

DAFTAR PUSTAKA

- Abidin, Z. Z., Mohd Shamsudin, N. S., Madehi, N., & Sobri, S. (2013). Optimisation of a method to extract the active coagulant agent from *Jatropha curcas* seeds for use in turbidity removal. *Industrial Crops and Products*, 41(1), 319–323. <https://doi.org/10.1016/j.indcrop.2012.05.003>
- Adesina, O. A., Abdulkareem, F., Yusuff, A. S., Lala, M., & Okewale, A. (2019). Response surface methodology approach to optimization of process parameter for coagulation process of surface water using *Moringa oleifera* seed. *South African Journal of Chemical Engineering*, 28(January), 46–51. <https://doi.org/10.1016/j.sajce.2019.02.002>
- Ahmed, S. F., Mehejabin, F., Chowdhury, A. A., Almomani, F., Khan, N. A., Badruddin, I. A., & Kamangar, S. (2024). Biochar produced from waste-based feedstocks: Mechanisms, affecting factors, economy, utilization, challenges, and prospects. *GCB Bioenergy*, 16(8), 1–37. <https://doi.org/10.1111/gcbb.13175>
- Aini, S. (2021). Optimasi Dosis Koagulan Untuk Pengolahan Air Sungai Suko. *Eksergi*, 18(1), 1. <https://doi.org/10.31315/e.v0i0.4497>
- Al-Jadabi, N., Laaouan, M., El Hajjaji, S., Mabrouki, J., Benbouzid, M., & Dhiba, D. (2023). The Dual Performance of *Moringa Oleifera* Seeds as Eco-Friendly Natural Coagulant and as an Antimicrobial for Wastewater Treatment: A Review. *Sustainability (Switzerland)*, 15(5), 1–37. <https://doi.org/10.3390/su15054280>
- Al-Jadabi, N., Laaouan, M., Mabrouki, J., Fattah, G., & El Hajjaji, S. (2021). Comparative study of the coagulation efficacy of *Moringa Oleifera* seeds extracts to alum for domestic wastewater treatment of Ain Aouda City, Morocco. *E3S Web of Conferences*, 314. <https://doi.org/10.1051/e3sconf/202131408003>
- Alghamdi, A., Rajan, K. P., & Thomas, S. P. (2024). Comprehensive evaluation of *Moringa oleifera* seed as a low-cost adsorbent for removal of manganese (Mn)

- from aqueous solutions. *Case Studies in Chemical and Environmental Engineering*, 9(December 2023), 100635. <https://doi.org/10.1016/j.cscee.2024.100635>
- Amalia, R. N., Shalaho Dina Devy, Angga Syfa Kurniawan, Nur Hasanah, Elisa Destephani Salsabila, Dira Anis Ageung Ratnawati, Febry Muhammad Fadil, Nur Aqsan Syarif, & Guntur Arsi Aturdin. (2022). Potensi Limbah Cair Tahu sebagai Pupuk Organik Cair di RT. 31 Kelurahan Lempake Kota Samarinda. *ABDIKU: Jurnal Pengabdian Masyarakat Universitas Mulawarman*, 1(1), 36–41. <https://doi.org/10.32522/abdiku.v1i1.38>
- Aneta, R., Umboh, J. M. L., Sondakh, R. C., Kesehatan, F., Universitas, M., & Ratulangi, S. (2021). Analisis Tingkat Kekeruhan, Total Dissolved Solids (TDS) dan Kandungan Escherichia Coli Pada Air Sumur di Desa Arakan Kecamatan Tatapaan. *Jurnal KESMAS*, 10(4), 106–111.
- Aphirta, S., Ratnaningsih, R., Hadisoebroto, R., Yusuf, A. M., & Gantara, H. (2023). Determination of the optimum organic coagulants dosage in tofu industrial wastewater treatment. *IOP Conference Series: Earth and Environmental Science*, 1203(1). <https://doi.org/10.1088/1755-1315/1203/1/012049>
- Aprilia, I. S., & Zunggaval, L. E. (2019). Peran Negara Terhadap Dampak Pencemaran Air Sungai Ditinjau Dari Uu Pplh. *SUPREMASI Jurnal Hukum*, 2(2), 15–30. <https://doi.org/10.36441/supremasi.v2i2.115>
- Apriyani, N. (2018). Industri Batik: Kandungan Limbah Cair dan Metode Pengolahannya. *Media Ilmiah Teknik Lingkungan*, 3(1), 21–29. <https://doi.org/10.33084/mitl.v3i1.640>
- Aragaw, T. A., & Bogale, F. M. (2023). Role of coagulation/flocculation as a pretreatment option to reduce colloidal/bio-colloidal fouling in tertiary filtration of textile wastewater: A review and future outlooks. *Frontiers in Environmental Science*, 11(April). <https://doi.org/10.3389/fenvs.2023.1142227>
- Aras, N. R., & Asriani, A. (2021). Efektifitas Biji Kelor (*Moringa oleifera* L.) sebagai Biokoagulan dalam Menurunkan Cemar Limbah Cair Industri

