

## DAFTAR PUSTAKA

- Adamczuk, A. and Kolodynska, D., 2015, Equilibrium, thermodynamic and kinetic studies on removal of chromium, copper, zinc and arsenic from aqueous solutions onto fly ash coated by chitosan, *Chem. Eng. J.*, 247, 200-212.
- Adamson, A.W., 1990, *Physical Chemistry of Surface*, Fifth Edition, John Wiley and Sons Inc., New York.
- Adebowale, I.E. Unuabonah, B.I., Olu-Owolabi, 2006, The effect of some operating variables on the adsorption of lead and cadmium ions on kaolinite clay, *J. Hazard. Mater.*, 134, 130-139.
- Ahmaruzzaman, 2010, A review on the utilization of fly ash, *Prog. Energy Combust. Sci.*, 36, 327-363.
- Anwar, C., 2017, Adsorpsi simultan ion Cd(II) dan Mg(II) pada abu dasar batubara terimobilisasi ditizon, *Tesis*, Universitas Gadjah Mada.
- Asuquo. E., Martin, A., Nzerem, P., Sisperstein, F., and Fan, 2017, Adsorption of Cd(II) and Pb(II) ions from aqueous solutions using mesoporous activated carbon adsorbent: Equilibrium, kinetics and characterization studies, *J. Environ. Chem. Eng.*, 5, 679-698.
- Attari, M., Bukhari, S.S., Kazemian, H., and Rohani, S., 2017, A low-cost adsorbent from coal fly ash for mercury removal from industrial wastewater, *J. Environ. Chem. Eng.*, 391-399.
- Bhattacharya, K.G., and Gupta, S.S., 2008, Adsorption of a Few Heavy Metals on Natural and Modified Kaolinite and Montmorillonite: A review, *Adv. Colloid Interface Sci.*, 140(2), 276-292.
- Bukhari, S.S., Behin, J., Kazemian, H., and Rohani, S., 2014, A comparative study using direct hydrothermal and indirect fusion methods to produce zeolites from coal fly ash utilizing single-mode microwave energy, *J. Mater. Sci.*, 49, 8261-8271.
- Castillo, X., Pizarro, J., Ortiz, H., Flores, M., Canck, E.D., and Voort, P.V.D., 2018, A cheap mesoporous silica from fly ash as an outstanding adsorbent for sulfate in water, *Microporous Mesoporous Mater.*, 272, 184-192.
- Cestari, A.R., Vieira, E.F.S., Lopes, E.C.N., da Silva, R.G., 2004, Kinetics and equilibrium parameters of Hg(II) adsorption on silica-dithizone, *J. Colloid Interface Sci.*, 272(2), 271-276.
- Chatterjee, A., Hu, X., and Lam, F.L, 2019, Modified coal fly ash waste as an efficient heterogeneous catalyst for dehydration of xylose to furfural in biphasic medium, *Fuel*, 239, 726-736.
- Chen, G., Shah, K.J., Shi, L., and Chiang, P.C., 2017, Removal of Cd(II) and Pb(II) ions from aqueous solutions by synthetic mineral adsorbent: Performance and mechanism, *Appl. Surf. Sci.*, 296-305.

