



DAFTAR PUSTAKA

- Anonim, 2001, Peraturan Pemerintah Nomor 82 tentang Pengelolaan Kualitas Air dan Pengendalian Pencemaran Air.
- Anonim, 2005, Standar Nasional Indonesia 06-6989.51-2005 tentang Cara Uji Kadar Surfaktan Anionik dengan Spektrofotometer Secara Biru Metilen.
- Asok, A.K., and Jisha, M.S., 2012, Assessment of Soil Microbial Toxicity and Acute Exposure of the Anionic Surfactant Linear Alkylbenzene Sulphonate, *J. Environ. Sci. Technol.*, 5(5), 354-363.
- Asok, A.K., and Jisha, M.S., 2012, Biodegradation of the Anionic Surfactant Linear Alkylbenzene Sulfonate (LAS) by Autochthonous *Pseudomonas* sp., *Water Air Soil Pollut.*, 223, 5039-5048.
- Ayrancı, E., and Duman, O., 2007, Removal of Anionic Surfactants from Aqueous Solutions by Adsorption onto High Area Activated Carbon Cloth Studied by in Situ UV Spectroscopy, *J. Hazard. Mater.*, 148(1), 75-82.
- Basavarajappa, P.S., Patil, S.B., Ganganagappa, N., Reddy, K.R., Raghu, A. V., and Reddy, C.V., 2020, Recent Progress in Metal-doped TiO⁺, Non-metal Doped/Codoped TiO₂ and TiO₂ Nanostructured Hybrids for Enhanced Photocatalysis, *Int. J. Hydrogen Energy*, 45, 7764-7778.
- Bendjeffal, H., Djebli, A., Mamine, H., Metidji, T., Dahak, M., Rebbani, N., and Bouhedja, Y., 2018, Effect of the Chelating Agents on Bio-sorption of Hexavalent Chromium Using Agave Sisalana Fibers, *Chin. J. Chem. Eng.*, 26(5), 984-992.
- Binas, V.D., Sambani, K., Maggos, T., Katsanaki, A., and Kiriakidis, G., 2012, Synthesis and Photocatalytic Activity of Mn-doped TiO₂ Nanostructured Powders under UV and Visible Light, *Appl. Catal. B*, 112, 79-86.
- Bloch, J.Z., Dillert, R., and Bahnemann, D.W., 2012, Designing Optimal Metal-Doped Photocatalysts: Correlation between Photocatalytic Activity, Doping Ratio, and Particle Size, *J. Phys. Chem. C.*, 116, 25558-25562.
- Bsiri, N., Zrir, M.A., Bardaoui, A., and Bouaïcha, M., 2016, Morphological, Structural and Ellipsometric Investigations of Cr Doped TiO₂ Thin Films Prepared by Sol-Gel and Spin Coating, *Ceram Int.*, 42(9), 10599-10607.
- Budiawan, Fatima, Y., and Khairani, N., 2010, Optimasi Biodegradabilitas dan Uji Toksisitas Hasil Degradasi Surfaktan Linear Alkilbenzena Sulfonat (LAS) sebagai Bahan Deterjen Pembersih, *MAKARA Sci. Ser.*, 13, 125-133.
- Castaneda, C., Santos, D., Hernandez, J.S., Alvarez, A., Rojas, H., Gomez,, R., Rajabi, F., Martinez, J.J., and Luque, R., 2023, Efficient NiO/F-TiO₂ Nanocomposites for 4-Chlorophenol Photodegradation, *Chemosphere*, 315, 137606.



- Collivignarellia, M.C., Miino, M.C., Baldi, M., Manzi, S., Abba, A., and Bertanza, G., 2019, Removal of Non-Ionic and Anionic Surfactants from Real Laundry Wastewater by Means of a Full-Scale Treatment System, *Process Saf. Environ. Prot.*, 132, 105-115.