- Minuman Ringan. *Sainsmat : Jurnal Ilmiah Ilmu Pengetahuan Alam*, 10(1), 42. <https://doi.org/10.35580/sainsmat101261692021>
- Ardianto, R., & Amalia, R. (2023). Optimasi Proses Deasetilasi Kitin menjadi Kitosan dari Selongsong Maggot menggunakan RSM. *Metana*, 19(1), 1–12. <https://doi.org/10.14710/metana.v19i1.50480>
- Ariefianti, A. R., Krisan, M., Rexita, H., Budiono, A., Kimia, J. T., Negeri, P., Soekarno, J., & No, H. (2024). Studi Literatur Pengaruh Berbagai Koagulan Terhadap Pengolahan Limbah Cair Tahu. *Jurnal Teknologi Separasi*, 10(9), 889–901.
- Arifin, Karlina, A., & Khair, A. (2017). Pengaruh Dosis Kitosan Terhadap Kadar Warna Limbah Cair Home Industry Sasirangan “Oriens Handicraft” Landasan Ulin. *Journal of Health Science and Prevention*, 1(2), 58–67.
- Ariyatun, A., Ningrum, P., Musyarofah, M., & Inayah, N. (2018). Analisis Efektivitas Biji dan Daun Kelor (*Moringa oleifera*) Untuk Penjernihan Air. *Walisongo Journal of Chemistry*, 1(2), 60. <https://doi.org/10.21580/wjc.v2i2.3103>
- Asmiyarna, L., Daud, S., & Darmayanti, L. (2021). Pengaruh Dosis Koagulan Belimbing Wuluh serta Pengaruh pH dalam Menyingkahkan Warna dan Zat Organik Pada Air Gambut. *Jom FTEKNIK*, 8, 1–5.
- Aufar, D. V. G. (2019). Analisis Kualitas Air Sungai Pada Aliran Sungai Kali Surabaya. *Swara Bhumi*, 5(8), 1–6.
- Azizah, R. N., Mardiamon, R., & Fajar, M. (2024). Perencanaan Bangunan Pengolahan Lumpur Studi Kasus: Perumda Air Minum Kota Padang (IPA Lubuk Paraku). *Al-Ard: Jurnal Teknik Lingkungan*, 9(2), 94–101. <http://jurnalsaintek.uinsa.ac.id/index.php/alard/index>
- Ba’adilla, S., Nugraha, A. W., & Laksono, U. T. (2025). Pengaruh Biokoagulan Dari Kulit Pisang Kepok dan Biji Kelor Terhadap Kualitas Limbah Cair Industri Tahu. *Jurnal Agroindustri Pangan*, 4(1), 1–17.
- Badawi, A. K., Salama, R. S., & Mostafa, M. M. M. (2023). Natural-based coagulants/flocculants as sustainable market-valued products for industrial wastewater treatment: a review of recent developments. *RSC Advances*,

- 13(28), 19335–19355. <https://doi.org/10.1039/d3ra01999c>
- Bahrina, I. (2022). Pengolahan Limbah Cair Tahu Menjadi Pupuk Organik Cair di Desa Lengkong. *Literasi: Jurnal Pengabdian Masyarakat Dan Inovasi*, 2(2), 1685–1688. <https://doi.org/10.58466/literasi.v2i2.690>
- Barakwan, R. A., Trihadiningrum, Y., & Bagastyo, A. Y. (2019). Characterization of alum sludge from Surabaya Water Treatment Plant, Indonesia. *Journal of Ecological Engineering*, 20(5), 7–13. <https://doi.org/10.12911/22998993/104619>
- Benalia, A., Derbal, K., Khalfaoui, A., Pizzi, A., & Medjahdi, G. (2022). The use of aloe vera as natural coagulant in algerian drinking water treatment plant. *Journal of Renewable Materials*, 10(3), 625–637. <https://doi.org/10.32604/jrm.2022.017848>
- Bouchareb, R., Derbal, K., & Benalia, A. (2021). Optimization of active coagulant agent extraction method from Moringa Oleifera seeds for municipal wastewater treatment. *Water Science and Technology*, 84(2), 393–403. <https://doi.org/10.2166/wst.2021.234>
- Budiati, T., & Rahma, I. N. (2024). Pengaruh Kehalusan Bahan Terhadap Karakteristik Fisik dan Kimia Kitosan Dari Limbah Black Soldier Fly (*Hermetia illucens*). 3(4), 145–154. <https://doi.org/10.25047/jofe.v3i4.5006>
- Chik, C. E. N. C. E., Kamaruzzan, A. S., Rahim, A. I. A., Lananan, F., Endut, A., Aslamyah, S., & Kasan, N. A. (2023). Extraction and Characterization of Litopenaeus vannamei's Shell as Potential Sources of Chitosan Biopolymers. *Journal of Renewable Materials*, 11(3), 1181–1197. <https://doi.org/10.32604/jrm.2023.022755>
- Daud, N. M., Abdullah, S. R. S., Hasan, H. A., Othman, A. R., & Ismail, N. 'Izzati. (2023). Coagulation-flocculation treatment for batik effluent as a baseline study for the upcoming application of green coagulants/flocculants towards sustainable batik industry. *Heliyon*, 9(6), e17284. <https://doi.org/10.1016/j.heliyon.2023.e17284>
- Desta, W. M., & Bote, M. E. (2021). Wastewater treatment using a natural coagulant (*Moringa oleifera* seeds): optimization through response surface

