.*, 25 (1) 105–114.
- Ding, P., Huang, K., Li, G., Liu, Y., and Zeng, W., 2014, Kinetic of Adsorption of Zn(II) Ion on Chitosan Derivatives, *J. Biol. Macromol.*, 39, 222-227.
- Dogra, S.K., 1990, *Kimia Fisik dan Soal-soal*, 1st Ed., Universitas Indonesia Press, Jakarta.

- Francisca, F.M., Glatstein, D.A., Francisca, F.M., and Glatstein, D.A., 2017, Influence of pH on Cadmium, Copper, and Lead Removal from Wastewater by Steel Slag, *Desalination and Water Treatment*, 57, 21610-21618.
- Fu, F., and Wang, Q., 2011, Removal of Heavy Metal Ions from Wastewaters, *J. Env. Management*, 92(3), 407-418.
- Fuadi, I., 2015, Adsorpsi Simultan Ion Logam Ni(II) dan Mg(II) pada Abu Dasar Batubara Terlapis Ditizon, *Skripsi*, Universitas Gadjah Mada, Yogyakarta.
- Gao, H., Song, Z., Zhang, W., Yang, X., Wang, X., and Wang, D., 2017, Synthesis of Highly Effective Absorbents with Waste Quenching Blast Furnace Slag to Remove Methyl Orange from Aqueous Solution, *J. Envir. Sci.*, 53, 68-77.
- Guerra, D.L., and Airoidi, C., 2008, Kinetics and Modified Clay Thermodynamic from the Brazilian Amazon Region for Lead Removal, *J. hazard. Maters.*, 159, 412-419.
- Hameed, B.H., Din, A.T.M., and Ahmad, A.L., 2007, Adsorption of Methylen Blue onto Bamboo based Activated Carbon Kinetics and Equilibrium Studies, *J. Hazard Matter.*, 141(3), 819-825.
- Handayani, T., 2014, Adsorpsi Ion Pb(II) dan Cd(II) pada Abu Dasar Batubara Terimobilisasi Ditizon, *Tesis*, Universitas Gadjah Mada, Yogyakarta.
- Ho, Y.S., and McKay, G., 1999, Pseudo-second Order Model for Sorption Processes, *Process Biochem.*, 34(5), 451-465.
- Huang, J., Yuan, F., Zeng, G., Li, X., and Gu, Y., 2017, Chemosphere Influence of pH on Heavy Metal Speciation and Removal from Wastewater using Micellar-enhanced Ultrafiltration, *Chemosphere*, 173, 199-206.
- Itodo, A.U., and Itodo, H.U., 2010, Sorption Energies Estimation using Dubinin-Radushkevich and Temkin Adsorption Isotherms, *Life Scie. J.*, 7(4), 31-39.
- Jadwiga, C., Witold, S., Elzbieta, S., Jakub, Maria, Leon, 2013, Properties of Ditizon Sorbent and its Application to Trace Metals Separation for AAS Determination, *J. Nucl. Radiochem. Sci.*, 1, 76-79.
- Josowidagdo, L., 2013, *Pemanfaatan Limbah Terak: Studi Kasus di Pabrik Ferro-Nikel, Pomalaa, Sulawesi Tenggara*, Ubinus, Jakarta.
- Kenawy, I.M., Hafez, M.A.H., Ismail, M.A., and Hashem, M.A., 2018, Adsorption of Cu(II), Cd(II), Hg(II), Pb(II) and Zn(II) from Aqueous Single Metal Solutions by Guanyl-Modified Cellulose, *J. Bio. Mac.*, 107, 1538-1549.

