

## DAFTAR PUSTAKA

- Adamson, A.W., 1990, *Physical Chemistry of Surface*, Edisi 5, John Wiley and Sons Inc, New York.
- Afandi, S., 2006, *Sintesa dan Karakterisasi Partikel Magnetik Submikron Berbasis Oksida Fe dan Polimer Polilaktat (PLA)*, Institut Pertanian Bogor, Bogor.
- Agustinus, E.T.S., Mursito, A.T. dan Sembiring, H., 2013, Peningkatan Daya Serap Karbon Aktif Terhadap Ion Logam Hexavalent Chromium Melalui Modifikasi Dengan Cationic Surfactan, *Ris. Geo. Tam*, 1(23), 13–24.
- Agustriawan, D., 2014, *Komposit PVA/Kitosan dan PVA/MgAl-LDH/Kitosan Beads Untuk Adsorpsi Cr(VI)*, Tesis S2 Kimia, Universitas Gadjah Mada, Yogyakarta.
- Aksu, D., Ozer, H.I., Ekiz, T., Kutsal and A. Calar., 1996, Investigation of biosorption of Chromium (VI) on *Cladophora Crispata* in Two-Staged Batch reactor, *Environ.Technol.*, 2(17), 215–220.
- Arami, H., Stephen, Z., Veiseh, O., and Zhang, M., 2011, Chitosan-Coated Iron Oxide Nanoparticles for Molecular Imaging and Drug Delivery, *Chitosan for Biomaterials I. Advances in Polymer Science*, 243, 163–184.
- Arifin, Z., Irawan, D., Kasim, M. dan Fajar, M., 2018, Adsorpsi Logam Fe (II) dalam Limbah Cair Artifisial Menggunakan Komposit Kitosan-Karbon Aktif Cangkang Buah Karet, *Pengembangan Teknologi Kimia Untuk Pengolahan Sumber Daya Alam Indonesia*, 1–5.
- Ariyanto, E., Lestari, D.D. dan Kharismadewi, D., 2021, Analisa Kemampuan dan Kinetika Adsorpsi Karbon Aktif dari Cangkang Ketapang Terhadap Zat Warna Metil Oranye, *Jurnal Dinamika Penelitian Industri*, 2(23), 166–178.
- Asbahani, 2013, Pemanfaatan Limbah Ampas Tebu sebagai Karbon Aktif untuk Menurunkan Kadar Besi pada Air Sumur. *Jurnal Teknik Sipil Untan*, 1(13), 105–114.
- Bailey, S.E., Olin, T.J., Bricka, R.M., and Adrian, D.D., 2005, Removal of Heavy Metal from Industrial Wastewater Using Chitosan, *Water Res*, 39, 2469–2479.
- Bangari, R. S., and Sinha, N., 2019, Adsorption of Tetracycline, Ofloxacin and Cephalexin Antibiotics on Boron Nitride Nanosheets from Aqueous Solution, *J. Mol. Liq.*, 111376.
- Bhatnagar, A., Sillanpää, M., 2009, Applications of Chitin- And Chitosan-Derivatives for the Detoxification of Water and Wastewater A Short Review, *Adv. Colloid. Interf. Sci.*, 152, 26–38.
- Boparai, H.K., Joseph M., O’Caroll D.M., 2010, Kinetics and Thermodynamics of Cadmium Ion Removal by Adsorption onto Nano Zero Valent Iron Particles, *J. Hazard. Mater.*, 18, 324–328.

- Butler, R.F., 1992, *Paleomagnetism: Magnetik Domains to Geologic Teranes*, Blackwell Scientific, Boston.
- Chaemsanit, S., Matan, N., Matan, N., 2017, Activated Carbon for Food Packaging Application: Review, *Walailak. J. Sci&Tech.*, 15(4), 255–271.