- methodology. *Heliyon*, 7(11), e08451. <https://doi.org/10.1016/j.heliyon.2021.e08451>
- Djana, M. (2023). Analisis Kualitas Air Dalam Pemenuhan Kebutuhan Air. *Jurnal Redoks*, 8(1), 82.
- Dotto, J., Fagundes-Klen, M. R., Veit, M. T., Palácio, S. M., & Bergamasco, R. (2019). Performance of different coagulants in the coagulation/flocculation process of textile wastewater. *Journal of Cleaner Production*, 208, 656–665. <https://doi.org/10.1016/j.jclepro.2018.10.112>
- Ejimofor, M. I., Ezemagu, I. G., & Menkiti, M. C. (2021). Physiochemical, Instrumental and thermal characterization of the post coagulation sludge from paint industrial wastewater treatment. *South African Journal of Chemical Engineering*, 37(May), 150–160. <https://doi.org/10.1016/j.sajce.2021.05.008>
- Ekoputri, S. F., Rahmatunnissa, A., Nulfaidah, F., Ratnasari, Y., Djaeni, M., & Sari, D. A. (2023). Pengolahan Air Limbah dengan Metode Koagulasi Flokulasi pada Industri Kimia. *Jurnal Serambi Engineering*, 9(1), 7781–7787. <https://doi.org/10.32672/jse.v9i1.715>
- El Gaayda, J., Titchou, F. E., Barra, I., Karmal, I., Afanga, H., Zazou, H., Yap, P. S., Abidin, Z. Z., Hamdani, M., & Akbour, R. A. (2022). Optimization of turbidity and dye removal from synthetic wastewater using response surface methodology: Effectiveness of Moringa oleifera seed powder as a green coagulant. *Journal of Environmental Chemical Engineering*, 10(1), 106988. <https://doi.org/10.1016/j.jece.2021.106988>
- Elsergany, M. (2023). The Potential Use of Moringa peregrina Seeds and Seed Extract as a Bio-Coagulant for Water Purification. *Water (Switzerland)*, 15(15). <https://doi.org/10.3390/w15152804>
- Feria-Díaz, J. J., Polo-Corrales, L., & Hernández-Ramos, E. J. (2016). Evaluation of coagulation sludge from raw water treated with Moringa oleifera for agricultural use. *Ingenieria e Investigacion*, 36(2), 14–20. <https://doi.org/10.15446/ing.investig.v36n2.56986>
- Fitria, D., Komala, P. S., & Vendela, D. (2022). Pengaruh Waktu Flokulasi Pada Proses Koagulasi Flokulasi Dengan Biokoagulan Kelor Untuk Menyisihkan

- Kadar Besi Air Sumur. *Jurnal Reka Lingkungan*, 10(2), 165–174.
<http://dx.doi.org/10.26760/rekalingkungan.v10i2.165-174>
- Gadekar, M. R., & Ahammed, M. M. (2020). Use of water treatment residuals for colour removal from real textile dye wastewater. *Applied Water Science*, 10(7), 1–8. <https://doi.org/10.1007/s13201-020-01245-9>
- Getahun, M., Befekadu, A., & Alemayehu, E. (2024). Coagulation process for the removal of color and turbidity from wet coffee processing industry wastewater using bio-coagulant: Optimization through central composite design. *Heliyon*, 10(7), e27584. <https://doi.org/10.1016/j.heliyon.2024.e27584>
- Govindan, N. (2018). Use of Moringa (*Moringa Stenopetala*) Seed Extract for Removal of Some Anionic Dyes (Direct and Reactive Dyes) in Textile Wastewater. *Current Trends in Fashion Technology & Textile Engineering*, 4(4), 23–34. <https://doi.org/10.19080/ctfte.2018.04.555642>
- Gutierrez Herrera, J. C., Martínez Ovallos, C. A., Agudelo-Castañeda, D. M., & Paternina-Arboleda, C. D. (2024). Exploring Moringa oleifera: Green Solutions for Sustainable Wastewater Treatment and Agricultural Advancement. *Sustainability (Switzerland)*, 16(21). <https://doi.org/10.3390/su16219433>
- Hadadi, A., Imessaoudene, A., Bollinger, J. C., Assadi, A. A., Amrane, A., & Mouni, L. (2022). Comparison of Four Plant-Based Bio-Coagulants Performances against Alum and Ferric Chloride in the Turbidity Improvement of Bentonite Synthetic Water. *Water (Switzerland)*, 14(20). <https://doi.org/10.3390/w14203324>
- Harahap, L. A., Sirait, R., & Yusuf Lubis, R. (2023). Efektivitas Biji Kelor Pada Proses Koagulasi Untuk Penurunan Kekeruhan, Logam (Fe), dan Zat Organik (KMnO₄) Pada Air. *Journal Online of Physics*, 8(2), 66–69. <https://doi.org/10.22437/jop.v8i2.20970>
- Hardika, & Sururi, M. R. (2023). Penyisihan Kekeruhan Menggunakan Unit Koagulasi-Flokulasi Instalasi Pengolahan Air Minum : Review. *FTSP Series : Seminar Nasional Dan Diseminasi Tugas Akhir 2023*, 1995–2000.
- Haslinah, A. (2020). Ukuran Partikel dan Konsentrasi Koagulan Serbuk Biji Kelor

