

DAFTAR PUSTAKA

- Alawiyah, T., 2012, Pengembangan TiO₂ pada Abu Dasar Batubara (*Bottom Ash*) dan Uji Aktivitasnya Sebagai Fotokatalis dalam Degradasi Zat Warna Metilen Biru, *Tesis*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Anggoro, S.W., 2016, Pengujian Abu Vulkanik Gunung Kelud Sebagai Adsorben untuk Menghilangkan Ion Pb(II) dalam Larutan, *Skripsi*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Anonim, 1991, *Keputusan Menteri Negara Lingkungan Kependudukan dan Lingkungan Hidup No 3 tentang Pedoman Penetapan Baku Mutu Lingkungan*.
- Barakat, M.A., 2005, Adsorption Behaviour of Copper and Cyanide Ions at TiO₂-Solution Interface, *J. Colloid Interface Sci.*, 291, 345-352.
- Bathia, R.B. and Brinker, C.J., 2000, Aqueous Sol-Gel Process for Protein Encapsulation, *Chem. Mater.*, 12(8), 2434-2441.
- Bina, B., Kermani, M., Movahedian, H., and Khazaei, Z., 2006, Biosorption of Copper and Zinc from Aqueous Solutions by Non Living Biomass Marine Brown Algae *sargassum* sp., *J. Biol. Sci.*, 9(8): 1525-1530.
- Boer, K.W., 1992, *Survey of Semiconductor Physics*, Van Nostrand Reinhold, New York.
- Brady, James E., 1999, *Kimia Universitas Asas dan Struktur*, Edisi Kelima, Jilid Satu, Binarupa Aksara, Jakarta.
- Brinker, C.J. and Scherer, W.J., 1990, *Sol-Gel Science: The Physic and Chemistry of Sol-Gel Processing*, Academic Press, San Diago.
- Cai, R., Kubota, Y., Shuin, T., Sakai, H., Hashimoto, K. and Fujishima, A., 1992. Induction of Cytotoxicity by Photoexcited TiO₂ Particles, *Cancer Res.*, 52(4), 2346-2348.
- Chen, D and Ray, A.K., 2001, Removal of Toxic Metal Ions from Wastewater by Semiconductor Photocatalysis, *Chem. Eng. Sci.*, 56, 1561-1570.
- Cotton, F.A. and Wilkinson, G., 1972, *Advanced Inorganic Chemistry – A Comprehensive Text*. 3th Ed., Interscience Publisher, New York.
- Day, R.A., and Underwood, A.L., 2002, *Analisis Kimia Kuantitatif*, diterjemahkan oleh: Sofyan, I., dan Simamarta, K., edisi keenam, Erlangga, Jakarta.
- Doyle, F.M. and Liu, Z., 2003, The Effect Of Triethylenetetraamine (Trien) on The Ion Flotation of Cu²⁺ and Ni²⁺, *J. Colloid Interface Sci.*, 258(2), 396-403.

- Fitriani, A.N.H., 2007, Kajian Pengaruh Konsentrasi Awal, Waktu Paparan dan Adanya Asam Oksalat Terhadap Fotoreduksi Ion Cu(II) Terkatalisis TiO₂, *Skripsi*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Foster, N. S., Noble, R. D. and Koval, C., 1993, Reversible Photoreductive Deposition and Oxidative Dissolution Of Copper Ions in Titanium Dioxide Aqueous Suspensions, *Environ. Sci. Technol.*, 27(2), 350–356.
- Hardjata, R.A., 2016, Karakterisasi Erupsi Gunung Kelud Tahun 2014 Berbasis Komposisi Kimia Batuapung, *Skripsi*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Hawari, A.H and Catherine N.M., 2006, Biosorption of Lead(II), Cadmium(II), Copper(II) and Nickel(II) by Anaerobic Granular Biomass, *Bioresour. Technol.*, 97, 692–700.
- Hoffmann, M.R., Martin, S., Choi, W. and Bahnemann, D.W., 1995, Environmental Applications of Semiconductor Photocatalysis, *Chem. Rev.*, 95(1), 69–96.
- Hsu, Y.Y., Hsiung, T.L., Paul Wang, H., Fukushima, Y., Wei, Y.L. and Chang, J.E., 2008, Photocatalytic Degradation of Spill Oils on TiO₂ Nanotube Thin Films, *Mar. Pollut. Bull.*, 57(6–12), 873–876.
- Iler, R.K., 1955, *The Colloid Chemistry of Silica and The Silicates*, Cornell University Press, New York.
- Iqbah, I.P., 2016, Preparasi TiO₂/SiO₂ Menggunakan Abu Vulkanik Gunung Kelud Sebagai Sumber Silikat Dan Penggunaannya Pada Fotoreduksi Gas CO₂, *Tesis*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Kabra, K., Chaudhary, R. and Sawhney, R.L., 2008, Solar Photocatalytic Removal of Cu(II), Ni(II), Zn(II) and Pb(II): Speciation Modeling of Metal-Citric Acid Complexes, *J. Hazard. Mater.*, 155(3), 424–432.
- Kang, M., Suk-Jin, C. and Park, J.Y., 2003, Photocatalytic Performance of Nanometer-sized Fe_xO_y/TiO₂ Particle Synthesized by Hydrothermal Method, *Catal. Today*, 97, 87–97.
- Klankaw, P., Chawengkijwanich, C., Grisdanurak, N. and Chiarakorn, S., 2012, Superlattices and Microstructures The Hybrid Photocatalyst of TiO₂-SiO₂ Thin Film Prepared from Rice Husk Silica, *Superlattices Microstruct.*, 51, 343–352.
- Ko, S., Fleming, P.D., Joyce, M. and Ari-Gur, P., 2009, High Performance Nano-Titania Photocatalytic Paper Composite. Part II: Preparation and Characterization of Natural Zeolite-Based Nano-Titania Composite Sheets and Study of Their Photocatalytic Activity, *Mater. Sci. Eng. B*, 164, 135–139.