- Corona, R.R.B., Sad, C.M.S, Silva, M., Lopes, D.L., Leite, J.S.D., Viegas, G.M.F., Goncalves, G.R., Filgueiras, P.R., and Castro, E.V.R., 2021, Adsorption of Anionic Surfactant in Graphite Oxide: a Study for Treatment of Laundry Wastewater, *J. Environ. Chem. Eng.*, 9(6), 106858.
- Delforno, T.P., Belgini, D.R.B., Hidalgo, K.J., Centurion, V.B., Lacerda-Junior, G.V., Duarte, I.C.S., Veresche, M.B.A., and Oliveira, V.M., 2020, Anaerobic Reactor Applied to Laundry Wastewater Treatment: Unveiling the Microbial Community by Gene and Genome-Centric Approaches, *Int. Biodegradation Biodegradation*, 149, 104916.
- Devi, L.G., and Kavitha, R., 2014, Enhanced Photocatalytic Activity of Sulfur Doped TiO₂ for the Decomposition of Phenol : A New Insight into the Bulk and Surface Modification, *Mater. Chem. Phys.*, 143, 1300-1308.
- Diaz-Uribe, C., Vallejo, W., and Ramos, W., 2014, Methylene Blue Photocatalytic Mineralization Under Visible Irradiation on TiO₂ Thin Films Doped with Chromium, *Appl. Surf. Sci.*, 314, 121-127.
- Eng, Y.Y., Sharma, V.K., and Ray, A.K., 2012, Degradation of Anionic and Cationic Surfactants in a Monolithic Swirl-Flow Photoreactor, *Sep. Purif. Technol.*, 92, 43-49.
- Feng, H., Zhang, M.H., and Yu, L., 2012, Hydrothermal Synthesis and Photocatalytic Performance of Metal-Ions Doped TiO₂, *Appl. Catal. A: Gen.*, 413, 238-244.
- Garrido, I., Pastor-Belda, M., Campillo, N., Vinas, P., Yanez, M.J., Vela, N., Navarro, S., and Fenoll, J., 2019, Photooxidation of Insecticide Residues by ZnO and TiO₂ Coated Magnetic Nanoparticles under Natural Sunlight, *J. Photochem. Photobiol. A*, 372, 245-253.
- Heibati, B., Ghoochani, M., Albadarin, A.B., Mesdaghinia, A., Makhluof, A.S.H., Asif, M., Maity, A., Tyagi, I., Agarwal, S., and Gupta, VK., 2016, Removal of Linear Alkyl Benzene Sulfonate from Aqueous Solutions by Functionalized Multi-Walled Carbon Nanotubes, *J. Mol. Liq.*, 213, 339-344.
- Ho, K.C., Teow, Y.H., Sum, J.Y., Ng, Z.J., and Mohammad, A.W., 2021, Water Pathways Through the Ages: Integrated Laundry Wastewater Treatment for Pollution Prevention, *Sci. Total Environ.*, 760, 143966.
- Huang, C.Y., Chen, Y., and Lin C.S., 2022, High-Temperature Oxidation Resistance of Hot Stamping Steel with Chromium Coating Electroplated in Trivalent Chromium Bath, *Mater. Today Commun.*, 33, 104663.



- Jangkorn, S., Kuhakaew, S., Theantanoo, S., Klinla-or, H., and Sriwiriyarat, T., 2011, Evaluation of Reusing Alum Sludge for The Coagulation of Industrial Wastewater Containing Mixed Anionic Surfactants, *J. Environ. Sci.*, 23(4), 587-594.
- Jurado, E., Fernandez-Serrano, M., Nunez-Olea, Luzon, G., and Lechunga, M., 2006, Simplified Spectrophotometric Method Using Methylene Blue for Determining Anionic Surfactants: Application to The Study of Primary Biodegradation in Aerobic Screening Tests, *Chemosphere*, 65, 278-285.
- Katta, K.V., and Dubey, R.S., 2021, Comparative Study of Doped-TiO₂ Nanocrystals Prepared by Sol-Gel and Solvothermal Approaches, *Mater. Today: Proc.*, 39(4), 1422-1425.
