

DAFTAR PUSTAKA

- Abarna, B., Preethi, T., Karunanithi, A. and Rajarajeswari, G.R., 2016, Influence of Jute Template on The Surface, Optical and Photocatalytic Properties of Sol-Gel Derived Mesoporous Zinc Oxide, *Mater. Sci. Semicond. Process.*, 56, 243–250.
- Abdullah, A.H., Mat R., Somderam, S., Aziz, A.S.S. and Mohamed, A., 2018, Hydrogen Sulfide Adsorption by Zinc Oxide-Impregnated Zeolite (Synthesized From Malaysian Kaolin) for Biogas Desulfurization, *J. Ind. Eng. Chem.*, 65, 334–342.
- Agustin, R., Sari, N. and Zaini, E., 2014, The Release of Ibuprofen from Carbomer 940 Gel of Ibuprofen-Nicotinamide Cocrystal, *J. Sains Farm. Klin.*, 1(1), 79–88.
- Ahda, M., 2011, Sintesis MCM-41 dengan Metode Hidrothermal: Pengaruh Waktu Hidrothermal Rasio CTA/TMA dan Rasio Mol Si/Al, *Tesis*, Jurusan Kimia, FMIPA, Universitas Gadjah Mada, Yogyakarta.
- Atkins, P.W., 1999, *Kimia Fisika*, Edisi 4, Penerbit Erlangga, Jakarta.
- Benhebal, H., Chaib, M., Salomon, T., Geens, J., Leonard, A., Lambert, S.D., Crine, M. and Heinrichs, B., 2013, Photocatalytic Degradation of Phenol and Benzoic Acid Using Zinc Oxide Powders Prepared by Sol-Gel Process, *Alex. Eng. J.*, 52, 517–523.
- Bhattacharyya, K.G. and Gupta, S. S., 2007, Adsorptive Accumulation of Cd(II), Co(II), Cu(II), Pb (II) and Ni(II) from Water on Montmorillonite: Influence of Acid Activation, *J. Colloid Interf. Sci.*, 310, 411-424.
- Domb, A.J., Kumar, N. and Ezra, A., 2011, *Biodegradable Polymers in Clinical Use and Clinical Development*, John Wiley and Sons Inc., Hoboken.
- Estaca, G.J., Montero, P., Ferna, F. and Go, M.C., 2009, Physical and Chemical Properties of Tuna-Skin and Bovine-Hide Gelatin Films with Added Aqueous Oregano and Rosemary Extracts, *J. Foodhyd.*, 23, 1334-1341.
- Falah, I.I., Ruliatima dan Triyono, 2015, Reversible Second Order Kinetics of Sorption-Desorption of Cr(VI) Ion on Activated Carbon from Palm Empty Fruit Bunches, *Indones. J. Chem.*, 15(3), 288-294.
- Fedeyko, J.M., Vlachos, D.G. and Lobo, R.F., 2006, Understanding the Differences Between Microporous and Mesoporous Synthesis Through the Phase Behaviour of Silica, *Micropor. Mesopor. Mater.*, 90, 102-111.

