

## DAFTAR PUSTAKA

- Afdal dan Niarti, L., 2013, Karakterisasi Sifat Magnet dan Kandungan Mineral Pasir Besi Sungai Batang Kuranji Padang Sumatera Barat, *J. Ilmu Fis*, 5(1), 24-30.
- Allen, S.J., Mckay, G. dan Porter, J.F., 2004, Adsorption Isotherm Models for Basic Dye Adsorption by Peat in Single and Binary Component Systems, *Colloid Interface Sci.*, 280(2), 322-333.
- Andaka, G., 2008, Penurunan Kadar Tembaga Pada Limbah Cair Industri Kerajinan Perak dengan Presipitasi Menggunakan Natrium Hidroksida, *Jurtek*, 1(2), 127
- Anonim, 2012, EDTA Disodium Dihydrate, *Safety Data Sheet*, 77(58), 1-6.
- Anonim, 2016, *Peraturan Daerah Daerah Istimewa Yogyakarta Nomor 7 Tahun 2016 tentang Baku Mutu Air Limbah*, Yogyakarta.
- Beigi, H., Yaghmei, S., Roostaazad, R. dan Arpanaei, A., 2013, Comparasion of Different Strategies for The Assembly of Gold Colloids Onto Fe<sub>3</sub>O<sub>4</sub>@SiO<sub>2</sub> Nanocomposite Particles, *Physica E.*, 49, 30-38.
- Blais, J. F., Dufresne, B. dan Mercier, G., 2000, State of The Art of Technologies for Metal Removal from Industrial Effluents, *Rev. Sci. Eau.*, 12 (4), 687-711.
- Bruce, I.J., Taylor, J., Todd, M., Davies, M.J., Borioni, E., Sangregorio, C. dan Sen, T., 2004, Synthesis, Characterisation and Application of Silica-Magnetite Nanocomposite, *J. Magn. Magn. Mater.*, 284, 145-160.
- Budnyak, T.M., Pylypchuk, I. V., Tertykh, V. A., Yanovska, E. S. dan Kolodynska, D., 2015, Synthesis and Adsorption Properties of Chitosan-Silica Nanocomposite Prepared by Sol-Gel Method, *Nanoscale Res. Let.*, 10(1), 87-97.
- Buhani dan Suharso, 2010, Modifikasi Silika dengan 3-Aminopropil Trimetoksisilan Melalui Proses Sol Gel untuk Adsorpsi Ion Cd(II) dari Larutan, *J. Sains MIPA*, 16, 177-183.
- Cahyaningrum, S.E., Narsito, Santoso, S. J. dan Agustini, R., 2011, Adsorpsi Ion Logam Zn(II) dan Cu(II) Pada Kitosan Nano Bead dari Cangkang Udang Windu (*Penaus monodon*), *J.Manusia dan Lingkungan*, 18(3), 200-205.
- Cahyono, H.B. dan Ariami, N. M., 2014, Reduksi Tembaga dalam Limbah Cair Proses Etching Printing Circuit Board (PCB) dengan Proses Elektrokimia, *J. Ris.Ind.*, 8(2), 113.