- Khairy, M., Kamar, E.M., and Mousa, M.A., 2022, Photocatalytic Activity of Nano-Sized Ag and Au Metal-Doped TiO₂ Embedded in rGO Under Visible Light Irradiation, *Mater. Sci. Eng. B.*, 286, 116023.
- Kumar, A., Raorane, C.J., Syed, A., Bahkali, A.H., Elgorban, A.M., Raj, V., and Kim, S.C., 2023, Synthesis of TiO₂, TiO₂/PAni, TiO₂/PAni/GO Nanocomposites and Photodegradation of Anionic Dyes Rose Bengal and Thymol Blue in Visible Light, *Environ. Res.*, 216(3), 114741.
- Lee, S.Y., and Park, S.J., 2013, TiO₂ Photocatalyst for Water Treatment Applications, *J. Ind. Eng. Chem.*, 19(6), 1761-1769.
- Lei, X.F., Xue, X.X., and Yang, H., 2014, Preparation and Characterization of Ag-Doped TiO₂ Nanomaterials and Their Photocatalytic Reduction of Cr(VI) Under Visible Light, *Appl. Surf. Sci.*, 321, 396-403.
- Li, H., Yang, Y., Gao, J., Li, X., Zhou, Z., Wang, N., Du, P., Zhang, T., and Feng, J., 2020, Degradation of Sodium Dodecyl Benzenesulfonate by Vacuum Ultraviolet Irradiation, *J. Water Process Eng.*, 34, 101172.
- Li, J., Song, Y., Wei, Z., Wang, F., Zhang, X., Zhu, H., Sheng, S., and Zou, H., 2023, Unique Kinetics Feature and Excellent Photocatalytic Performance of Tetracycline Photodegradation Using Yolk-Shell TiO₂-Void-TiO₂:Eu³⁺, *Appl. Catal. A-Gen.*, 650, 119008.
- Lopez, R., Gomez, R., and Oros-Ruiz, S., 2011, Photophysical and Photocatalytic Properties of TiO₂-Cr Sol-Gel Prepared Semiconductors, *Catal. Today*, 166(1), 159-165.
- Luo, L., Cai, W., Zhou, J., and Li, Y., 2016, Facile Synthesis of Boehmite/PVA Composite Membrane with Enhanced Adsorption Performance Towards Cr(VI), *J. Hazard. Mater.*, 318, 452-459.
- Mahajan, R.K., and Shaheen, A., 2008, Effect of Various Additives On The Performance of a Newly Developed PVC Based Potentiometric Sensor for Anionic Surfactants, *J. Colloid Interface Sci.*, 326(1), 191-195.



- Marques, J., Gomes, T.D., Forte, M.A., Silva, R.F., and Tavares, C.J., 2019, A New Route for the Synthesis of Highly-Active N-Doped TiO₂ Nanoparticles for Visible Light Photocatalysis using Urea as Nitrogen Precursor, *Catal. Today*, 36-45.
- Maryani, Y., and Kustiningsih, I., 2014, Determination and Characterization of Photocatalytic Products of Linear Alkyl Sulphonate by High Performance Liquid Chromatography and Nuclear Magnetic Resonance, *Procedia Chem.*, 17, 216-223.
- Mirbahoush, S.M., Chaibakhsh, N., and Moradi-Shoeili, Z., 2019, Highly Efficient Removal of Surfactant from Industrial Effluents Using Flaxseed Mucilage in Coagulation/Photo-Fenton Oxidation Process, *Chemosphere*, 231, 51-59.
- Nishiyama, N., Kozasa, K., and Yamazaki, S., 2016, Photocatalytic Degradation of 4-Chlorophenol on Titanium Dioxide Modified with Cu(II) or Cr(III) Ion Under Visible Light Irradiation, *Appl. Catal. A-Gen.*, 527, 109-115.