- Chakravarti, A.K., Chowdhury, S.B., Chakrabarty, S., Chakrabarty, T., and Mukherjee, D.C., 1995, Liquid Membrane Multiple Emulsion Process of Chromium (VI) Separation from Wastewaters, *Colloids Surf. A Physicochem. Eng. Asp.*, 1–2(103), 59–71.
- Cotton, F.A., and Wilkinson, G., 1989, *Basic Inorganic Chemistry*, John Wiley and Sons Inc, New York.
- Dada, A.O., Olalekan, A.P., Olatunya, A.M., dan Dada, O., 2012, Langmuir, Freundlich, Temkin, and Dubinin-Radushkevich Isotherm Studies of Equilibrium Sorption of  $Zn^{2+}$  onto Phosphoric Acid Modified Rice Husk, *J. Appl. Chem.*, 3(1), 38–45.
- Dahbi, S., Azzi, M., de la Guardia, M., 1999, Removal of Hexavalent Chromium from Wastewaters by Bone Charcoal, *Fresenius. J. Anal. Chem.*, 363, 404–407.
- Delavar, M., Ghoreyshi, A.A., Jahanshahi, M., Khalili, S., dan Nabian, N., 2012, Equilibria and Kinetics of Natural Gas Adsorption on Multi-walled Carbon Nanotube Material, *RSC Adv.*, 2, 4490–4497.
- Dos Santos, V.C.G., Salvado, A.D.P.A., Dragunski, D.C., Peraro, D.N.C., Tarley, C.R.T., and Caetano, J., 2012, Highly Improved Chromium (III) Uptake Capacity in Modified Sugarcane Bagasse using Different Chemical Treatments, *Quim. Nova*, 35, 1606–1611.
- Emam, A.A., Goma, S.H., ELsisi, A.A. dan Emam, A.G., 2018, Application of Magnetite Nanoparticles for Adsorption Acid Red 141 from Aqueous Solutions, *Azhar. Bull. Sci.*, 2(29), 157–166.
- Foo, K.Y. and Hameed, B.H., 2010, Insights into the Modeling of Adsorption Isotherm Systems, *Chem. Eng. J.*, 1(156), 2–10.
- Gottsching, L. and Pakarinen, H, 2000, *Recycled Fiber and Deinking, Papermaking Science and Technology*, TAPPI, Atlanta.
- Guibal E., 2004, Interaction of Metal Ions with Chitosan-based Sorbents: A Review, *Sep. Purif. Technol.*, 38, 43–74.
- Gulicovski, J.J., Čerović, L.S., and Milonjić, S.K., 2008, Point of Zero Charge and Isoelectric Point of Alumina, *Mater. Manuf. Process.*, 23, 615–619.
- Haldorai, Y., Kharismadewi, D., Tuma, D., and Shim, J.J., 2015, Properties of Chitosan/Magnetite Nanoparticles Composites for Efficient Dye Adsorption and Antibacterial Agent, *Korean J. Chem. Eng.*, 8(32), 1688–1693.

- Hardyanti, S.I., Nurani, I., Hardjono, D.S.H., Apriliani, E. dan Wibowo, A.P., 2017, Pemanfaatan Silika (SiO<sub>2</sub>) dan Bentonit sebagai Adsorben Logam Berat Fe, *Jurnal Sains Terapan*, 2(3), 37–41.
- Hariani, P.L., Faizal, M., Ridwan., Marsi., dan Stiabudidaya, D., 2013, Synthesis and Properties of Fe<sub>3</sub>O<sub>4</sub> Nanoparticles by Co-precipitation Method to Removal Procion Dye, *Int. J. Environ. Sci. Dev.*, 3(4), 336–340.
- Harimu, L., Wahyuni, S., Nasrudin, N., Baari, M.J. dan Permana, D., 2022, Fabrication of Chitosan/Fe<sub>3</sub>O<sub>4</sub> Nanocomposite as Adsorbent for Reduction Methylene Blue Contents, *Indones. J. Chem*, 3(22), 878–886.