- Chang, Y.C. dan Chen, D. H., 2005, Preparation and Adsorption Properties of Monodisperse Chitosan-Bound  $\text{Fe}_3\text{O}_4$  Magnetic Nanoparticles for Removal of Cu(II) Ions, *Colloid Interface Sci.*, 283(2), 446-451.
- Chao, A. C., 2008, Preparation of Porous Chitosan/GPTMS Hybrid Membrane and Its Application in Affinity Sorption for Tyrosinase Purification with *Agaricus bisporus*, *J. Membrane Sci.*, 311(1-2), 306-318.
- Dada, A.O., Olalekan, A.P. dan Olatunya, A.M., 2012, Langmuir, Freundlich, Temkin and Dubinin-Radushkevich Isotherms Studies of Equilibrium Sorption of  $\text{Zn}^{2+}$  Unto Phosphoric Acid Modified Rice Husk, *IOSR J. Appl. Chem.*, 3(1), 38-45.
- Darmono, 1995, *Logam Dalam Sistem Biologi Makhluk Hidup*, Universitas Indonesia Press, Jakarta.
- Deng, Y. H., Wang, C. C., Hu, J. H., Yang, W. L. dan Fu, S. K., 2005, Investigation of Formation of Silica Coated Magnetite Nanoparticles Via Sol-Gel Approach, *J. Phys. Chem. Eng.*, 262, 87-93.
- Dhawade, P. dan Jagtap, R., 2012, Comparative Study of Physical and Thermal Properties of Chitosan-Silica Hybrid Coatings Prepared by Sol-Gel Method, *J. Der Chemica Sinica*, 3(3), 589-601.
- Do, D.D., 1998, *Adsorption Analysis: Equilibria and Kinetics*, Imperial College Press, London.
- Endang, W.L., Ikhsam, J. dan Prodjosantoso, A.K., 2006, Efek pH Terhadap Kemampuan Adsorpsi Kitosan dengan Logam, *Proceeding International Conference of Mathematics and Natural Sciences*, 243-247.
- Faraji, M., Yamini, Y. dan Rezaee, M., 2010, Iranian Chemical Society Magnetic Nanoparticles: Synthesis, Stabilization, Functionalization, Characterization, and Applications, *J. Iran. Chem. Soc.*, 7(1), 1-37.
- Hastuti, S., Nuryono, and Kuncaka, A., 2015, L-Arginine-Modified Silica for Adsorption of Gold(III), *Indo. J. Chem.*, 15(2), 108-115.
- He, X., Xu, H. dan Li, H., 2015, Cr(VI) Removal from Aqueous Solution by Chitosan/Carboxymethyl Cellulose/Silica Hybrid Membrane, *World J. Eng. Technol.*, 3, 234-240.
- Ho, Y.S., 2006, Review of Second-Order Models for Adsorption Systems, *Process Biochem.*, B136, 681-689.
- Hyosang, L., 2008, Characterization and Modeling of Mainstream and Alternative Conditioning and Polishing Technologies in Inter-layer Dielectric and Copper

Chemical Mechanical Planarization, *Dissertation*, Faculty of Dept. Of Chemical and Environmental Engineering, University of Arizona, Arizona.

Iida, H., Takayanagi, K., Nakanishi, T. dan Osaka, T., 2007, Synthesis of Fe<sub>3</sub>O<sub>4</sub> Nanoparticles with Various Sizes and Magnetic Properties by Controlled Hydrolysis, *Colloid Interface Sci.*, 314, 274-280.

Jin, L. dan Bai, R., 2002, Mechanism of Lead Adsorption on Chitosan/PVA Hydrogel Beads, *Langmuir*, 18(25), 9765-9770.

Krupanidhi, S., Sreekumar, A. dan Sanjeevi, C. B., 2008, Copper and Biological Health, *Indian J Med.Res.*, 128, 103-116.

Kusumaningsih, T., Masykur, A. dan Arief, U., 2004, Pembuatan Kitosan dari Kitin Cangkang Bekicot (*Achatina Fulica*), *Biofarmasi*, 2(2), 64-68.

Lee, C. G., Jeon, J. W., Hwang, J. dan Ahn, K. H., 2015, Lead and Copper Removal from Aqueous Solutions Using Carbon Foam Derived from Phenol Resin, *Chmosphere*, 130, 59-65.

Liu, Y., Su, Y. Y. H. dan Lai, J. Y., 2004, In Situ Crosslinking of Chitosan and Formation of Chitosan-Silica Hybrid Membranes with Using Glycidoxypopyltrimethoxysilane as a Crosslinking Agent, *Polymer*, 45(20), 6831-6837.

Liu Y. L., Liu, S., Zhang, Q., Li, C., Bao, C., Liu, X., and Xiao, P., 2013, Adsorption of Au(III), Pd(II) and Pt(IV) from Aqueous Solution Onto Graphene Oxide. *J. Che. Eng. Data*, 58(2), 209-216.

Marganof, 2007, Model Pengendalian Pencemaran Perairan di Danau Maninjau Sumatera Barat, *Tesis*, Pascasarjana IPB, Bogor.

Marwati, S., Padmaningru, R.T. dan Marfuatun, 2009, Pemanfaatan Ion Logam Berat Tembaga (II), Kromium (III), Timbal (II), dan Seng(II) dalam Limbah Cair Industri Electroplating untuk Pelapisan Logam Besi, *J.Pen.Sains*, 14(1), 17-40.

McCabe, W. Smith, J. dan Harriot, P., 2005, *Unit Operation of Chemical Engineering*, Mc Graw-Hill Inc., New York.

Miettinen, 1977, *Inorganic trace Element as Water Pollutan to Health and Aquatic Biota*, Academy press, New York.

Mitani, T., Yamashita, T., Okumura, C. dan Ishi, H., 1995, Adsorption of Benzoic Acid and Its Derivatives to Swollen Chitosan Beads, *Biosci. Biotech. Biochem.*, 59(5), 927-928.