- Noorimotlagh, Z., Kazeminezhad, I., Jaafarzadeh, N., Ahmadi, M., and Ramezani, Z., 2020, Improved Performance of Immobilized TiO₂ Under Visible Light for the Commercial Surfactant Degradation: Role of Carbon Doped TiO₂ and Anatase/Rutile Ratio, *Catal. Today*, 348, 277-289.
- Ogawa, T., and Kawase, Y., 2021, Effect of Solution pH on Removal of Anionic Surfactant Sodium Dodecylbenzenesulfonate (SDBS) from Model Wastewater Using Nanoscale Zero-Valent Iron (nZVI), *J. Environ. Chem. Eng.*, 5(9), 105928.
- Pianta, D.D., Frayret, J., Gleyzes, C., Cugnet, C., Dupin, J.C., and Hecho, I.L., 2018, Determination of the Chromium(III) Reduction Mechanism During Chromium Electroplating, *Electrochim. Acta*, 284, 234-241.
- Peng, C., Meng, H., Song, S., Lu, S., and Lopez - Valdivieso, A., 2010, Elimination of Cr(VI) from Electroplating Wastewater by Electrodialysis Following Chemical Precipitation, *Sep. Sci. Technol.*, 39(7), 1501-1517.
- Raguram, T., and Rajni, K.S., 2022, Synthesis and Characterisation of Cu-Doped TiO₂ Nanoparticles for DSSC and Photocatalytic Applications, *Int. J. Hydrog. Energy*, 47(7), 4674-4689.
- Raju, I.M., Rao, T.S., Lakshmi, K.V.D., Chandra, M.R., Padmaja, J.S., and Divya, G., 2019, Poly 3-Thenoic Acid Sensitized, Copper Doped Anatase/Brookite TiO₂ Nano hybrids for Enhanced Photocatalytic Degradation of an Organophosphorus Pesticide, *J. Environ. Chem. Eng.*, 4(7), 103211.
- Riyadi, T.W.D., Sarjito, Masyrukan, and Riswan, R.A., 2017, Mechanical Properties of Cr-Cu Coatings Produced by Electroplating, *AIP*, 1(1855), 030007.



- Ruzmanova, Y., Stoller, M., Bravi, M., and Chianese, A., 2015, A Novel Approach for the Production of Nitrogen Doped TiO₂ Nanoparticles, *Chem. Eng. Trans.*, 43, 721-726.
- Saleh, S., Mohammednejad, S., Khorgoei, H., and Otadi, M., 2021, Photooxidation/Adsorption of Arsenic (III) in Aqueous Solution Over Bentonite/Chitosan/TiO₂ Heterostructured Catalyst, *Chemosphere*, 280, 130583.
- Sari, L.N., 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.
- Shaban, M., Ahmed, A.M., Shehata, N., Betiha, M.A., and Rabie, A.M., 2019, Ni-Doped and Ni/Cr Co-Doped TiO₂ Nanotubes for Enhancement of Photocatalytic Degradation of Methylene Blue, *J. Colloid Interface Sci.*, 555, 31-41.
- Sumisha, A., Arthanareeswaran, G., Thuyavan, Y.L., Ismail, A.F., and Chakraborty, S., 2015, Treatment of Laundry Wastewater Using Polyethersulfone/ Polyvinylpyrrolidone Ultrafiltration Membranes, *Ecotoxicol. Environ. Saf.*, 121, 174–179.
- Sun, Y., Gu, Y., and Zhang, P., 2022, Adsorption Properties and Recognition Mechanisms of a Novel Surface Imprinted Polymer for Selective Removal of Cu(II)-Citrate Complexes, *J. Hazard. Mater.*, 424, 127735.
- Turyasingura, M., Wakatuntu, J., Lubwama, M., Jjagwe, J., Hensel, O., and Olupot, P.W., 2023, Optimisation of Eggshell-Zeolite Composite as a Potential Surfactant Adsorbent for Hand-Washing Wastewater, *Case Stud. Chem. Environ. Eng.*, 7, 100284.