- Hastuti, B. dan Tulus, N., 2015, Sintesis Kitosan dari Cangkang Kerang Bulu (*Anadara Inflata*) sebagai Adsorben Ion Cu<sup>2+</sup>, *Seminar Nasional Kimia dan Pendidikan Kimia. Surakarta*, Universitas Sebelas Maret.
- Herwanto, B. dan Eko, S., 2006, Adsorpsi Ion Logam Pb (II) pada Membran Selulosa-Khitosan Terikat Silang, *Jurnal Akta Kimia Indonesia*, 1(2), 9–24.
- Ho, Y.S. dan Mckay, G., 1998, A Comparison of Chemisorption Kinetic Models Applied to Pollutant Removal on Various Sorbents, *Trans. IchemE.*, 76, 332–340.
- Hou, Y.L. dan Gao, S., 2004, Solvothermal Reduction Synthesis and Magnetic Properties of Polymer Protected Iron and Nickel Nanocrystals., *J. Alloys Comp.*, 1–2(365), 112–116.
- Imani, A., Sukwika, T., dan Febrina, L., 2020, Karbon Aktif Ampas Tebu sebagai Adsorben Penurun Kadar Besi dan Mangan Limbah Air Asam Tambang, *Jurnal Teknologi*, 1(13), 33–42.
- Islam, N.M., Khan, M.N., Malik, A.K. and Rahman, M.M., 2019, Preparation of Bio-inspired Trimethoxysyl Group Terminated Poly(1-vinylimidazole)-modified-chitosan Composite for Adsorption of Chromium(IV) Ions, *J. Hazard. Mater.*, 379, 1–11.
- Jeirani, Z., Niu, C.H., dan Soltan, J., 2017, Adsorption of Emerging Pollutants on Activated Carbon, *Rev. Chem. Eng.*, 33(5), 1–32.
- Kakom, S.M., Abdelmonem, N.M., Ismail, I.M. dan Refaat, A.A., 2022, Activated Carbon from Sugarcane Bagasse Pyrolysis for Heavy Metals Adsorption, *Sugar Tech.*
- Kenneth, H.L., 1987, *Heavy Metal Removal*, Departemen Perindustrian.
- Khan, S.U., 2016, *Pesticides in The Soil Environment*, Elsevier Scientific Publishing Co, New York.
- Koyuncu, F., Guzel, F., Saygilt, H., 2018, Role of Optimization Parameters in the Production of Nanoporous Carbon from Mandarin Shells by Microwave-Assisted Chemical Activation and Utilization as Dye Adsorbent, *Adv. Powder Technol.*, 9, 2108–2118.

- Kristianto, S., Wilujeng, S., and Wahyudiarto, D., 2017, Analisis Logam Berat Kromium (Cr) Pada Kali Pelayaran Sebagai Bentuk Upaya Penanggulang Pencemaran Lingkungan di Wilayah Sidoarjo', *Jurnal Biota*, 2(3), 66–70.
- Lazulva, dan Sari, W.W., 2013, Uji Kualitas Karbon Aktif dari Kulit Ubi Kayu (Manihot esculenta crantz), *Jurnal Photon*, 2(3), 33–37.
- Le., V.T., Dao, M.U., Le, H.S., Tran, D.L., Doan, V.D., dan Nguyen, H.T., 2019, Adsorption of Ni(II) Ions by Magnetic Activated Carbon Chitosan Beads Prepared from Spent Coffe Grounds, Shrimps Shells and Green Tea Extract, *Envi. Technol.*, 41, 2817–2832.
- Leimkuehler, E., P., 2010, *Production, Characterization, and Applications of Activated Carbon*, Thesis, The Faculty of The Graduate School, University of Missouri, Missouri.