- Kim, K., Asaoka, S., Yamamoto, T., Hayakawa, S., Takeda, K., Katayama, M., and Onoue, T., 2012, Mechanisms of Hydrogen Sulfide Removal with Steel Making Slag, *Environ. Sci. Tech.*, 46, 10169-10174.
- Lang, L., Chiu, K., and Lang, Q., 2008, Spectrophotometric Deterination of Lead, *Pharm. Tech.*, 32, 74-83.
- Largitte, L., and Pasquier, R., 2016, Chemical Engineering Research and Design A Review of the Kinetics Adsorption Models and Their Application to the Adsorption of Lead by an Activated Carbon, *Chem. Eng. Research and Design*, 109, 495–504.
- Li, G., Wang, B., Sun, Q., Qiang, W., and Han, Y., 2017, Microporous and Mesoporous Materials Adsorption of Lead Ion on Amino-functionalized fly Ash Based SBA-15 Mesoporous Molecular Sieves Prepared via Two-step Hydrothermal Method, *Microporous and Mesoporous Mater.*, 252, 105-115.
- Lin, L., and Yu, Y., 2006, Application of Modified Nickel Slag Adsorbent on the Removal of Pb^{2+} and Cu^{2+} from Aqueous Solution, *Chinese J. Struct. Chem.*, 35(6), 879-888.
- Liu, S., Gao, J., Yang, Y., Yang, Y., and Ye, Z., 2010, Adsorption Intrinsic Kinetics and Isotherms of Lead Ions on Steel Slag, *Sagepub*, 173, 558–562.
- Mahmoud, M.E., Osman, M.M., Hafez, O.F., Hegazi, A.H., and Elmelegy, E., 2010, Removal and Preconcentration of Lead(II) and other Heavy Metals from Water by Alumina Adsorbents Developed by Surface-adsorbed-ditizon. *DES*, 251(1–3), 123–130.
- Marczhenko, Z., 1996, *Separation and Spectrophotometric Determination of Elements*, John Willey and Sons, Columbia.
- Mihailova, I., Dimitrova, S., and Mehandjiev, D., 2013, Effect of the Thermal Treatment on the Pb(II) Adsorption Ability of Blast Furnace Slag, *J. Chem. Tech. and Metallurgy*, 48(1), 72–79.
- Mishra, I.M., Wasewar, K.L., Atif, M., and Prasad, B., 2009, Batch adsorption of zinc on tea factory waste, *DES*, 244(1–3), 66–71.
- Mubarok, M.Z., Yudiarto, A., 2017, Synthesis of Magnesium Oxide from Ferronickel Smelting Slag Through Hydrochloric Acid Leaching-Precipitation and Calcination, *The Minerals, Metals & Mater. Soc.*, 247-257.
- Mudasir, M., Karelius, K., Aprilita, N.H., Wahyuni, E.T., 2016, Adsorption of Mercury (II) on Ditizon-immobilized Natural Zeolite, *J. Environ. Chem. Eng.*, 4, 1839–1849.

- Mudasir, M., Maryanti, D., Pramiyanti, G., and Roto, R., 2007, Re-concentration Study of Pb(II) and Cd(II) from Aqueous Solution Using Silica Gel Loaded with Ditizon, *J. Ion Exchange*, 18(4), 516-517.
- Mudasir, M., Siswanta, D., 2007, Adsorption Characteristics of Pb(II) and Cd(II) Ions on Ditizon-loaded Natural Zeolite, *J. Ion Exchange*, 18(4), 418-423.
- Nehrenheim, E., and Gustafsson, J.P., 2008, Kinetic Sorption Modelling of Cu, Ni, Zn, Pb and Cr Ions to Pine Bark and Blast Furnace Slag by Using Batch Experiments, *Bioresource Tech.*, 99(6), 1571–1577.
- Nguyen, T.A.H., Ngo, H.H., Guo, W.S., Zhang, J., Liang, S., Yue, Q.Y., and Nguyen, T.V., 2013, Bioresource Technology Applicability of Agricultural Waste and by Products for Adsorptive Removal of Heavy Metals from Wastewater, *Bioresource Tech.*, 148, 574–585.
- Oluwasola, E.A., Hainin, M.R., and Aziz, M.M.A., 2014, Characteristics and Utilization of Steel Slag in Road Construction. *J. Tech. (Sci. and Eng.)*, 70(7), 117–123.
- Oscik, J., 1982, *Adsorption*, John Willan and Sons, New York.
- Papirer, E., 2001, *Adsorptionon of Silica Surface*, Marcel Dekker Inc, New York.
- Park, S.M., Jang, J.G., Lee, N.K., and Lee, H.K, 2016, Cement and Concrete Research Physicochemical properties of binder gel in alkali-activated fly ash/slag exposed to high temperatures, *Cement and Concrete Research*, 89, 72–79.
- Pearson, R.G., 1963, Hard and Soft Bases, *J. Am. Chem. Soc.*, 85(22), 3533-3539.
- Prasetyo, M.D., and Nursyamsi, 2015, Pengaruh Kombinasi Slag dan Fly Ash Terhadap Beton Ringan dengan Penambahan Serat Baja, *J.T.S.*, Universitas Sumatra Utara.
- Raharjo, G., Tahir, I., and Wahyuni, E.T., 2008, Immobilization of Ditizon onto Chitin Isolated from Prawn Seawater Shells (*P. merguensis*) and its Preliminary Study for the Adsorption of Cd(II) Ion, *J. Phys. Sci.*, 19(1), 63–78.
- Reeder, R.J., Schoonen, M.A.A., and Lanzirotti, A., 2006, Metal Speciation and its Role in Bioaccessibility and Bioavailability, *Min. and Geochem.*, 64(1), 59-113.
- Repo, E., Warchol, J.K., Westholm, L.H., and Silanppa, M., 2015, Steel Slag as a Low Cost Sorbent for Metal Removal in the Presence of Chelating Agents, *JIEC*, 27, 115–125.