- (*Moringa oleifera*) Terhadap Penurunan Persentase COD Dalam Limbah Cair Industri Tahu. *ILTEK : Jurnal Teknologi*, 15(01), 50–53. <https://doi.org/10.47398/iltek.v15i01.510>
- Hidayati, N. F., Rahman, M., Fauzana, N. A., & Aisiah, S. (2021). Effectiveness of Chitosan To Reduce the Color Value, Turbidity, and Total Dissolved Solids in Shrimp-Washing Wastewater. *Russian Journal of Agricultural and Socio-Economic Sciences*, 115(7), 82–88. <https://doi.org/10.18551/rjoas.2021-07.08>
- Hidayati, N., Setiawan, A., Afiuddin, A. E., & Yulianto, E. (2019). Pengaruh Dosis Koagulan-Flokulan dalam Menurunkan Kandungan Zinc dan Fosfat Di Waste Water Treatment Plant (WWTP) PT POMI. *Conference Proceeding on Waste Treatment Technology*, 2(2010), 119–126.
- Iber, B. T., Torsabo, D., Che Engku Noramalina Che Engku, C., Wahab, F., Sheikh Abdullah, S. R., Abu Hassan, H., & Kasan, N. A. (2023). A study on the recovery and characterization of suspended solid from aquaculture wastewater through coagulation/flocculation using chitosan and its viability as organic fertilizer. *Journal of Agriculture and Food Research*, 11(December 2022), 100532. <https://doi.org/10.1016/j.jafr.2023.100532>
- Idris, M., Rismayani, D., Aulia, A., Nopiyanti, T., & Rahayu, R. (2024). Biology of Black Soldier Fly (*Hermetia illucens*) and Utilization of its Waste (Maggot Frass) for Plant Growth: A Literature Review. *Jurnal Biologi Tropis*, 24(3), 273–291.
- Indrayani, L., & Rahmah, N. (2018). Nilai Parameter Kadar Pencemar Sebagai Penentu Tingkat Efektivitas Tahapan Pengolahan Limbah Cair Industri Batik. *Jurnal Rekayasa Proses*, 12(1), 41. <https://doi.org/10.22146/jrekpros.35754>
- Ize-iyamu, O. K., Ph, D., Eguavoen, O., Osuide, M., Egbon, E. E., Ize-iyamu, O. C., Sc, B., Akpoveta, V. O., Sc, M., & Ibizubge, O. O. (2011). *Characterization and Treatment of Sludge from the Brewery using Chitosan*. 12(1), 542–547.
- Jia, Q., Zhuge, Y., Duan, W., Liu, Y., Yang, J., Youssf, O., & Lu, J. (2022). Valorisation of alum sludge to produce green and durable mortar. *Waste Disposal and Sustainable Energy*, 4(4), 283–295.

<https://doi.org/10.1007/s42768-022-00113-3>

- Juliani, A., Rahmawati, S., & Yoneda, M. (2021). Heavy Metal Characteristics of Wastewater From Batik Industry in Yogyakarta Area, Indonesia. *International Journal of GEOMATE*, 20(80), 59–67. <https://doi.org/10.21660/2021.80.6271>
- Khayrova, A., & Lopatin, S. (2022). The Potential of *Hermetia Illucens* as a Source of Chitin , Chitosan and their Melanin Complexes. *Polym. Sci. Peer Rev. J.*, 3(4), 000568. <https://doi.org/10.31031/PSPRJ.2022.03.000568>
- Koul, B., Bhat, N., Abubakar, M., Mishra, M., & Arukha, A. P. (2022). Application of Natural Coagulants in Water Treatment: *MDPI Water*, 14(3715). <https://doi.org/https://doi.org/10.3390/w14223751>
- Krisna, T., Setyawan, A., Lolo, E. U., & Sudaryantiningsih, C. (2025). Efektivitas Variasi Dosis Koagulan PAC Pada Pengolahan Limbah Cair Industri Tahu Untuk Penurunan Parameter BOD Dan TSS (Studi Kasus : Industri Tahu Dele Emas , Kampung Krajan , Kelurahan Mojosongo , Kota Surakarta). *Jurnal Solo Teknologi*, 1(1), 1–9.
- Kurniawan, S. B., Imron, M. F., Chik, C. E. N. C. E., Owodunni, A. A., Ahmad, A., Alnawajha, M. M., Rahim, N. F. M., Said, N. S. M., Abdullah, S. R. S., Kasan, N. A., Ismail, S., Othman, A. R., & Hasan, H. A. (2022). What compound inside biocoagulants/bioflocculants is contributing the most to the coagulation and flocculation processes? *Science of the Total Environment*, 806(October). <https://doi.org/10.1016/j.scitotenv.2021.150902>
- Kurniawan, Y., Purnaini, R., & Asbanu, G. C. (2021). Efektivitas Limbah Cangkang Kepiting Sebagai Biokoagulan Dalam Penurunan Kadar Kekeruhan Dan Warna Air Baku Sungai Kapuas. *Jurnal Teknologi Lingkungan Lahan Basah*, 10(1), 001–010. <https://doi.org/10.26418/jtllb.v10i1.48540>
- Lemma, M., Kalsido, A. W., & Wotee, M. W. (2024). Removal of river water turbidity and total dissolved solids using natural coagulants derived from banana peel and *Moringa stenopetala* seed. *Aqua Water Infrastructure, Ecosystems and Society*, 73(7), 1467–1493. <https://doi.org/10.2166/aqua.2024.130>
- Luthfiyana, N., Ratrinia, P. W., Rukisah, Asniar, & Hidayat, T. (2022).