- Leyva-Ramos, R., Fuentes-Rubio, L., Guerrero-Coronado, R. M., and Mendoza-Barron, J., 1995, Adsorption of Trivalent Chromium from Aqueous Solutions onto Activated Carbon. *J. Chem. Technol. Biotechnol.*, 1(62), 64–67.
- Li, F., Shen, K., Long, X., Wen, J., Xie, X., Zeng, X., Liang, Y., Wei, Y., Lin, Z., Huang, W., and Zhong, R., 2016, Preparation and Characterization of Biochars from Eichornia crassipes for Cadmium Removal in Aqueous Solutions, *PLOS ONE*, 2(11), 1–13.
- Lim, Y.S., Lai, W., Hamid, S.B.A., Julkapli, N.M., Yehya W.A., Karim, M.Z., Tai, M.F., dan Lau, K.S., 2014, A Study on Growth Formation of Nano-Sized Magnetite Fe<sub>3</sub>O<sub>4</sub> Via Co-Precipitation Method, *Mat. Res. Innovation*, 18, 457–461.
- McDougall, G.J., 1991, The Physical Nature and Manufacture of Activated Carbon, *J. South. Afr. Inst. Min. Metall.*, 4(90), 109–120.
- Mehta, D., Mazumdar, dan Singh, S.K., 2015, Magnetic Adsorbents for the Treatment of Water/Wastewater—A Review, *J. Water Process. Eng.*, 224(7), 244–265.
- Mohan, D. dan Pittman Jr. C. U., 2006, Activated Carbons and Low-Cost Adsorbents for Remediation of Tri- and Hexavalent Chromium from Water, *J. Hazard. Mater.*, 137, 762–811.
- Nalbandian, L., Patrikiadou, E., Zaspalis, V., Patrikidou, A., Hatzidaki, E., and Papandreou, C.N., 2015, Magnetic Nanoparticles in Medical Diagnostic Applications: Synthesis, Characterization and Proteins Conjugation, *Curr. Nanosci.*, 12, 455 – 468.
- Ngaha, W.S.W., Teonga, L.C., and Hanafiah, M.A.K.M., 2011, Adsorption of Dyes and Heavy Metal Ions by Chitosan Composites: A Review, *Carbohydr. Polym.*, 83, 1446–1456.
- Oscik, J., 1982, *Adsorption*, Ellis Harwood Limited, England.

- Oshita, K., Oshima, M., Gao, Y., Lee, K.H., and Motomizu, S., 2002, Adsorption Behaviour of Mercury and Precious Metals on Cross-Linked Chitosan and the Removal of Ultratrace Amounts of Mercury in Concentrated Hydrochloric Acid by a Column Treatment with Cross-Linked Chitosan, *J. Anal. Sci.*, 18, 1121–1125.
- Owlad M, Aroua, M.K., Daud, W.A.W., and Baroutian, S., 2009, Removal of Hexavalent Chromium-Contaminated Water and Wastewater: A Review, *Wat. Air Soil Poll.*, 200, 59–77.
- Paramita, R. W., Wardhani, E., dan Pharmawati, K., 2017, Kandungan Logam Berat Kadmium (Cd) dan Kromium (Cr) di Air Permukaan dan Sedimen : Studi Kasus Waduk Saguling Jawa Barat, *Rekayasa Lingkungan*, 2(5), 1–12.
- Pérez-Marín, A.B., Zapata, V.M., Ortuño, J.F., Aguilar, M., Sáez, J., and Lloréns, M., 2007, Removal of Cadmium from Aqueous Solutions by Adsorption onto Orange Waste, *J. Hazard. Mater.*, 139, 122–131.
- Pratomo, S. W., Mahatmanti, F.W. dan Sulistyaningsih, T., 2017, Pemanfaatan Zeolit Alam Teraktivasi H<sub>3</sub>PO<sub>4</sub> sebagai Adsorben Ion Logam Cd(II) dalam Larutan, *Indo. J. Chem. Sci.*, 2(6), 161–167.