- Reza, M, 2008, Absorption of Lead Ions by Various Types of Steel Slag, *Iran. J. Chem. Eng.*, 27(3), 69–75.
- Rohmani, 2011, Preconcentration Of Copper With Solid Phase Extration and its Determination by Flame Atomic Absortion Spectrometry, *E-J. Chem.*, 4(5), 878-883.
- Salih, B., Denizli, A., Kavakli, C., Say, R., Pişkin, E., 1998, Adsorption of Heavy Metal Ions onto Ditizon-anchored Poly (EGDMA-HEMA) Microbeads, *Talanta*, 46(5), 1205-1213.
- Setiawan, K.N.S., Achmadi, T., and Lazuardi, S.D., 2018, Analisis Skala Penambangan Mineral dan Pengangkutan (Studi Kasus: Angkutan Nikel di Sulawesi Tenggara), *J.Tek. ITS*, 7(1), 43-48.
- Sharma, S.K., Pandey, P.K., and Sambhi, S., 2015, Removal of lead (II) from waste water on zeolite-NaX., *Biochemi. Pharm.*, 3(4), 2604–2610.
- Shirzadi, H., and Ejhieh, A.N., 2017, An Efficient Modified Zeolite for Simultaneous Removal of Pb(II) and Hg(II) from aqueous Solution, *J. Mol. Liq.*, 230, 221–229.
- Srivastava, S.K., Gupta, V.K., and Mohan, D., 1997, Removal of Lead and Chromium by Activated Slag a Blast-Furnace Waste, *J. Env. Eng.*, 123(5), 461-468.
- Stumm, B.W., 1993, Water Endangered Ecosystem: Assessment of Chemical pollution 3, *J.Environt. Eng.*, 118(4), 466–476.
- Syakirin, M., Mohd, F., and Nurjaliah, S., 2015, Adsorption of Manganese in Aqueous Solution by Steel Slag, *Procedia Environ. Sci.*, 30, 145–150.
- Wang, L., and Lin, C., 2008, Adsorption of Lead(II) Ion from Aqueous Solution Using Rice Hull Ash, *Ind. Eng. Chem. Res.*, 47 (14) 4891–4897.
- White, W.E., 1925, Ditizon as an Analytical Reagent, *J. Chem. Ed.*, 2, 269-273.
- Wu, Q., You, R., Clark, M., and Yu, Y., 2014, Applied Surface Science Pb(II) Removal from Aqueous Solution by a Low Cost Adsorbent Dry Desulfurization Slag, *Applied Surf. Sci.*, 314, 129–137.
- Xue, Y., Hou, H., and Zhu, S., 2009, Competitive Adsorption of Copper (II), Cadmium(II), Lead(II) and Zinc(II) onto Basic Oxygen Furnace Slag, *J. Hazard. Mater.*, 162, 391–401.
- Yahya, M., 2013, Pemanfaatan Limbah Industri Baja (Blast Furnace Iron Slag) sebagai Bahan Bangunan Studi Kasus: PT. Barawaja Makassar, *Prosiding Temu Ilmiah IPLBI*, E11-E17.



- Yu, H., Song, H., and Chen, M., 2011, Ditizon Immobilized Silicagel on-line Preconcentration of Trace Copper with Detection by Flame Atomic Absorption Spectrometry, *Talanta*, 85, 625-30.
- Yu, Y., Wu, Q., You, R., and Clark, M., 2014, Applied Surface Science Pb(II) Removal from Aqueous Solution by a Low-cost Adsorbent Dry Desulfurization Slag, *Applied Surface Sci.*, 314, 129–137.
- Zahar, M.S.M., Kusin, F.M., and Muhammad, S.N., 2015, Adsorption of Manganese in Aqueous Solution by Steel Slag, *Procedia Environ. Sci.*, 30, 145– 150.
- Zhang, J.X., and Qu, L.L., 2013, Kinetic, Isoterm, and Tehrmodynamic Studies of the Adsorption of Crystal Violet by Activated Carbon from Peanut Shells, *Water Sci. Tech.*, 67, 733-744.
- Zhou, Y., and Haynes, R.J., 2010, Sorption of Heavy Metals by Inorganic and Organic Components of Solid Wastes: Significance to Use of Wastes as Low-cost Adsorbents and Immobilizing Agents. *Critical Reviews in Environ. Sci. Tec.*, 40(11), 909-977.
- Zhu, Y., Hu, J., and Wang, J., 2012, Competitive Adsorption of Pb(II), Cu(II) and Zn(II) Onto Xanthate-modified Magnetic Chitosan, *J. Hazard. Mater.*, 221–222, 155–161.