- Ho, Y.S. and McKay, G., 1998, A Comparison of Chemisorption Kinetic Models Applied to Pollutant and Various Sorbent, *Trans. Ichem. E.*, 76, 332-340.
- Hsu, C.H., Lim, H.P., Tang, C.Y. and Lim, C.Y., 2007, Synthesis of Mesoporous Silica and Mesoporous Carbon Using Gelatin as Organic Template, *Mesostructur. Mater*, 385-388.
- Jin, X., Bailey G.W., Yu, Y.S. and Lynch, A.T., 1996, Kinetics of Single and Multiple Metal Ion Sorption Processes on Humic Substances, *Soil. Sci.*, 8, 509-520.
- Karim, A.A. and Bhat, R., 2009, Fish Gelatin: Properties, Challenges, and Prospects as an Alternative to Mammalian Gelatins, *Food. Hydrocoll.*, 23, 563-576.
- Kim, J., Jung, D., Park, Y., Kim, Y., Moon, D.W. and Lee, T.G., 2007, Quantitative Analysis of Surface Amine Groups on Plasmopolymerized Ethylenediamine Films Using UV-visible Spectroscopy Compared to Chemical Derivatization with FT-IR Spectroscopy, XPS and TOF-SIMS, *Appl. Surf. Sci.*, 253 (9), 4112-4118.
- Kittiphattanabawon, P., Benjakul, S., Visessanguan, W., Nagai, T. dan Tanaka, M., 2005, Isolation and Characterisation of Collagen from the Skin of Brownbanded Bamboo Shark (*Chiloscyllium punctatum*), *Food. Chem.*, 89(8), 363-372.
- Kumar, S., Ahlawat, W., Kumar, R. and Dilbaghi, N., 2015, Graphene, Carbon Nanotubes, Zinc Oxide and Gold as Elite Nanomaterials for Fabrication of Biosensors or Healthcare, *Biosens. Bioelectron.*, 10-12.
- Lancheros, J.C., Madera-Parra, C.A., Caselles-Osorio, A., Torres-López W.A. and Vargas-Ramírez, X.M, 2019, Ibuprofen and Naproxen Removal from Domestic Wastewater Using a Horizontal Subsurface Flow Constructed Wetland Coupled to Ozonation, *J. Ecol. Eng.*, 135, 89-97.
- Lefatshe, K., Muiva, C.M. and Kebaabetswe, L.P., 2017, Extraction of Nanocellulose and Insitu Casting of ZnO/Cellulose Nanocomposite with Enhanced Photocatalytic and Antibacterial Activity, *J. Carbpol.*, 164, 301-308.
- Li, X., Wang, Y., Yuan, S., Li, Z., Wang, B., Huang, J., Deng, S. and Yu, G., 2014, Degradation of the Anti-Inflammatory Drug Ibuprofen by Electro-Peroxone Process, *Water. Res.*, 63, 81-93.
- Lippens, E., Swennen, I., Girones, J., Declercq, H., Vertenten, G., Vlamincx, L., Gasthuys, F., Schacht, E. and Cornelissen, R., 2011, Cell Survival and

Proliferation after Encapsulation in a Chemically Modified Pluronic F-127 Hydrogel, *J. Biomater. Appl.*, 27 (7), 828–839.

Miao, J. and Liu, B., 2016, Cadmium Selenide-Sensitized Upright-Standing Mesoporous Zinc Oxide Nanosheets for Efficient Photoelectrochemical H₂ Production, *J. Energy Chem.*, 3 (25), 371–374.

Muhammad, N., Pair, J., Smith, M. D. And Wheatley, A, D., 1998, Adsorption of Heavy Metal in Slow Sand Filters, *Proceedings of the 24th WEOC International Conference on Water Supply and Sanitation*, Durban, South Africa.

Muhdarina, Mohammad, A.W. and Muchtar, A., 2014, Potensi Adsorpsi Polutan Anorganik oleh Lempung Cengar: Kajian Isoterm dan Mekanisme Adsorpsi Batch Kation Ni (II) di Dalam Media Air, *Repository Universitas Riau*, Riau, 19-28.

Muyonga, J.H., Cole, C.G.B. and Duodu, K.G., 2003, Characterisation of Acid Soluble Collagen From Skin of Young and Adult Nile Perch (*Lates niloticus*), *Food. Chem.*, 85, 81-89.

Nandiyanto, A.B.D., Kim, S.G, Iskandar, F. and Okuyama, K., 2009, Synthesis of Spherical Mesoporous Silica Nanoparticle with Nanometer-Size Controllable Pores and Outer Diameters, *Micropor. Mesopor. Mater.*, 120, 447-453.