- Optimization of Demineralization Stage in Chitosan Extraction from Mangrove Crab Shell (*Scylla* sp.). *Jurnal Pengolahan Hasil Perikanan Indonesia*, 25(2), 352–363. <https://doi.org/10.17844/jphpi.v25i2.41853>
- Maharani, Z., & Caniago, L. (2024). Uji Variasi Konsentrasi Koagulan Kitosan Hasil Pemanfaatan Limbah Cangkang Kepiting Bakau (*Scylla* Sp) Dalam Penurunan Kadar TSS Pada Limbah Cair Tahu. *Jurnal Multidisiplin Ilmu*, 3(05), 806–814.
- Manora, W., Astono, W., & Aphirta, S. (2024). Efektivitas Biokoagulan Biji Kelor Pada Pengolahan Limbah Cair Tempe (Studi Kasus : Industri Tempe Semanan, Jakarta). *Jurnal Bhuwana*, 4(1), 43–53.
- Martina, A., Effendy, D. S., & Soetedjo, J. N. M. (2018). Aplikasi Koagulan Biji Asam Jawa dalam Penurunan Konsentrasi Zat Warna Drimaren Red pada Limbah Tekstil Sintetik pada Berbagai Variasi Operasi. *Jurnal Rekayasa Proses*, 12(2), 40. <https://doi.org/10.22146/jrekpros.38948>
- Marwiyah, Kalsum, U., & Artiningsih, A. (2024). Modifikasi Kitosan Dari Cangkang Bekicot (*Achatina Fulica*) Kitosan Kulit Udang(*Penaeus Monodon*) Terlapis Pasir Besi Dan Silika Dengan (3-Chloroprophyl)Trimethoxysilane (Cptms) Sebagai Adsorben Magnetik. *INNOVATIVE: Journal Of Social Science Research*, 4(1), 6736–6752.
- Maulidifa, N. A., & Hidayah, E. N. (2024). Pengaruh Waktu Pengadukan Biosorben Cangkang Maggot dalam Menyisihkan Ion Fe. *Jurnal Serambi Engineering*, IX(2), 9040–9044.
- Mawaddati, I., Munfarida, I., & Hakim, A. (2021). Evaluasi Daya Tampung Beban Pencemaran Air Sungai Wonokromo (Kali Jagir) Kota Surabaya. *Jurnal Teknik Lingkungan*, 7(1), 33–43.
- Meicahayanti, I., Marwah, M., & Setiawan, Y. (2018). Efektifitas Kitosan Limbah Kulit Udang dan Alum Sebagai Koagulan dalam Penurunan TSS Limbah Cair Tekstil. *Jurnal Chemurgy*, 2(1), 1. <https://doi.org/10.30872/cmng.v2i1.1630>
- Moerdiyanti, M., Zahara, T. A., & Jati, D. R. (2016). Pdam Kota Pontianak Sebagai Koagulan Untuk Pengolahan Air Bersih. *Jurnal Teknologi Lingkungan Lahan Basah*, 1(492), 1–10.

- Muharam, Lestari, A., & Solahudin. (2022). Pemanfaatan Limbah Sludge Industri Kertas Menjadi Pupuk Organik Sebagai Suatu Upaya Penanggulangan Pencemaran Lingkungan dan Pengembangan Ekonomi Budidaya Kembang Kol (*Brassica Oleraceal.*) di Kecamatan Rawamerta Kabupaten Karawang. *Jurnal Pengabdian Masyarakat*, 5(1), 45–49. <https://jurnalpertanianunisapalu.com/>
- Munggaran, G. A., Sg, H., Zen, A., Latifah, N., & Romdhona, N. (2024). Identifikasi Pencemaran Air berdasarkan Parameter Kekeruhan , pH , dan Warna di Situ Pamulang Identification of Water Pollution Based on Turbidity , pH , and Color Parameters in. *HSEJ: Health Safety and Environment Journal*, 3 (1), 43–49.
- Muqim, R. B., & Purnomo, Y. S. (2023). Koagulan Polielektrolit Alami dari Kulit Udang Kaki Putih untuk Menyisihkan Parameter Warna, TSS, dan COD dalam Limbah Cair Batik. *Jurnal Serambi Engineering*, 8(4), 7348–7355. <https://doi.org/10.32672/jse.v8i4.6903>
- Mursida, Tasir, & Sahriawati. (2018). Efektifitas Larutan Alkali Pada Proses Deasetilasi Dari Berbagai Bahan Baku Kitosan. *Jurnal Pengolahan Hasil Perikanan Indonesia*, 21(2), 358. <https://doi.org/10.17844/jphpi.v21i2.23091>
- Namane, P. I., Letshwenyo, M. W., & Yahya, A. (2025). Evaluation of plant-based coagulants for turbidity removal and coagulant dosage prediction using machine learning. *Environmental Technology (United Kingdom)*, 46(14), 2570–2585. <https://doi.org/10.1080/09593330.2024.2439183>
- Nimesha, S., Hewawasam, C., Jayasanka, D. J., Murakami, Y., Araki, N., & Maharjan, N. (2022). Effectiveness of natural coagulants in water and wastewater treatment. *Global Journal of Environmental Science and Management*, 8(1), 101–116. <https://doi.org/10.22034/gjesm.2022.01.08>
- Nisa, N. I. F., & Aminudin, A. (2019). Pengaruh Penambahan Dosis Koagulan Terhadap Parameter Kualitas Air dengan Metode Jartest. *JRST (Jurnal Riset Sains Dan Teknologi)*, 3(2), 61. <https://doi.org/10.30595/jrst.v3i2.4500>
- Nouj, N., Hafid, N., Alem, N. El, & Cretescu, I. (2021). Novel liquid chitosan-based biocoagulant for treatment optimization of fish processing wastewater from a