- Krisnanti, G.Y., 2016, Pemanfaatan Abu Vulkanik Gunung Kelud Sebagai Sumber Silika Pada Pembuatan Fotokatalis TiO₂/SiO₂ dan Uji Aktivitasnya untuk Fotodegradasi Limbah Laundry, *Skripsi*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Kumar, D.A., Xavier, J.A. and Shyla, J.M., 2013, Synthesis and Structural, Optical and Electrical Properties of TiO₂/SiO₂ Nanocomposites, *J. Mater. Sci.*, 48, 3700-3707.
- Lestari, N.D., 2016, Pengaruh Disolusi Abu Vulkanik Gunung Kelud Dengan Larutan Na₂EDTA Terhadap Kemampuan Adsorpsinya Pada Ion Pb(II), *Skripsi*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Linggarweni, B.I., 2014, Kajian Fotoreduksi Ion Cr(VI) Dengan Menggunakan Fotokatalis TiO₂-Resin, *Tesis*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Linsebigler, A.L., Linsebigler, A.L., Yates Jr, J.T., Lu, G., and Yates, J. T., 1995, Photocatalysis on TiO₂ Surfaces: Principles, Mechanisms, and Selected Results, *Chem. Rev.*, 95(3), 735–758.
- Mahyar, A., Behnajady, M.A. and Modirshahla, N., 2010, Characterization and Photocatalytic Activity of SiO₂-TiO₂ Mixed Oxide Nanoparticles Prepared by Sol-Gel Method, *Indian J. Chem.*, 49A, 1593-1600.
- Mashuni, 1999, Bisorpsi Tembaga dan Krom oleh Biomassa *Saccharomyces Cerevisiae*, *Tesis*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Melián, E.P., Díaz, O.G., Méndez, A.O., López, C.R., Suárez, M.N., Rodríguez, J.M.D., Navío, J.A., Hevia, D.F. and Peña, J.P., 2013, Efficient and Affordable Hydrogen Production by Water Photo-Splitting Using TiO₂-Based Photocatalysts, *Int. J. Hydrogen Energy*, 38(5), 2144–2155.
- Murashkevich, A.N., Lavitskaya, A.S., Barannikova, T.I. and Zharskii, I.M., 2008, Infrared Absorption Spectra and Structure of TiO₂-SiO₂ Composites, *J. Appl. Spectrosc.*, 75(5), 724-728.
- Murcia, J.J., Ávila-Martínez, E.G., Rojas, H., Navío, J.A. and Hidalgo, M.C., 2017, Study of The *E. Coli* Elimination from Urban Wastewater Over Photocatalysts Based on Metallized TiO₂, *Appl. Catal. B*, 200, 469–476.
- Noviati, K., 2005, Studi Adsorpsi Pb(II), Cu(II) dan Cr(III) pada C-4 hidroksi-3-Metoksifenilkaliks (4) Resonsinarena, *Skripsi*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Nurhayati, S., 2007, Kajian Pengaruh pH Larutan, Massa Fotokatalis dan Asam Askorbat Terhadap Efektivitas Fotoreduksi Ion Cu(II) Terkatalis TiO₂, *Skripsi*, Departemen Kimia FMIPA UGM, Yogyakarta.