Nguyen, D.T.C., Le, H.T.N., Do, T.S., Pham, V.T., Tran, D.L., Ho, V.T.T., Tran, T.V., Nguyen, D.C., Nguyen, T.D., Bach, L.G., Ha, H.K.P. and Doan, V.T., 2019, Metal-Organic Framework MIL-53(Fe) as an Adsorbent for Ibuprofen Drug Removal from Aqueous Solutions: Response Surface Modeling and Optimization, *Indones. J. Chem.*, 11-12.

Nikolaou, A., Meric, S. and Fatta, D., 2007, Occurrence Patterns of Pharmaceuticals in Water and Wastewater Environments, *Anal. Bioanal. Chem*, 387 (4), 1225-1234.

Ningsih, S.K.W., 2016, *Sintesis Anorganik*, UNP Press, Padang, 27-28.

Oscik, J., 1982, *Adsorption*, Ellis Horwood Limited, England, 256-258.

Pandey, P.K., Sharma, S.K. and Sambhi, S.S., 2010, Kinetics and Equilibrium Study of Chromium Adsorption on Zeolite NaX, *Int. J. Environ. Sci. Technol.*, 7 (2), 395–404.

- Patil, S., Deshmukh, V., Remukdas, S. and Patel, N., 2010, Kinetics of Adsorption Crystal Violet from Aqueous Solutions Using Different Natural Materials, *Intern. J. Environ. Sci.*, 6(1), 1116-1134.
- Perwitasari, D.S., 2008, Hidrolisis Tulang Sapi Menggunakan HCl untuk Pembuatan Gelatin, *Makalah Seminar Nasional Soeboardjo Brotohardjono*, 18 Juni 2008, 2-3.
- Pradini, D., Juwono, H., Madurani, K.A. and Kurniawan, F., 2018, A Preliminary Study of Identification Halal Gelatin Using Quartz Crystal Microbalance (QCM) Sensor, *Mal. J. Fund. Appl. Sci.*, 3(14), 325-330.
- Pusceddu, F.H., Choueri, R.B., Pereira, C.D.S., Cortez, F.S., Santos, D.R.A., Moreno, B.B., Santos, A.R., Rogero, J.R. and Cesar, A., 2018, Environmental Risk Assesment of Triclosan and Ibuprofen in Marine Sediments Using Individual and Sub Individual Endpoints, *J. Environ. Pollut*, 232, 274-283.
- Radzimska, K. and Jesionowski, T., 2014, Zinc Oxide-from Synthesis to Application: A Review, *Materials (Basel)*, 4(7), 2833-2881.
- Rahmawati, A. and Santosa, S.J., 2012, Studi Adsorpsi Logam Pb(II) dan Cd (II) pada Asam Humat dalam Medium Air, *Alchemy*, 1(2), 46-57.
- Ruksudjarit, A., Pengpat, K., Rujijanagul, G. and Tunkasiri, T., 2008, Synthesis and Characterization of Nanocrystalline Hydroxyapatite from Natural Bovine Bone, *Curr. Appl. Phys*, 8(3), 270-272.
- Rustan, M., Subaer and Irhamsyah, 2015, Studi Tentang Pengaruh Nanopartikel Zno (Seng Oksida) Terhadap Kuat Tekan Geopolimer Berbahan Dasar Metakaolin, *J. Sains dan Pendidik. Fis.*, 3(1), 286-291.
- Santosa, S.J., Siswanta, D., Kurniawan, A., and Rahmanto, W.H., 2007, Hybrid of Chitin and Humic Acid as High Performance Sorbent for Ni(II), *Surf. Sci.*, 601(22), 5155-5161.
- Seader, J.D. and Henley, E.J., 1998, *Separation Process Principles*, John Wiley & Sons.Inc, New York.
- Setyawan, B. and Balgis, R., 2011, Mesoporous Silicas Prepared from Sodium Silicate Using Gelatin Templating, *Asia-Pac. J. Chem. Eng*, 1-7.
- Sharma M., Joshi, M., Nigam, S., Shree, S., Avasthi, D.K., Adelong, R., Srivastava, S.K. and Mishra, Y., 2019, ZnO Tetrapods and Activated Carbon Based Hybrid Composite: Adsorbents for Enhanced

Decontamination of Hexavalent Chromium from Aqueous Solution, *Chem. Eng. J.*, 358, 540–551.