- Muflikhah, Rusdiarso, B., Putra, E.G.R. dan Nuryono., 2017, Modification of Silica Coated on Iron Sand Magnetic Material with Chitosan for Adsorption of Au(III), *Indones. J. Chem.*, 17(2), 264-273.
- Muhdarina, Mohammad, A.W. dan Muchtar, A., 2010, Prospektif Lempung Alam Cengar sebagai Adsorben Polutan Anorganik di dalam Air: Kajian Kinetika Adsorpsi Kation Co(II), *Reaktor*, 13(2), 81-88.
- Muzzarelli, R.A.A., 1973, *Natural Chelating Polymers*, Pergamon Press, Oxford.
- Navarro, R., Guzman, J., Saucedo, I., Revilla, J., Guibal, E., 2003, Recovery of Metal Ions by Chitosan: Sorption Mechanisms and Influence of Metal Speciation, *Macromol. Biosci.*, 3, 552-561.
- Nithya, R., Gomathi, T., Sudha, P. N., Venkatesan, J., Anil, S. dan Kim, S. K., 2016, Removal of Cr(VI) from Aqueous Solution Using Chitosan-g-poly(butylacrylate)/Silica Gel Nanocomposite, *Int. J. Biol. Macromol.*, 87, 545-554.
- Nurdiani, D., 2005, Adsorpsi Logam Cu(II) pada Kitosan Bentuk Serpihan dan Butiran, *Skripsi*, FMIPA IPB, Bogor.
- Nuriadi, Napitupulu, M. dan Rahman, N., 2013, Analisis Logam Tembaga (Cu) pada Buangan Limbah Tromol (Tailing) Pertambangan Poboya, *J. Akad. Kim.*, 2(2), 90-96.
- Nurwidiyani, R., 2014, Sintesis Magnetit Terlapis Hibrida Amino Silika untuk Sorpsi Ion Au(III) dalam Sistem Multilogam Au(III)-Cu(II)-Ni(II), *Tesis*, Jurusan Kimia FMIPA UGM, Yogyakarta.
- Nuryono, Muliaty, E., Rusdiarso, B., Sakti., S.C.W. dan Tanaka, S., 2014, Adsorption of Au(III), Cu(II) and Ni(II) on Magnetite Coated with Mercapto Groups Modified Rice Hull Ash Silica, *J. Ion Exchange*, 25, 114-121.
- Oscik, J. dan Cooper, I. L., 1982, *Adsorption*, Ellis Horwood Ltd., Chichester.
- Pandey, A., Bera, D., Shukla, A. dan Ray, L., 2007, Studies on Cr(VI), Pb(II), and Cu(II) Adsorption-Desorption Using Calcium Alginate as Biopolymer, *Chem. J. Speciation and Bioavailability.*, 19(1), 17-24.
- Pearson, R.G., 1968, Hard Soft Acid and Base, HSAB, Part 1, Fundamental Principle, *J. Chem. Educ.*, 45, 571-581.
- Putra, H., Fadhilah dan Nasra, E., 2014, Pengolahan Tembaga (Cu) Dalam Sampel Batuan Menggunakan Metode Ekstraksi Pelarut Kelat Ditizon dengan Variasi Waktu dan pH Optimum, *Min. Eng. J.*, 1(1).28-34.