- Moroccan plant. *Materials*, 14(23). <https://doi.org/10.3390/ma14237133>
- Olafadehan, O. A., Amoo, K. O., Ajayi, T. O., & Bello, V. E. (2021). *Extraction and characterization of chitin and chitosan from Callinectes amnicola and Penaeus notialis shell wastes*. 12(June), 1–30. <https://doi.org/10.5897/JCEMS2020.0353>
- Ong, D. C., Kan, C. C., Pingul-Ong, S. M. B., & De Luna, M. D. G. (2017). Utilization of groundwater treatment plant (GWTP) sludge for nickel removal from aqueous solutions: Isotherm and kinetic studies. *Journal of Environmental Chemical Engineering*, 5(6), 5746–5753. <https://doi.org/10.1016/j.jece.2017.10.046>
- Pajak, M. (2023). Alum sludge as an adsorbent for inorganic and organic pollutants removal from aqueous solutions: a review. *International Journal of Environmental Science and Technology*, 20(10), 10953–10972. <https://doi.org/10.1007/s13762-023-04854-4>
- Pamabel, A. A., Maksuk, Amin, M., & Kamsul. (2024). Uji Efektivitas Serbuk Kulit Nanas Sebagai Biokoagulan Untuk Menurunkan Kekeruhan Pada Air Sumur Gali di Kelurahan Sungai Selincah Kota Palembang. *Jurnal Sanitasi Lingkungan*, 4(1), 1–6.
- Pambudi, Y. S., Sudaryantiningasih, C., & Geraldita, G. (2021). Analisis Karakteristik Air Limbah Industri Tahu Danalternatif Proses Pengolahannya Berdasarkan Prinsip-Prinsip Teknologi Tepat Guna. *Jurnal Ilmiah Indonesia*, 6(8), 4180–4192.
- Pieczykolan, B., & Krzyżowska, P. (2022). Removal of Helaktyn Blue F-2R via adsorption onto modified post-coagulation sludge. *Desalination and Water Treatment*, 275(December 2021), 103–115. <https://doi.org/10.5004/dwt.2022.28802>
- Pieczykolan, B., & Płonka, I. (2019). Post-Coagulation Sludge as an Adsorbent of Dyes from Aqueous Solutions. *Ecological Chemistry and Engineering S*, 26(3), 509–520. <https://doi.org/10.1515/eces-2019-0038>
- Pramesti, D. S., & Puspikawati, S. I. (2020). Analisis Uji Kekeruhan Air Minum Dalam Kemasan yang Beredar Di Kabupaten Banyuwangi. *Preventif: Jurnal*

Kesehatan Masyarakat, 11(2), 75–85.

- Precious Sibiya, N., Rathilal, S., & Kweinor Tetteh, E. (2021). Coagulation treatment of wastewater: Kinetics and natural coagulant evaluation. *Molecules*, 26(3). <https://doi.org/10.3390/molecules26030698>
- Putri, F. E., Mulyati, S. S., Saputra, A. S., & Fikri, E. (2019). Perbedaan Waktu Operasional Aerator Lumpur Aktif terhadap Kadar COD Limbah Cair Industri Susu. *Jurnal Riset Kesehatan*, 11(1), 207–210.
- Raditieas, R. M., Ruhmawati, T., Ardiani, Y., & Budi, T. (2019). Perbedaan Waktu Operasional Aerator Lumpur Aktif terhadap Kadar COD Limbah Cair Industri Susu. *Jurnal Riset Kesehatan*, 11(1), 207–210.
- Rahimah, Z., Heldawati, H., & Syauqiah, I. (2018). Pengolahan Limbah Deterjen Dengan Metode Koagulasi-Flokulasi Menggunakan Koagulan Kapur Dan Pac. *Konversi*, 5(2), 13. <https://doi.org/10.20527/k.v5i2.4767>
- Rahma, C., & Niani, C. R. (2021). Penggunaan Tawas ($\text{Al}_2(\text{SO}_4)_3$) dalam Menurunkan Kadar Total Suspended Solid Air Limbah Batubara. *Jurnal Optimalisasi*, 7(1), 60. <https://doi.org/10.35308/jopt.v7i1.2562>
- Rahmawati, S. H., & Puspitaningrum, C. (2022). Analisis Pengolahan Air Limbah Industri Tahu dan Efektivitasnya Terhadap Masyarakat dan Lingkungan di Bandar Lampung Analysis of Tofu Industrial Wastewater Treatment and Its Effectiveness on Society and the Environment in Bandar Lampung. *Open Science and Technology*, 02(01), 2776–169. <https://opscitech.com/journal>
- Ramirez, K. G., Possan, E., Bittencourt, P. R. S., Carneiro, C., & Colombo, M. (2018). Physico-chemical characterization of centrifuged sludge from the Tamanduá water treatment plant (Foz do Iguaçu, PR). *Revista Materia*, 23(3). <https://doi.org/10.1590/S1517-707620180003.0521>
- Rangga Sururi, M., & Hardika. (2024). Penyisihan Kekeruhan Dan Natural Organic Matter (Nom) Pada Unit Koagulasi-Flokulasi Instalasi Pengolahan Air Minum Di Asia Tenggara : Studi Literatur. *Jurnal Reka Lingkungan*, 12(1), 63–79. <http://dx.doi.org/10.26760/rekalingkungan.v12i1.63-79>
- Riyanto, & Hanindyta, L. P. (2022). Treatment of Dyes Wastewater Using Aluminium Sulfate and Poly Aluminium Chloride (Pac). *Journal of*