- Park, O.K. and Kang, Y.S., 2005, Preparation and Characterization of Silica-Coated TiO₂ Nanoparticle, *Colloids Surf., A: Physicochem. Eng.*, 261-265.
- Pavasant, P., Apiratikul, Sungkhum, V., Suthiparinyanont, P., Wattanachira, S. and Marhaba, T.F., 2005, Bisorption of Cu²⁺, Cd²⁺, P²⁺ and Zn²⁺ Using Dried Marine Green Macroalga *Caulerpa Letilifera*, *Bioresour. Tech.*, 30, 359-373.
- Peter, A., Mihaly-cozmuta, L., Mihaly-cozmuta, A. and Nicula, C., 2013, Photocatalytic Efficiency of Zeolite-Based TiO₂ Composites for Reduction of Cu(II): Kinetic Models, *Int. J. Appl. Ceram. Technol.*, 1-14.
- Prabandari, T., 1999, Identifikasi Situs Aktif Adsorpsi Cu(II) pada Permukaan Biomassa *Chaeteros Calcitrans* dan *Chlorella sp*, *Skripsi*, Jurusan Kimia FMIPA UGM, Yogyakarta.
- Pratama, A.F., 2016, Pengaruh Perlakuan NaOH Terhadap Kemampuan Adsorpsi Abu Vulkanik Gunung Kelud Pada Ion Pb(II), *Skripsi*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Qourzal, S., Barka, N., Tamimi, M., Assabbane, A., Nounah, A., Ihlal, A and Ait-Ichou, Y., 2008, Sol-Gel Synthesis of TiO₂/SiO₂ Photocatalys for β-Naphthol Photodegradation, *J. Mater. Sci.*, 29, 1616-1620.
- Rose, W.L. and Durant, A.J., 2009, Fine Ash Content of Explosive Eruptions, *Journal of Volcanology and Geothermal Research*, 186, 31-39.
- Ruspita, R., 2016, Pengaruh Kadar TiO₂ Terhadap Aktivitas Fotokatalis TiO₂/SiO₂-(Abu Vulkanik) Pada Fotooksidasi Amonia, *Skripsi*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Sari, L.N.I., 2016, Fotodegradasi Surfaktan Anionik dalam Limbah *Laundry* Menggunakan Fotokatalis TiO₂/SiO₂ dari Abu Vulkanik Gunung Kelud Sebagai Sumber SiO₂, *Skripsi*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Shi, H., Magaye, R., Castranova, V. and Zhao, J., 2013, Titanium Dioxide Nanoparticles: a Review of Current Toxological Data, *Part. Fibre Toxicol.*, 10(15), 1-33.
- Spark, K.M., Wells, J.D. and Johnson, B.B., 1997, The Interaction of Humid Acid with Heavy Metal, *J. Soil. Resc.*, 35, 89-101.
- Supriharyono, 2000, *Pelestarian dan Pengelolaan Sumber Daya Alam di Wilayah Pesisir Tropis*, Garamedia Pustaka Utama, Jakarta.

- Tawa, B.D., 2001, Pengaruh Perlakuan Asam Terhadap Sifat Adsorpsi Cu(II) dan Zn(II) pada Zeolit Alam, *Skripsi*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Vanadianto, F.A., 2015, Pengaruh Suhu Kalsinasi, Massa Lignin, Konsentrasi Ti(IV) Terhadap Fotoaktivitas Katalis TiO₂/Lignin pada Fotoreduksi Ion Hg(II), *Skripsi*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Veli, S. and Alyüz, B., 2007, Adsorption of Copper and Zinc from Aqueous Solutions by Using Natural Clay, *J. Hazard. Mater.*, 149(1), 226–233.
- Wahyuni, E.T., Triyono, S., dan Suherman, 2012, Penentuan Komposisi Kimia Abu Vulkanik dari Erupsi Gunung Merapi, *J. Ling.*, 19.
- Wanna, D., 2008, Pengaruh Penambahan Ammonia dalam Berbagai Konsentrasi dan pH Larutan Terhadap Efektivitas Fotoreduksi Ion Cu(II) Terkatalis TiO₂, *Skripsi*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Widodo, A., 2015, Abu Vulkanik Gunung Kelud Sebagai Sumber SiO₂ pada Preparasi Fotokatalis TiO₂/SiO₂ dan Uji Aktivitasnya untuk Fotoreduksi Cr(IV), *Tesis*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Xu, Y. and Langford, C.H., 1997, Photoactivity of Titanium Dioxide Supported on MCM41, Zeolite X, and Zeolite Y, *J. Phys. Chem. B*, 101(16), 3115–3121.
- Yener, H.B. and Helvacı, S.S., 2015, Effect of Synthesis Temperature on The Structural Properties and Photocatalytic Activity of TiO₂/SiO₂ Composites Synthesized Using Rice Husk Ash as a SiO₂ Source, *Sep. Purif. Technol.*, 140, 84-93.
- Yuafeng, C., Hui, W., Mingjuan, H. and Goufeng, G., 2009, Photocatalytic Degradation of Organic Pollutants in Purified Terephthalic Acid Wastewater with Activated Carbon Supported Titanium Dioxide, In *International Conference on Energy and Environment Technology*, 658-661.
- Zhao, W., Zhang, J., Zhu, X., Zhang, M., Tang, J., Tan, M. and Wang, Y., 2014, Enhanced Nitrogen Photofixation on Fe-Doped TiO₂ with Highly Exposed (101) Facets in The Presence of Ethanol as Scavenger, *Appl. Catal. B*, 144, 468–477.