- Rahayu., Matheis, F.J.D.P., Tanasale. dan Bandjar, A., 2020, Isoterm Adsorpsi Ion Cr(III) oleh Kitosan Hasil Isolasi Limbah Kepiting Rajungan dan Kitosan Komersil, *Indo. J. Chem. Res*, 1(8), 28–34.
- Rahmah., Ramlawati., dan Side, S., 2011, Kapasitas Adsorpsi Tanah Diatomeae (*Diatomaceous earth*) terhadap Ion Kromium (VI), *Jurnal Chemica*, 1(12), 60–66.
- Ramírez-Estrada, A., Mena-Cervantes, V.Y., Fuentes-García, J., Vazquez-Arenas, J., Palma-Goyes, R., Flores-Vela, A.I. and Altamirano, R.H., 2018, Cr(III) Removal from Synthetic and Real Tanning Effluents Using an Electro-Precipitation Method, *J. Environ. Chem. Eng.*, 1(6), 1219–1225.
- Roth, H.C., Schwaminger, S.P., Schindler, M., Wagner, F.E., and Berensmeier, S., 2015, Influencing Factors in the CO-Precipitation Process of Superparamagnetic Iron Oxide Nano Particles: a Model Based Study, *J. Magn. Mater.*, 377, 81–89.
- Sari, F.I.P., 2017, Sintesis, Karakterisasi Nanopartikel Magnetit, Mg/Al(NO<sub>3</sub>)<sub>3</sub> - Hidrotalsit dan Komposit Magnetit-Hidrotalsit, *Jurnal Kimia VALENSI: Jurnal Penelitian dan Pengembangan Ilmu Kimia*, 1(3), 44–49.
- Schwertmann. dan Cornell, R.M., 2003, The Iron Oxides: Structure, Properties, Reactions, *Occurrences and Uses*, 2nd Edition, Wiley-Vch Verlag Gmbh and Co. Kga, Weinheim.
- Seaman, J.C., Bertsch, P.M., and Schwallie, L., 1999, In Situ Cr(VI) Reduction Within Coarse-Textured, Oxide-Coated Soil and Aquifer Systems Using Fe(II) Solutions, *J. Environ. Sci. Technol.*, 33, 938–944.



- Shahnaz, T., Patra, C., Sharma, V. and Selvaraju, N., 2020, A Comparative Study of Raw, Acid-modified and EDTA-complexed Acacia Auriculiformis Biomass for the Removal of Hexavalent Chromium, *Chem. Ecol.*, 36, 360–381.
- Shahrashoub, M. dan Bakhtiari, S., 2020, The Efficiency of Activated Carbon/ Iron Oxide Nanoparticles Composites in Copper Removal: Industrial Waste Recovery, Green Synthesis, Characterization, and Adsorption - Desorption Studies, *Microporous Mesoporous Mater.*, 110692.
- Sharififard, H., Nabavinia, M., dan Soleimani, M., 2016, Evaluation of Adsorption Efficiency of Activated Carbon/Chitosan Composite for Removal of Cr (IV) and Cd (II) from Single and Bi-Solute Dilute Solution, *Adv. Envi. Technol.*, 4, 215–227.
- Singh, V. K. dan Kumar, E. A., 2016, Measurement and Analysis of Adsorption Isoterm of CO<sub>2</sub> on Activated Carbon, *Appl. Therm. Eng.*, 97, 77–86.
- Song, X., Wang, L., Ma, X. and Zeng, Y., 2017, Adsorption Equilibrium and Thermodynamics of CO<sub>2</sub> and CH<sub>4</sub> on Carbon Molecular Sieves. *Appl. Surf. Sci.*, 396, 870–878.
- Sontheimer, J.E., 1985, *Activated Carbon for Water Treatment*, Elsevier, Netherlands.