Engineering Science and Technology, 17, 38–46.

- Rizky, M. H., & Ratni, N. (2020). Penurunan Total Suspended Solid dan Kekeruhan Air Baku Menggunakan Pipa Circular dan Gravel Bed Flocculator dengan Koagulan Poly Aluminium Chloride. *Jurnal Envirous*, 1(1), 16–21.
- Rockson-Itiveh, D. E., Ozioko, F. C., & Keke, M. (2024). The Use of Chitosan as A Coagulant in Wastewater Treatment. *International Journal of Environmental Pollution and Environmental Modelling*, 7(1), 27–36.
- Rohman Bahari, M., & Amalia, A. (2025). Perbandingan Koagulan Komersial dan Biokoagulan Biji Pepaya Pada Flokulasi Hydrocyclone Terbuka Dalam Menurunkan Total Suspended Solid (TSS). *Jurnal Serambi Engineering*, 10(1), 11805–11812.
- Rusydi, A. F., Suherman, D., & Sumawijaya, N. (2017). Pengolahan Air Limbah Tekstil Melalui Proses Koagulasi-Flokulasi dengan Menggunakan Lempung Sebagai Penyumbang Partikel Tersuspensi. *Arena Tekstil*, 31(2), 105–114.
- Sari, Y., Fauzana, N. A., Fitriliani, I., & Herliwati. (2016). Efektivitas Kombinasi Koagulan Sintetik dan Biokoagulan Terhadap Peningkatan Mutu Baku Air Sungai Tabalong. *EnviroScienteeae*, 19(4), 1–23.
- Sayow, F., Polii, B. V. J., Tilaar, W., & Augustine, K. D. (2020). Analisis Kandungan Limbah Industri Tahu dan Tempe Rahayu di Kelurahan Uner Kecamatan Kawangkoan Kabupaten Minahasa. *Agri-SosioEkonomi Unsrat*, 16, 245–252.
- Setiawan, R., & Daniel. (2023). Review Artikel : Pemanfaatan Selongsong Maggot (*Hermetia illucens*) Sebagai Sumber Kitin dan Bahan Dasar Kitosan. *Prosiding Seminar Nasional Kimia Dan Terapan II*, 61–67.
- Setyawati, H., Kriswantono, M., Nisa, D. A., & Hastuti, R. (2016). *Serbuk Biji Kelor Sebagai Koagulan Pada Proses Koagulasi Flokulasi Limbah Cair Pabrik Tahu*. 1–6.
- Sinardi, Ica, S. H., & Sry Iryani, A. (2025). Analisis Parameter Kimia Kinerja Koagulan Biji Kelor (*Moringa oleifera*) dalam. *Seminar Nasional Rekayasa, Sains, Dan Teknologi*, 5(1).
- Sisnayati, Winoto, E., Yhopie, & Aprilyanti, S. (2021). Perbandingan Penggunaan

