DAFTAR PUSTAKA

Abdiani, I.M., dan Sari, D.P., 2015, Pemafaatan Kulit Udang dan Cangkang Kepiting Sebagai Bahan Baku Kitosan, *J. Harpodon Borneo*, 8, 142–147.

Ahmad, M., Ahmed, S., Swami, B.L., and Ikram, S., 2015, Adsorption of Heavy Metal Ions: Role of Chitosan and Cellulose for Water Treatment, *Langmuir*, 79, 109–155.

Ali, F., Fithri, A.R., dan Adhitya, R.H., 2017, Pemanfaatan Limbah Karet Alam dan Ampas Tebu sebagai Adsorben Crude Oil Spills, *J. Tek. Kim.*, 23, 9–16.

Anggriani, U.M., Hasan, A., dan Purnamasari, I., 2021, Kinetika Adsorpsi Karbon Aktif dalam Penurunan Konsentrasi Logam Tembaga (Cu) dan Timbal (Pb), J. *Kinet.*, 12, 29–37.

Canra, M., Fadli, A., dan Komalasari, K. Kinetika Adsorpsi Ion Logam Cu^{2+} Menggunakan Tricalciumphosphate Sebagai Adsorben Dengan Variasi Kecepatan Pengadukan dan Temperatur, *J. Online Mhs. Bid. Tek. dan Sains*, 2, 1–6.

Devina, U.A.R., and Anggi Arumsari, 2022, Kajian Literatur Sintesis dan Karakterisasi Nanopartikel Emas Menggunakan Ekstrak Tanaman, *J. Ris. Farm.*, 5, 59–65.

Dąbrowski, A., 2001, Adsorption - From theory to practice, *Adv. Colloid Interface Sci.*, 93, 135–224.

Dong, C., Chen, W., and Liu, C., 2014, Preparation of Novel Magnetic Chitosan Nanoparticle and Its Application for Removal of Humic Acid from Aqueous Solution, *Appl. Surf. Sci.*, 292, 1067–1076.

Dubey, R., Bajpai, J., and Bajpai, A.K., 2016, Chitosan-Alginate Nanoparticles (CANPs) as potential nanosorbent for removal of Hg (II) ions, *Environ. Nanotech.*, 6, 32–44.

Fadlilah, I., Prasetya, A., dan Mulyono, P., 2018, Recovery Ion Hg^{2+} dari Limbah Cair Industri Penambangan Emas Rakyat dengan Metode Presipitasi Sulfida dan Hidroksida, *J. Rekayasa Proses*, 12, 23-24.

Fajari, R.M., Purwanto, A., dan Erdawati, E., 2013, Kapasitas Adsorpsi Komposit Besi Oksida Kapasitas terhadap Ion Logam Pb(II) dalam Medium Cair, *J. Ris. Sains dan Kim. Terap.*, 3, 296–300.

Farida, A., Ariyani, S., Sulistyaningsih, N.E., dan Kurniasari, L., 2019,Pemanfaatan Limbah Kulit Jagung *(Zea mays L.)* sebagai Adsorben Logam Kadmium dalam Larutan, *J. Inov. Tek. Kim.*, 4, 27–32.

Farooq, U., Kozinski, J.A., Khan, M.A., and Athar, M., 2010, Biosorption of Heavy Metal Ions Using Wheat Based Biosorbents a Review of the Recent Literature, *Bioresour. Technol.*, 101, 5043–5053.

Fauziyati, M.R., 2019, Uji Adsorpsi Bentonit Teraktivasi KOH Terhadap Logam Cu (II), *Walisongo J. Chem.*, 2, 80–88.

Ghasemi--Fasae, R.G., Haghigh, M., Mousavi, S.M., and Dehghan, M., 2012, Sorption Characteristics of Heavy Metals onto Natural Zeolite of Clinoptilolite type, *Int. Res. J. Appl. Basic Sci.*, 3, 2079–2084.

Gylienë, O., Razmutë, I., Tarozaitë, R., and Nivinskiene, O., 2003, Chemical Composition and Sorption Properties of Chitosan Produced from Fly Larva shells, *Chem.*, 14, 121–127.

Hamdaoui, O. and Chiha, M., 2007, Removal of Methylene Blue from Aqueous Solutions by Wheat Bran, *Acta Chim. Slov.*, 54, 12-13.

Han, X., Wang, W., and Ma, X., 2011, Adsorption Characteristics of Methylene Blue onto Low Cost Biomass Material Lotus Leaf, *Chem. Eng. J.*, 171, 1–8.