- Viet, T.Q.Q., Phong, H.H.T., Thinh, D.B., Giang, N.T.H., Dat, N.M., Hai, N.D., Phong, M.T., and Hieu, N.H., 2022, Enhanced Photodegradation toward Graphene-based MgFe₂O₄-TiO₂: Investigation and Optimization, *Int. J. Hydrog. Energy*, 75(47), 32092-32106.
- Wahyuni, E.T., Aprilita, N., Hatimah, H., Wulandari, A., and Mudasir, M., 2015, Removal of Toxic Metal Ions in Water by Photocatalytic Method, *Am. Chem. Sci. J.*, 5, 194–201.
- Wahyuni, E.T., Rahmaniati, T., Hafidzah, A.R., Suherman, dan Suratman, A., 2021, Photocatalysis over N-doped TiO₂ driven by visible light for Pb(II) removal from aqueous media, *Catalysts*, 8, 945.
- Wahyuni, S., 2022, Pemanfaatan Air Limbah Penyamakan Kulit yang Mengandung Ion Logam Cr sebagai Sumber Dopan untuk Meningkatkan Aktivitas Fotokatalis TiO₂ di Bawah Sinar Tampak, *Tesis*, Jurusan Kimia FMIPA UGM, Yogyakarta



- Yang, C.-H., Ladd, J.A., and Goedken, V. L., 1988, New Heterobinuclear μ -Oxo-Bridged Dimer Complexes: Synthesis, Characterization and Structural Studies of a Macroyclic Titanyl Complex and its Adducts, *J. Coord. Chem.*, 19(1-3), 235–251.
- Yi, X., Wei, Y., Zhai, W., Wang, P., Liu, D., and Zhou Z., 2022, Effects of Three Surfactants on the Degradation and Environmental Risk of Metolachlor in Aquatic Environment, *Chemosphere*, 300, 134295.
- You, S., Hu, Y., Liu, X., and Wei, C., 2018, Synergetic Removal of Pb(II) and Dibutyl Phthalate Mixed Pollutants on Bi₂O₃-TiO₂ Composite Photocatalyst under Visible Light, *Appl. Catal. B: Environ.*, 232, 288-298.
- Yu, H., Zhang, M., Wang, Y., Lv, J., Liu, Y., He, Y., and Sun, Z., 2021, Low-Temperature Strategy for Vapor Phase Hydrothermal Synthesis of CN⁻S-Doped TiO₂ Nanorod Arrays with Enhanced Photoelectrochemical and Photocatalytic Activity, *J. Ind. Eng. Chem.*, 95, 130-139.
- Yuan, C., Zhou, W., and Xie, Y., 2013, Mass Spectrometry Analysis and Chromatographic Separation of Fatty Alcohol Polyoxyethylene Ether Nonionic Surfactants, *J. Chin. Mass Spectro. Soc.*, 34(4), 215-225.
- Yuan, R., Luo, D., Fu, C., Tian, W., Wu, P., Wang, Y., Zhang, H., and Jiang, W., 2020, Simultaneous Removal of Cu(II) and Cr(VI) Ions from Wastewater by Photoreduction with TiO₂-ZrO₂, *J. Water Process. Eng.*, 33, 101052.
- Zhang, R., Gao, L., and Zhang, Q., 2004, Photodegradation of Surfactants on the Nanosized TiO₂ Prepared by Hydrolysis of the Alkoxide Titanium, *Chemosphere*, 3(54), 405-411.
- Zhang, X., Ma, K., Peng, H., Gong, Y., and Huang, Y., 2023, Imidazolium Functionalized Polysulfone/DTPA-Chitosan Composite Beads for Simultaneous Removal of Cr(VI) and Cu(II) from Aqueous Solutions, *Sep. Purif. Technol.*, 310, 123145.
- Zhu, J., Deng, Z., Chen, F., Zhang, J., Chen, H., Anpo, M., Huang, J., and Zhang, L., 2006, Hydrothermal Doping Method for Preparation of Cr³⁺-TiO₂ Photocatalysts with Concentration Gradient Distribution of Cr³⁺, *Appl. Catal. B: Environ.*, 62, 329-335.