Sing, K.S.W., Everett, D.H., Haul, R.A.W., Moscou, L., Pierotti, R.A., Rouquerol, J. and Siemieniewska, T., 1985, Reporting Physisorption Data for Gas/Solid Systems with Special Reference to the Determination of Surface Area and Porosity (Recommendations 1984), *Pure. Appl. Chem.*, 57, 603-619

Singh, P. and Nanda, A., 2014, Enhanced Sun Protection of Nano-Sized Metal Oxide Particles Over Conventional Metal Oxide Particles: An In Vitro Comparative Study, *Int. J. Cosmet. Sci.*, 3(36), 273–283.

Su, Y., Cockerill, I., Wang, Y., Qin Y.X., Chang, L., Zheng, Y. and Zhu, D., 2019, Zinc-Based Biomaterials for Regeneration and Therapy, *Trends. Biotechnol.*, 4 (37), 428–441.

Sukadjo, 1990, *Kimia Anorganik*, Penerbit Rineka Cipta, Jakarta.

Sun, H., Luo, M., Weng, W., Cheng, K., Du, P., Shen, G. and Han, G., 2008, Room Temperature Preparation of ZnO Nanosheets Grown on Si Substrates by a Seed-Layer Assisted Solution Route, *Nano.Tech.*, 19,1–5.

Trisunaryanti, W., Lisna, P.S., Kartini, I., Sutarno., Falah, I.I. and Triyono, 2016, Extraction of Gelatin from Bovine Bone and its Use as Template in Synthesis of Mesoporous Silica, *Asian. J. Chem.*, 8(5), 996-1000.

Triyono, 2006, *Kimia Fisik II, Kesetimbangan Kimia*, Jurusan Kimia, FMIPA, Universitas Gadjah Mada, Yogyakarta.

Ulfa, M. and Apriliani, W., 2020, Physico-Chemical Characteristics of Gelatin as Green Template for Nanomaterial Production, *AIP Conference Proceeding*, 2020, 41-42.

Ulfa, M., Aristia, K.S. and Prasetyoko, D., 2018a, Synthesis of Mesoporous Silica Materials Via Dual Templating Method from Starch of Waste Rice and Their Application for Drug Delivery System, *AIP Conference Proceedings*, 22-21.

Ulfa, M., Iswanti, Y., 2020, Ibuprofen Adsorption Study by Langmuir, Freundlich, Temkin and Dubinin-Radushkevich Models Using Nano Zinc Oxide from Mild Hydrothermal Condition, *The 2nd International Conference on Chemistry and Material Science (IC2MS)*, 4-6.

Ulfa, M., Prasetyoko, D., Mahadi, A.H. and Bahruji, H., 2019, Size Tunable Mesoporous Carbon Microspheres Using Pluronic F127 and Gelatin as Co-Template for Removal of Ibuprofen, *J. Sci. Tot. Env.*, 6-7.