Hashemian, S., Ardakani, M.K., and Salehifar, H., 2013, Kinetics and Thermodynamics of Adsorption Methylene Blue onto Tea Waste/Cu Fe_3O_4 composite, *J. Am. Anal. Chem.*, 4,7.

Ho, Y.-S. and McKay, G., 1999, Pseudo-Second Order Model for Sorption processes, *Process Biochem.*, 34, 451–465.

Holle, R.B., Wuntu, A.D., dan Sangi, M.S., 2013, Kinetika Adsorpsi Gas Benzena pada Karbon Aktif Tempurung Kelapa, *J. MIPA*, 2, 100–104.

Hossain, M.A., Ngo, H.H., Guo, W.S., and Nguyen, T. V., 2012, Removal of Copper from Water by Adsorption onto Banana Peel as Bioadsorbent, *Int. J. Geomate*, 2, 227–234.

Husin, H. dan Zaki, M., 2017, Adsorpsi Logam Cu (II) Menggunakan Kitosan dari Kulit Kerang Hijau, *J. Innov*, 6, 9–16.

Igder, A., Rahmani, A.A., Fazlavi, A., Ahmadi, M.H., Ahmadi Azqhandi, M.H., and Omidi, M.H., 2012, Box-Behnken Design of Experiments Investigation forAdsorption of Cd^{2+} onto carboxymethyl Chitosan Magnetic Nanoparticles, *J. Min. Environ.*, 3, 51–59.

Indirawati, S., 2017, Pollution of Pb and Cd and Health Complaints to Communities in the Belawan Coastal Area, *J. Jumantik*, 2, 54–60.

Irawan, C., Dahlan, B., dan Retno, N., 2015, Pengaruh Massa Adsorben, Lama Kontak Dan Aktivasi Adsorben Menggunakan HCl Terhadap Efektivitas Penurunan Logam Berat (Fe)Dengan Menggunakan Abu Layang Sebagai Adsorben, *JTT (Jurnal Teknol. Terpadu)*, 3, 10-12.

Irnawati, D., Agustiono, P., and Wardhani, E.H., 2010, The Influence of Cu Concentration on Cu-Zeolite to Antibacterial Power in Streptococcus mutans, *J. Zeolit Indones.*, 9, 47–53.

Karim, M.A., Juniar, H., dan Ambarsari, M.F.P., 2022, Adsorpsi Ion Logam Fe dalam Limbah Tekstil Sintesis dengan Menggunakan Metode Batch, *J. Distilasi*, 2, 68–81.

Kazeminezhad, I. and Mosivand, S., 2014, Phase Transition of Electrooxidized Fe_3O_4 and Fe_2O_3. Nanoparticles Using Sintering Treatment, *Acta Phys. Pol. A*, 125, 1210–1214.

Kiswanto, K., Rahayu, L.N., dan Wintah, W., 2019, Pengolahan Limbah Cair Batik Menggunakan Teknologi Membran Nanofiltrasi Di Kota Pekalongan, *J. Litbang*, 17, 72–82.

Kumar, S. and Koh, J., 2014, Physiochemical and optical properties of chitosan based graphene oxide bionanocomposite, *Int. J. Biol. Macromol.*, 70, 559–564.

Kustomo, K., 2020, Uji Karakterisasi dan Mapping Magnetit Nanopartikel Terlapisi Asam Humat dengan Scanning-Electron-Microscope Energy Dispersive X-Ray (SEM-EDX), *Indones. J. Chem. Sci.*, 9, 148–153.

Larous, S., Meniai, A.-H., and Lehocine, M.B., 2005, Experimental Study of the Removal of Copper from Aqueous Solutions by Adsorption using Sawdust, *Desalination*, 185, 483–490.

Letti, C.J., Paterno, L.G., Pereira-da-Silva, M.A., Morais, P.C., and Soler, M.A.G., 2017, The role of Polymer Films on the Oxidation of Magnetite Nanoparticles, *J. Solid State Chem.*, 246, 57–64.

Li, W., Xiao, L., and Qin, C., 2011, The Characterization and Thermal Investigation of chitosan-Fe3O4 Nanoparticles Synthesized Via a Novel One-Step Modifying Process, *J. Macromol. Sci. Part A Pure Appl. Chem.*, 48, 57–64.

Lubis, H., 2022, Perbandingan Karakterisasi Morfologi Fe_3O_4 terhadap Fe_3O_4 Merck melalui Metode Kopresipitasi, *Juripol*, 5, 458–463.

Luo, J., Xu, H., Liu, Y., Zhao, Y., Daemen, L.L., Brown, C., Timofeeva, T. V, Ma, S., and Zhou, H.-C., 2008, Hydrogen Adsorption in a Highly Stable Porous Rare-Earth Metal-Organic Framework: Sorption Properties and Neutron Diffraction Studies, *J. Am. Chem. Soc.*, 130, 9626–9627.