- Sun, J., Zhou, S., Hou, P., Yang, Y., Weng, J., Li, X. dan Li, M., 2006, Synthesis and Characterization of Biocompatible Fe<sub>3</sub>O<sub>4</sub> Nanoparticles, *J. Biomed. Mater. Res. A.*, 2(80), 333–341.
- Sutamihardja, 2006, *Toksikologi Lingkungan*, Buku Ajar Program Studi Ilmu Lingkungan Universitas Indonesia, Jakarta.
- Taib, S., dan Suharyadi, E., 2015, Sintesis Nanopartikel Magnetite dengan Template Silika dan Karakterisasi Sifat Kemagnetannya, *Indones. J. Appl. Phys.*, 5(1), 23–30.
- Tasanif, R., Isa, Ishak. dan Kunusa, W.R., 2020, Potensi Ampas Tebu Sebagai Adsorben Logam Berat Cd, Cu dan Cr, *Jamb. J. Chem*, 1(2), 33–43.
- Tiravanti, G., Petruzzelli, D., and Passino, R., 1997, Pretreatment of Tannery Wastewaters by An Ion Exchange Process for Cr(III) Removal and Recovery, *Water Sci. Technol.*, 36, 197–207.
- Tran, H.V., Tran, L.D., dan Nguyen, T.N., 2010, Preparation of Chitosan/Magnetite Composite Beads and Their Application for Removal of Pb (II) and Ni (II) from Aqueous Solution, *Mater. Sci. Eng.*, 30, 304–310.
- Tran, V. S., Ngo, H. H., Guo, W., Zhang, J., Liang, S., Ton-That, C. dan Zhang, X., 2015, Typical Low Cost Biosorbents for Adsorptive Removal of Specific Organic Pollutants from Water, *Bioresour. Technol.*, 182, 353–363.
- Van Vlack, L.H., 1995, *Ilmu Dan Teknologi Bahan: Diterjemahkan Oleh Djaprie, S.*, Edisi Kelima, Penerbit UI-Press, Jakarta.

- Villegas L.B, Fernández, P.M., Amoroso, M.J., and de Figueroa, L.I.C., 2008, Chromate Removal by Yeasts Isolated from Sediments of A Tanning Factory and A Mine Site in Argentina, *Biometals*, 5(21), 591–600.
- Wang, N., Zhu, L., Wang, D., Wang, M., Lin, Z., and Tang, H., 2010, Sono-Assited Preparation of Highly Efficient Peroxidase-Like  $\text{Fe}_3\text{O}_4$  Magnetic Nanoparticles for Catalitic Removal of Organic Pollutants with  $\text{H}_2\text{O}_2$ , *Ultrason. Sonochem.*, 17, 526–533.
- Wu, W., He, Q., and Jiang, C., 2008, Magnetic Iron Oxide Nanoparticles: Synthesis and Surface Functionalization Strategies, *Nanoscales Res Lett.*, 3, 397–415.
- Zhang, J., Lin, S., Han, M., Su, Q., Xia, L. and Hui, Z., 2020, Adsorption Properties of Magnetic Magnetite Nanoparticle for Coexistent Cr(VI) and Cu(II) in Mixed Solution, *Water*, 2(12), 446.
- Zhou, X., Korenaga, T., Takahashi, T., Moriwake, T., and Shinoda, S., 1993, A Process Monitoring Controlling System for the Treatment of Wastewater Containing Chromium VI, *Water Res.*, 6(27), 1049–1054.
- Zhu. Y., Hu. J., dan Wang, J., 2014, Removal of  $\text{Co}^{2+}$  From Radioactive Wastewater by Polyvinyl Alcohol (PVA)/Chitosan Magnetite Composite, *Prog. Nucl. Energy*, 71, 172–178.
- Zou, C., Liang, J., Jiang, W., Guan, Y. dan Zhang, Y., 2018, Adsorption Behavior of Magnetic Bentonite for Removing Hg(II) from Aqueous Solutions, *RSC Adv.*, 48(8), 27587–27595.