- Cheng, Y., Xia, M., Luo, F., Li, N., Guo, C., and Wei, C., 2016, Effect of surface modification on physical properties of silica aerogels derived from fly ash acid sludge, *Colloids and Surfaces A: Physicochem. Eng. Aspects.*, 490, 200–206.
- Cho, H., Oh, D., and Kim, K., 2005. A study on removal characteristics of heavy metals from aqueous solution by fly ash, *J. Hazard. Mater.*, 187–195.
- Christian, G.D and O'Reilly, J.E., 1986, *Instrumental Analysis*, Second Edition, Allyn and Bacon, Boston.
- Deng, J., Kang., Chen., L, Wang, Y., Gu, Z., and Gu, Z., 2011, A nanofiber functionalized with dithizone by co-electrospinning for lead(II) adsorption from aqueous media, *J. Hazard. Mater.*, 187-193.
- Eschwege, K.G and Swarts, J.C., 2010, Chemical and electrochemical oxidation and reduction of dithizone, *Polyhedron*, 1727-1733.
- Ho, Y and Mc Kay, G, 1999, Pseudo-second order model for sorption processes, *Process Biochem.*, 34 (5), 451-465.
- Hojamberdiev, M., Daminova, S.S., Kadirova, Z.C., Sharipov, K.T., Mtalo, F., dan Hasegawa, M., 2018, Ligand-immobilized spent alumina catalyst for effective removal of heavy metal ions from model contaminated water, *J. Environ. Chem. Eng.*, 6, 4623-4633.
- Jal, P.K., Patel, S., and Mishra, B.K., 2004, Chemical modification of silica surface by immobilization of functional groups for extractive concentration of metal ions, *Talanta*, 62, 1005–1028.
- Janos, P., Buctova, H., and Ryznanova, M, 2003, Sorption of dyes from aqueous solutions onto fly ash, *Water Res.*, 37, 4938-4944.
- Jha, V.K., Matsuda, M., and Miyake, M., 2008, Sorption properties of the activated carbon-zeolite composite prepared from coal fly ash for Ni<sup>2+</sup>, Cu<sup>2+</sup>, Cd<sup>2+</sup>, and Pb<sup>2+</sup>, *J. Hazard. Mater.*, 148-153.
- Kolodynska, D., Krukowska, J., and Thomas P., 2017, Comparison of sorption and desorption studies of heavy metal ions from biochar and commercial active carbon, *Chem. Eng. J.*, 307, 353-363.
- Kula, A and Olgun., 2000, Effect of Colemanite Waste, Coal Bottom Ash and Fly Ash on The Properties of Cemment., *J. Chem. Concr. Res.*, 32, 491-494.
- Kutchko, B.G and Kim, A.G, 2006, Fly ash characterization by SEM-EDS, *Fuel*, 85, 2357-2544.
- Lee, H., Ha, H.S., Lee, C.H., Lee, Y.B., Kim, P.J., 2006. Fly ash effect on improving soil properties and rice productivity in Korean paddy soils. *Bioresour. Technol.* 97, 1490–1497.
- Li, J., Maroto-Valer, M.M., 2012, Computational and experimental studies of mercury adsorption on unburned carbon present in fly ash, *Carbon N.Y.*, 1913–1924.

- Liu, Z., and Liu, Y., 2015, Structure and properties of forming adsorbents prepared from different particle sizes of coal fly ash, *Chinese J. Chem. Eng.*, 23, 290-295.
- Luo, Y., Zheng, S., Ma, S., Liu, C., Ding, J., and Wang, X., 2018, Novel two-step process for synthesizing  $\beta$ -SiC whiskers from coal fly ash and water glass, *Ceramics Int'l.*, 44., 10585-10595.
- 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-dithizone, *Desalination*, 251, 123-130.
- Maratta, A., Vazquez, S., Lopez, A., Augusto, M., and Pacheco, P., 2016, Lead preconcentration by solid phase extraction using oxidized carbon xerogel and spectrophotometric determination with dithizone, *Microchem. J.*, 166-171.
- Marczenko, Z., 1996, *Separation and Spectrophotometric Determination of Elements*. John Wiley and Sons, Chichester, 88-94.
- Mudasir, Karelius, Aprilita, N.H., and Wahyuni, E.T., 2016, Adsorption of mercury (II) on dithizone-immobilized natural zeolite, *J. Environ. Chem. Eng.*, 1839-1849.
- Mudasir, M., Siswanta, D., 2007, Adsorption characteristics of Pb(II) and Cd(II) ions on dithizone-loaded natural zeolite, *J. Ion. Exchange*, 18(4), 516-517.
- Munoz, M.I., and Aller, A.J., 2012, Chemical modification of coal fly ash for the retention of low levels of lead from aqueous solutions, *Fuel*, 135-144.
- Nascimento, M., Soares, P.S.M., and Souza, V.P., 2009, Adsorption of heavy metals cations using coal fly ash modified by hydrothermal method, *Fuel*, 1714-1719.
- Nur, Y., Rohati, E., and Darusman, L.K., 2017, Optical sensor for the determination of  $Pb^{2+}$  based on immobilization of dithizone onto chitosan-silica membrane, *Indones. J. Chem.*, 17 (1), 7-14.
- Nyale, S.M., Babajide, O.O., Birch, G.D., Boke, N., and Petrik, L.F., 2013, Synthesis and characterization of coal fly ash-based foamed geopolymer, *Procedia Env.Sci*, 18, 722-730.
- Pap, S., Knudsen, T.S., Radonic, J., Maletic, S., Igetic, S.M., and Sekulic, M.T., 2017, Utilization of fruit processing industry waste as green activated carbon for the treatment of heavy metals and chlorophenols contaminated water, *J. Cleaner Prod.*, 162, 958-972.
- Pearson, R.G., 1963, Hard and soft acids and bases, *J. Am. Chem. Soc.*, 85(22), 3533-3539.
- Peraturan Menteri Kesehatan Republik Indonesia No. 492 Tahun 2010. *Persyaratan Kualitas Air Minum*. Jakarta.