Mahmuda, D., 2022, Modifikasi Permukaan Magnetit dengan Silika dan Aplikasinya sebagai Adsorben Ion Logam Berat Nikel dan Mangan, *Eksergi*, 10, 6–9.

Mahmudah, D., Sakinah, N., dan Suharyadi, E., 2017, Adsorpsi Logam Tembaga (Cu), Mangan (Mn) dan Nikel (Ni) dalam Artificial Limbah Cair dengan Menggunakan Nanopartikel Magnetit (Fe_3O_4), *Indones. J. Appl. Phys.*, 4, 126.

Mahyati, A. and Koesnarpadi, S., 2020, Synthesis Of Chitosan-Magnetite Nanoparticles Cross-Linked Tripolyphosphate as Antibacterial Magnetit Tersambung Silang Tripolifosfat sebgai Antibakterial *Salmonella typhi* dan *Staphylococcus aureus*, *J. At.*, 06, 16–21.

Mirzaei B., E., Ramazani, A., Shafiee, M., and Danaei, M., 2013, Studies on Glutaraldehyde Crosslinked Chitosan Hydrogel Properties for Drug Delivery Systems, *Int. J. Polym. Mater. Polym. Biomater.*, 62, 605–611.

Modrzejewska, Z. and Kaminski, W., 1999, Separation of Cr (VI) on Chitosan Membranes, *Ind. \& Eng. Chem. Res.*, 38, 4946–4950.a

Nasirimoghaddam, S., Zeinali, S., and Sabbaghi, S., 2015, Chitosan Coated Magnetic Nanoparticles as Nano-Adsorbent for Efficient Removal of Mercury Kontents from Industrial Aqueous and Oily Samples, *J. Ind. Eng. Chem.*, 27, 79–87.

Ngapa, Y.D., 2017, Study of The Acid-Base Effect on Zeolite Activation and Its Characterization as Adsorbent of Methylene Blue Dye, *Jurnal Kim. dan Pendidik. Kim.*, 2, 90.

Nuryono, N., Muliaty, E., Rusdiarso, B., Sakti, S.C.W., and Tanaka, S., 2014, Adsorption of Au (III), Cu (II) and Ni (II) on Magnetite Coated with Mercapto Groups Modified Rice Hull Ash Silica, *J. Jpn. Soc.*, 25, 114–121.

Oktarina, E., Adrianto, R., dan Setiawati, I., 2017, Immobilisasi Bakteri Pada Kitosan-Alginat dan Kitin-Alginat, *Maj. TEGI*, 9,2 .

Oladipo, B., Govender-Opitz, E., and Ojumu, T. V., 2021, Kinetics, Thermodynamics, and Mechanism of Cu(II) Ion Sorption by Biogenic Iron Precipitate: Using the Lens of Wastewater Treatment to Diagnose a Typical Biohydrometallurgical Problem, *ACS Omega*, 6, 27984–27993.

Pauzan, M., Kato, T., Iwata, S., dan Suharyadi, E., 2013, Pengaruh Ukuran Butir dan Struktur Kristal Terhadap Sifat Kemagnetan Pada Nanopartikel Magnetit (Fe_3O_4), *Pros. Pertem. Ilm. Fis. Indones. hal*, 24–28.

Peternele, W.S., Fuentes, V.M., Fascineli, M.L., Silva, J.R. da, Silva, R.C., Lucci, C.M., and Azevedo, R.B. de, 2014, Experimental Investigation of The Koprecipitation Method: An Approach to Obtain Magnetite and Maghemite Nanoparticles with Improved Properties, *J. Nanomater.*, 2014, 94.

Piccin, J.S., Dotto, G.L., and Pinto, L.A.A., 2011, Adsorption Isotherms and Thermochemical data of FD\&C Red n 40 Binding by Chitosan, *Brazilian J. Chem. Eng.*, 28, 295–304.

Prasojo, B.A. dan Siahaan, P., 2015, Pengaruh Berat Molekul Kitosan terhadap Efisiensi Enkapsulasi BSA (Bovine Serum Albumin) Menggunakan Agen Crosslink Asam Sitrat, *J. Kim. Sains dan Apl.*, 18, 62–66.

Prayoga, E., 2013, Perbandingan Efek Ekstrak Daun sirih hijau (*Piper betle L.*) dengan Metode Difusi Disk dan Sumuran terhadap Pertumbuhan Bakteri *Staphylococcus Aureus*, 21, 45-48.