- Qu, R., Sun, C., Wang, M., Ji, C., Xu, Q., Zhang, Y. dan Yin, P., 2009, Adsorption of Au(III) from Aqueous Solution Using Cotton Fiber/Chitosan Composite Adsorbents, *Hydrometallurgy*, 100(2), 65-71.
- Rinaudo, M., 2006, Chitin and Chitosan: Properties and Application, *Prog. Polym. Sci.*, 31, 603-632.
- Riyanto, A., 2012, Sintesis Nanopartikel Fe<sub>3</sub>O<sub>4</sub> (Magnetit) dan Potensinya Sebagai Material Aktif pada Permukaan *Sensing Biosensor* Berbasis Surface Plasmon Resonance (SPR), *Tesis*, Program Studi S2 Fisika FMIPA UGM, Yogyakarta.
- Ruasianto, T., Wildan, M.W., Abraha, K. dan Kusmono, 2012, The Potential of Iron Sand from The Coast South of Bantul Yogyakarta as Raw Ceramic Magnet Materials, *Jurtek.*, 5(1) 62-69.
- Sari, E. K., Azmiyawati, C. dan Taslimah, 2010, Modifikasi Silika Gel dari Abu Sekam Padi dengan  $\gamma$ -Glycidioxypropyltrimethoxysilane dan Mercaptobenzothiazole untuk Adsorpsi Logam Kadmium(II), *J. Kim. Sains.*, 13(3), 71-75.
- Singh, V. K. dan Kumar, E. A., 2016, Measurement and Analysis of Adsorption Isotherm of CO<sub>2</sub> on Activated Carbon, *Appl. Therm. Eng.*, 97, 77-86.
- Sonia, T.A., and Sharma, C.P., 2011, Chitosan and its Derivatives for Drug Delivery Perspective, *Adv. Polym Sci.*, 243, 23-54.
- Stum, W. dan Morgan, J.J., 1996, *Aquatic Chemistry: Chemical Equilibria in Natural Water*, 3<sup>rd</sup> Ed., John Wiley and Sons, New York.
- Sudarmaji, S. dan Mukono, J., 2006, Toksikologi Logam Berat B3 dan Dampaknya Terhadap Kesehatan, *J. Kes. Ling.*, 2(2), 129-142.
- Syukur, M., 2014, Sintesis Fe<sub>3</sub>O<sub>4</sub>/SiO<sub>2</sub> Termodifikasi (n-(2-Aminoetil)-e-Aminopropil) untuk Adsorpsi-Desorpsi Anionik [AuCl<sub>4</sub>]<sup>-</sup>, *Tesis*, Program Pascasarjana FMIPA UGM, Yogyakarta.
- Tian, Y., Yin, P., Qu, R., Wang, C., Zheng, H. dan Yu, Z., 2010, Removal of Transition Metal Ions from Aqueous Solution by Adsorption Using a Novel Hybrid Material Silica Gel Chemically Modified by Triethylenetetramino Methylenephosphonic Acid, *Chem. Eng. J.*, 162, 573-379.
- Volesky, B., 1990, *Biosorption of Heavy Metals*, CRC Press, Boca Raton.
- Wahyuningtyas, A., 2015, Studi Adsorpsi Desorpsi Glukosa pada Humin Sintetik, *Tesis*, Program Studi S2 Kimia FMIPA UGM, Yogyakarta.
- Wang, H. dan Ren, Z.J., 2014, Bioelectrochemical Metal Recovery from Wastewater: A Review, *Water Res.*, 66, 219-232.

- Wang, H., Chen, Q.W., Chen, J., Yu, B.X. dan Hu, X.Y., 2011, Carboxyl and Negative Charge-Functionalized Superparamagnetic Nanochains with Amorphous Carbon Shell and Magnetic Core: Synthesis and Their Application in Removal of Heavy Metal Ions, *Nanoscale*, 3, 4600-4603.
- Wibowo, S., 2006, Produksi Kitin Kitosan Secara Komersial, *Prosiding Seminar Nasional Kitin-Kitosan*, DHTP, Institut Pertanian Bogor.
- Xiao-lan, S., Ming-wan, Z., Ying, Z., Shu-tao, H., Bai-yang, G. dan Rang-bin, M., 2013, Surface Modification of Coconut-Based Activated Carbon by SDS and Its Effects on Pb<sup>2+</sup> Adsorption, *J. Cent. South. Univ.* 20, 1156-1160.
- Yahaya, N.K.E., Muhammad, F. P., Ismail, A., Olugbenga, S. B. dan Mohd, A. A., 2011, Adsorptive Removal of Cu(II) Using Activated Carbon Prepared from Rice Husk by ZnCl<sub>2</sub> Activation and Subsequent Gasification with CO<sub>2</sub>, *IJET-IJENS*, 11(1). 207-211.
- Yang, B., Tong, X., Deng, Z. dan Xiangwen, 2015, The Adsorption of Cu Species onto Pyrite Surface and Its Effect on Pyrite Flotation, *J. Chem-ny*, 1-7.
- Yuwei, C. dan Jianlong, W., 2011, Preparation and Characterization of Magnetic Chitosan Nanoparticles and Its Application for Cu(II) Removal, *Chem. Eng. J.*, 168, 286-292.
- Zakaria, A., Rohaeti, E., Batubara, I., Sutisna dan Purwamargapratala, Y., 2012, Adsorpsi Cu(II) Menggunakan Zeolit Sintetis dari Abu Terbang Batu Bara, *Prosiding Pertemuan Ilmiah Ilmu Pengetahuan dan Teknologi Bahan BATAN*, 190-194.
- Zhang, S., Zhang, Y., Liu, J., Xu, Q., Xiao, H., Wang, X., Xu, H. dan Zhou, J., 2013, Thiol Modified Fe<sub>3</sub>O<sub>4</sub>@SiO<sub>2</sub> As a Robust, High Effective, and Recycling Magnetic Sorbent for Mercury Removal, *Chem. Eng. J.*, 226, 30-38.