- Quintelas, C., Rocha, Z., Silva, B., Fonseca, B., Figueiredo, H., and T. Tavares, T., 2009, Removal of Cd(II), Cr(VI), Fe(III) and Ni(II) from aqueous solutions by an E. coli biofilm supported on kaolin, *Chem. Eng. J.*, 149, 319–324.
- Raharjo, G., Tahir, I., and Wahyuni, E.T., 2008, Immobilization of dithizone 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.
- Salmani, G.K., Rounaghi, G.H., and Chamsaz, M., 2017, A selective and sensitive optode for determination of  $Hg^{2+}$  ion based on covalent immobilization of thiazole yellow on triacetyl cellulose films, *Sens. Actuators B: Chem.*, 1–8.
- Shu, K., Li, J., Luo, J., Jin, Y., and Zheng, D., 2017, Removal of cadmium(II) from aqueous solution by new adsorbent of fluor-hydro yapatite composite, *J. Taiwan Institute Inst.of Chem. Eng.*, 200–208.
- Shukla, A., Zhang, Y.H., Dubey, P., Margrave, J.L., Shukla, S.S., 2002, The role of sawdust in the removal of unwanted materials from water, *J. Hazard. Mater.*, 95, 137–152.
- Suna, X., Zhang, Y., Wu, X., and Liu, 2010, Adsorption of anionic dyes from aqueous solution on fly ash, *J. Hazard. Mater.*, 181, 335–342.
- The United States Environmental Protection Agency (EPA), 2018, 2018<sup>th</sup> Edition of drinking water standards and health advisories tables, Washington, DC.
- Tomasz, K., Anna, K., and Ryszard, 2019, Effective adsorption of lead ions using fly ash obtained in the novel circulating fluidized bed combustion technology, *Micochem J.*, 145, 1011–1025.
- Visa, M., 2016, Synthesis and characterization of new zeolite materials obtained from fly ash for heavy metals removal in advanced wastewater treatment, *Powder Tech.*, 294, 338–347.
- Wang, X.S., Miao, H.H., He, W., and Shen, H.L., 2001, Competitive Adsorption of Pb(II), Cu(II), and Cd(II) Ions on Wheat Residue Derived Activated Carbon, *J. Chem. Eng.*, 56, 444–449.
- World Health Organization (WHO), 1989, *Environmental health criteria 85: lead environmental aspects*, Geneva.
- World Health Organization (WHO). 2011. *Guidelines for Drinking-water Quality 4th edition*, Geneva.
- Xiyili, H., Cetintas, S., Bingol, D., 2017, Removal of some heavy metals onto mechanically activated fly ash: Modeling approach for optimization, isotherms, kinetics and thermodynamics, *Process Saf. Environ.*, 288–300.
- Yan, F., Jiang, J., Li, K., Liu, N., Chen, X., Gao, Y., and Tian, S., 2017, Green Synthesis of Nanosilika from Coal Fly Ash and Its Stabilizing Effect on CaO Sorbents for CO<sub>2</sub> Capture., *Env. Sci. Technol.*, 51, 7606–7615.

- Yao, Z.T., Ji, X.S., Sharker, P.K., Tang, J.H., Ge, L.Q., Xia, M.S., and Xi, Y.Q., 2015, A comprehensive Review on the Application of Coal Fly Ash, *Earth Sci. Rev.*, 106-121
- Yu, H, Song, H, and Chena, M., 2011, Dithizone immobilized silica gel on-line preconcentration of trace copper with detection by flame atomic absorption spectrometry, *Talanta*, 625-630.
- Zargoosh, K and Babadi, F.F., 2015, Highly selective and sensitive optical sensor for determination of  $Pb^{2+}$  and  $Hg^{2+}$  ions based on the covalent immobilization of dithizone on agarose membrane, *Spectrochim. Acta Part A*, 137, 105-110.
- Zhu, Y., Hu, J., and Wang, J., 2012, Competitive Adsorption of Pb(II), Cu(II), and Zn(II) onto anthate-modified magnetic chitosan, *J. Hazard. Mater.*, 221-222.