Primadevi, S. dan Nafi, R., 2020, Pengaruh Crosslink Agent Pada Pembuatan Nanokitosan Terhadap kadar Flavonoid Ekstrak Etanol Buah Parijoto, *Cendekia J. Pharm.*, 4, 156–168.

Priya James, H., John, R., Alex, A., and Anoop, K.R., 2014, Smart polymers for the controlled delivery of drugs – a concise overview, *Acta Pharm. Sin. B*, 4, 120–127.

Rachma, Y.F, dan Karna, W.I.T., 2019, Material CuO/Bentoit sebagai Bahan Antibakteri *Escherichia Coli*, *Bimipa*, 25, 216–223.

Rastina, R., Sudarwanto, M., dan Wientarsih, I., 2015, Aktivitas Antibakteri Etanol Daun Kari (*Murraya koenigii*) terhadap *Staphylococcus aureus*, Escherichia coli, dan *Pseudomonas sp*., *J. Kedokt. Hewan-Indonesian J. Vet. Sci.*, 9, 55-59.

Reddy, D.H.K. and Lee, S.M., 2013, Application of Magnetic Chitosan Composites for the Removal of Toxic Metal and Dyes from Aqueous Solutions, *Adv. Colloid Interface Sci.*, 201–202, 68–93.

Rezaei, H., Haghshenasfard, M., and Moheb, A., 2017, Optimization of Dye Adsorption using Fe_3O_4 Nanoparticles Encapsulated with Alginate Beads by Taguchi Method, *Adsorpt. Sci. \& Technol.*, 35, 55–71.

Rifani, N.D., Budiyati, I.M., Saa'dah, F., dan Prihatningsih, T., 2019, Daya Antibakteri Nanopartikel Cu Hasil Laser Ablation terhadap Strapylococcus Mutans, *J. Kedokt*, 8, 964–969.

Rohmah, W.M., Salim, M.A., and Hasby, R.M., 2018, Imobilisasi Biomassa Haematococcus Pluvialis pada Sebagai Biosorben Logam Berat Seng (Zn),. In, *Prosiding Seminar Nasional Hayati*., 41, 258–267.

Rumengan, I.F.M., Suptijah, P., Salindeho, N., Wullur, S., and Luntungan, A.H., 2018, Nanokitosan dari Sisik ikan: Aplikasinya sebagai Pengemas Produk Perikanan, 7, 18-19.

Sampaio, C. de G., Frota, L.S., Magalhães, H.S., Dutra, L.M.U., Queiroz, D.C., Araújo, R.S., Becker, H., de Souza, J.R.R., Ricardo, N.M.P.S., and Trevisan, M.T.S., 2015, Chitosan/Mangiferin Particles for Cr(VI) Reduction and Removal, *Int. J. Biol. Macromol.*, 78, 273–279.

Shankar, S. and Rhim, J.W., 2019, Eco-friendly antimicrobial nanoparticles of keratin-metal ion complex, *Mater. Sci. Eng. C*, 105, 11-18.

Sivakami, M.S., Gomathi, T., Venkatesan, J., Jeong, H.S., Kim, S.K., and Sudha, P.N., 2013, Preparation and Characterization of Nano Chitosan for Treatment Wastewaters, *Int. J. Biol. Macromol.*, 57, 204–212.

Song, C., Yu, H., Zhang, M., Yang, Y., and Zhang, G., 2013, Physicochemical Properties and Antioxidant Activity of Chitosan from the Blowfly *Chrysomya Megacephala* Larvae, *Int. J. Biol. Macromol.*, 60, 347–354.

Suiva, K.A., 2014, *Esterifikasi Minyak Goreng Bekas Menggunakan Fotokatalis Komposit TiO2-Zeolit Alam Teraktivasi* (Doctoral dissertation, Universitas Islam Negeri Maulana Malik Ibrahim.

Sulistyarti, H., 2017, *Kimia Analisa Dasar untuk Analisis Kualitatif*, Universitas Brawijaya Press.

Sun, J., Zhou, S., Hou, P., Yang, Y., Weng, J., Li, X., and Li, M., 2007, Synthesis and Characterization of Biocompatible Fe_3O_4 Nanoparticles, *J. Biomed. Mater. Res. Part A*, 80, 333–341.

Susanto, D.S. dan Ruga, R., 2012, Studi Kandungan Bahan Aktif Tumbuhan Meranti Merah (*Shorea leprosula Miq)* sebagai Sumber Senyawa Antibakteri, *Mulawarmnan Sci.*, 11, 181–190.