- Ulfa, M., Sari, A.Y. and Prasetyoko, D., 2018b, Synthesis of Unique Natura Silica (UNS) Material via Dual co-Templating Method using Starch of Waste Rice-Gelatin Composite and Their Performance in Drug Delivery System, *AIP Conference Proceedings*, 2049.
- Ulfa, M., Trisunaryanti, W., Falah, I.I. and Kartini, I., 2014, Synthesis of Mesoporous Carbon Using Gelatin as Source of Carbon by Hard Template Technique and its Characterizations, *J. Chem. Eng.*, (1)1, 1–5.
- Umaningrum, D., Santoso, U. T., Nurmasari, R. and Yunus, R., 2010, Kinetika Adsorpsi Pb(II),Cd(II), dan Cr(III) pada Adsorben Produk Pengikatan Silang Terproteksi Asam Humat/Kitosan. *Indones. J. Chem.*, 10(1), 80-87.
- Uricanu, V.I., Duits, M.H.G., Filip, D., Nelissen, R.M.F. and Agterof, W.G.M., 2006, Surfactant-Mediated Water Transport at Gelatin Gel/Oil Interfaces, *J. Coll. Inter. Sci*, 298 (2), 920–934.
- Utrilla, J.R., Polo, M.S., Garcia, M.A.F., Joya, G.P. and Perez, R.O., 2013, Pharmaceuticals as Emerging Contaminants and Their Removal from Water, *Chemosphere*, 93 (7), 1268-1287.
- Wang, L., Han, C., Nadagouda, M.N. and Dionysiou, D.D., 2016, An Innovative Zinc Oxide-Coated Zeolite Adsorbent for Removal of Humic Acid, *J. Hazard. Mater.*, 313, 283–290.
- Wang, L., Liu, G., Zou, L. and Xue, D., 2010, Phase Evolution from Rod-like ZnO to Plate-like Zinc Hydroxysulfate during Electrochemical Deposition, *J. Alloy. Compd.*, 493, 471-475.
- Wang, S., Song, Z., Wang, J., Dong, Y. and Ming, Wu., 2010, Solubilities of Ibuprofen in Different Pure Solvents, *J. Chem. Eng.*, 55 (11), 5283–5285.
- Wang, X., Zhou, G., Zhang, H., Du, S., Xu, Y. and Wang, C., 2011, Immobilization and Catalytic Activity of Lipase on Mesoporous Silica Prepared from Biocompatible Gelatin Organic Template, *J. Non-Cryst. Solids.*, 357, 3027-3032.
- Wu, J., Liu, Y., Cui, Y., Ouyang, J., Baker, A.P., Li, Z. and Huayu, Z., 2018. Pluronic F127 as Auxiliary Template for Preparing Nitrogen and Oxygen Dual Doped Mesoporous Carbon Cathode of Lithium-Oxygen Batteries, *J. Phys. Chem. Solids.*, 113, 31–38.
- Xing, J., Liu, Z., Zhou, J., Wang, Q., Geng, Y., Du, Y. and Pan, Q., 2019, Mesostructure Carbon-Templated Synthesis of Mesoporous ZnO by A Nanocasting Route For NO₂ Sensing, *Mater. Lett.*, 244,182–185.

- Yang, C., Yang, S., Fan, H., Wang, Y. and Shangguan, J., 2019, Tuning the ZnO-Activated Carbon Interaction Through Nitrogen Modification for Enhancing The H₂S Removal Capacity, *J. Coll. Inter.Sci.*, 555, 548– 557.
- Yousefinejad, S., Eftekhari, R., Honarasa, F., Zamanian Z. and Sedaghati, F., 2017, Comparison between The Gas-Liquid Solubility of Methanol and Ethanol in Different Organic Phases Using Structural Properties of Solvents, *J. Mol. Liq.*, 241, 861–869.
- Yue, S., Yan, Z., Shi, Y. and Ran, G., 2013, Synthesis of Zinc Oxide Nanotubes within Ultrathin Anodic Aluminum Oxide Membrane by Sol-Gel Method, *Mater. Lett.*, 98, 246–249.
- Zahra, A.P. and Carolia, N., 2017, Obat Anti-inflamasi Non-steroid (OAINS): Gastroprotektif vs Kardiotoksik, *J. Major.*,6,153–158.
- Zhang, D. and Liu, X., 2013, Synthesis of Polymer-Stabilized Monometallic Cu and Bimetallic Cu/Ag Nanoparticles and Their Surface-Enhanced Raman Scattering Properties, *J. Mol. Struct.*, 1035, 471-475.
- Zhao, D., Feng, J., Hao, Q., Melosh, N., Predrickson, G.H., Chamelka, B.F. and Stucky, G.D., 1998, Triblock Copolymer Synthesis of Mesoporous Silica with Periodic 50 to 300 Å Pores, *Science*, 279, 548-552.