Susanto, T., 2011, Kajian Kemampuan Adsorpsi Zeolit Alam Aktif Terimmobilisasi Dithizon terhadap Limbah Ion logam Cd (II) terkompetisi Mg (II) dan Cu (II) secara simultan, *J. Din. Penelit. Ind.*, 22, 53–67. Tantowidjojo, V.R., Roosdiana, A., and Prasetyawan, S., 2013, OptimasiAmobilisasi Pektinase dari Bacillus Subtilis Menggunakan Kitosan-Natrium tripolifosfat, *Kim. Student J*, 1, 91–97.

Tran, H.V., Tran, L.D., and 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. C.*, 30, 304–310.

Unsoy, G., Khodadust, R., Yalcin, S., Mutlu, P., and Gunduz, U., 2014, Synthesis of Doxorubicin Loaded Magnetic Chitosan Nanoparticles for pH Responsive Targeted Drug Delivery, *Eur. J. Pharm. Sci.*, 62, 243–250.

Wang, A.L., Yin, H.B., Ren, M., Cheng, Q., Zhou, F., and Zhang, X.F., 2008, Effect of Different Group Containing Organics on Morphology Controlled Synthesis of Nanoparticles at Room Temperature, *Acta Metall. Sin. (Engl Lett.*, 19, 362–370.

Weng, C.-H., Lin, Y.-T., Hong, D.-Y., Sharma, Y.C., Chen, S.-C., and Tripathi, K., 2014, Effective Removal of Copper Ions from Aqueous Solution using Base Treated Black Tea Waste, *Ecol. Eng.*, 67, 127–133.

Widayatno, T., Yuliawati, T., dan Susilo, A.A., 2017, Adsorpsi Logam Berat (Pb) dari Limbah Cair dengan Adsorben Arang Bambu Aktif, *J. Teknol. Bahan Alam*, 1, 17–23.

Wijayanti, I.E., Kurniawati, E.A., dan Solfarina, S., 2019, Studi kinetika adsorpsi Isoterm Persamaan Langmuir dan Freundlich pada Abu Gosok sebagai Adsorben, *Jurnal Kim.*, 4, 175–184.

Wogo, H. E., Nama, M.I.B., and Ola, A.R.B., 2021, Antibacterial Plastic Made from the Composite of Silica Immobilized with Variation of EDTA-Cu and chitosan, *J. Phys. Conf. Ser.*, 2017, 8, 12-15 .

Wogo, H E, Nama, M.I.B., and Ola, A.R.B., 2021, Antibacterial Plastic Made from the Composite of Silica Immobilized with Variation of EDTA-Cu and Chitosan,. In, *Journal of Physics: Conference Series*., 23, 16-21.

Wulandari, I.O., Sabarudin, A., dan Santjojo, D.H.D.J., 2016, Pembuatan Nanopartikel Kitosan-Fe_3O_4 secara Kopresipitasi Ex-Situ dan Karakterisasinya Menggunakan XRD, J. *Nat. B.*, 3, 205–212.

Wulandari, I.O., Sabarudin, A., dan Santjojo, D.H.D.J., 2016b, Pembuatan Nanopartikel Kitosan-Fe_3O_4 secara Kopresipitasi Ex-Situ Menggunakan Tripolyphosphate/Sulfat sebagai Crosslinker dan Karakterisasinya Menggunakan XRD, J. *Nat.*, 3, 205–212.

Yanti, I., 2020, Pemanfaatan Mg/Al Hidrotalsit-Magnetit Sebagai Adsorben Ion Krom, *Jurnal Kim.*, *6*, 11-15.

Yanti, I., Santosa, S.J., and Kartini, I., 2016, Kinetics study of Au (III) adsorption on gallic acid intercalated mg/Al-hydrotalcite, *EKSAKTA. J. Sci. Data Anal.*, 27–35.

Yusniati, K.P., Srikandi, S., dan Syawaalz, A., 2022, Efektifitas Biji Kelor (*Moringa Oleifera*) sebagai Bioadsorben dalam Menurunkan Konsentrasi Fe Dan Mn, *NUKELUS. J.*, *S*, 3, 220–230.

Yuwei, C. and Jianlong, W., 2011, Preparation and Characterization of Magnetic Chitosan Nanoparticles and Its Application for Cu(II) Removal, *Chem. Eng. J.*, 168, 286–292.

Zhang, Y., Chen, Y., Wang, C., and Wei, Y., 2014, Immobilization of 5-Aminopyridine-2-Tetrazole on Cross-Linked Polystyrene for the Preparation of a New Adsorbent to Remove Heavy Metal Ions from Aqueous Solution, *J. Hazard. Mater.*, 276, 129–13.