- Tawas dan PAC Terhadap Kekeruhan dan pH Air Baku PDAM Tirta Musi Palembang. *Jurnal Redoks*, 6(2), 107–116. <https://doi.org/10.31851/redoks.v6i2.5841>
- Siswoyo, E., Zahra, R. N., Mai, N. H. A., Nurmiyanto, A., Umemura, K., & Boving, T. (2023). Chitosan of blood cockle shell (*Anadara granosa*) as a natural coagulant for removal of total suspended solids (TSS) and turbidity of well-water. *Egyptian Journal of Aquatic Research*, 49(3), 283–289. <https://doi.org/10.1016/j.ejar.2023.04.004>
- Soetemans, L., Uyttebroek, M., & Bastiaens, L. (2020). Characteristics of chitin extracted from black soldier fly in different life stages. *International Journal of Biological Macromolecules*, 165, 3206–3214. <https://doi.org/10.1016/j.ijbiomac.2020.11.041>
- Soros, A., Amburgey, J. E., Stauber, C. E., Sobsey, M. D., & Casanova, L. M. (2019). Turbidity reduction in drinking water by coagulation-flocculation with chitosan polymers. *Journal of Water and Health*, 17(2), 204–218. <https://doi.org/10.2166/wh.2019.114>
- Subramonian, W., Wu, T. Y., & Chai, S. P. (2014). A comprehensive study on coagulant performance and floc characterization of natural *Cassia obtusifolia* seed gum in treatment of raw pulp and paper mill effluent. *Industrial Crops and Products*, 61, 317–324. <https://doi.org/10.1016/j.indcrop.2014.06.055>
- Supriyatin, S. (2020). Pengaruh Konsetrasi Tawas terhadap Penurunan Kadar Fosfat Limbah Industri Penatu di Kota Cirebon. *Health Information : Jurnal Penelitian*, 12(1), 8–15. <https://doi.org/10.36990/hijp.vi.167>
- Sururi, M. R., & Hardika. (2024). Penyisihan Kekeruhan Dan Natural Organic Matter (Nom) Pada Unit Koagulasi-Flokulasi Instalasi Pengolahan Air Minum Di Asia Tenggara : Studi. *Jurnal Reka Lingkungan*, 12(1), 63–79.
- Tafarel, N. F., Macioski, G., De Carvalho, K. Q., Nagalli, A., De Freitas, D. C., & Passig, F. H. (2016). Avaliação das propriedades do concreto devido à incorporação de lodo de estação de tratamento de água. *Revista Materia*, 21(4), 974–986. <https://doi.org/10.1590/S1517-707620160004.0090>
- Tahraoui, H., Toumi, S., Boudoukhani, M., Touzout, N., Sid, A. N. E. H., Amrane,

- A., Belhadj, A. E., Hadjadj, M., Laichi, Y., Aboumustapha, M., Kebir, M., Bouguettoucha, A., Chebli, D., Assadi, A. A., & Zhang, J. (2024). Evaluating the Effectiveness of Coagulation–Flocculation Treatment Using Aluminum Sulfate on a Polluted Surface Water Source: A Year-Long Study. *Water (Switzerland)*, 16(3). <https://doi.org/10.3390/w16030400>
- Triunfo, M., Tafi, E., Guarnieri, A., Salvia, R., Scieuzo, C., Hahn, T., Zibek, S., Gagliardini, A., Panariello, L., Coltelli, M. B., De Bonis, A., & Falabella, P. (2022). Characterization of chitin and chitosan derived from *Hermetia illucens*, a further step in a circular economy process. *Scientific Reports*, 12(1), 1–17. <https://doi.org/10.1038/s41598-022-10423-5>
- Ueda Yamaguchi, N., Cusioli, L. F., Quesada, H. B., Camargo Ferreira, M. E., Fagundes-Klen, M. R., Salcedo Vieira, A. M., Gomes, R. G., Vieira, M. F., & Bergamasco, R. (2021). A review of *Moringa oleifera* seeds in water treatment: Trends and future challenges. *Process Safety and Environmental Protection*, 147(April), 405–420. <https://doi.org/10.1016/j.psep.2020.09.044>
- Umbu, L. E., Suryo, P. Y., & Indra Gunawan, R. (2020). Pengaruh koagulan dan tawas terhadap surfaktan dan kecepatan pengendapan flok dalam proses koagulasi flokulas. *Jurnal Serambi Engineering* 5(4): 1295-1305. *Serambi Engineering*, 5(4), 1295–1305.
- Ummah, M. F., & Herumurti, W. (2018). Pengeringan Lumpur Ipal Biologis Pada Unit Sludge Drying Bed (SDB). *Jurnal Purifikasi*, 18(1), 39–48.
- Un, C. (2024). Enhancing Sewage Sludge Treatment with Hydrothermal Processing: A Case Study of Adana City. *Sustainability (Switzerland)*, 16(10). <https://doi.org/10.3390/su16104174>
- Uysal, A., & Boyacioglu, E. (2021). Evaluation of the performance of titanium and zirconium salts as coagulants in industrial wastewater treatment: pollutant removal, sludge production, and sludge characteristics. *Applied Water Science*, 11(4), 1–10. <https://doi.org/10.1007/s13201-021-01409-1>
- Varsani, V., Vyas, S. J., & Dudhagara, D. R. (2022). Development of bio-based material from the *Moringa oleifera* and its bio-coagulation kinetic modeling—A sustainable approach to treat the wastewater. *Heliyon*, 8(9), e10447.

<https://doi.org/10.1016/j.heliyon.2022.e10447>

- Vigneshwaran, S., Karthikeyan, P., Sirajudheen, P., & Meenakshi, S. (2020). Optimization of sustainable chitosan/Moringa. oleifera as coagulant aid for the treatment of synthetic turbid water – A systemic study. *Environmental Chemistry and Ecotoxicology*, 2, 132–140. <https://doi.org/10.1016/j.enceco.2020.08.002>
- Wani, A. K., Hemmami, H., Sharma, A., & Garg, S. S. (2025). Chitin and Chitosan in Wastewater Treatment. In *Chitn and Chitosan: Physical and Chemical Properties* (Issue November). <https://doi.org/10.1201/9781003589778-12>
- Widiyawati, C., Hanifah, R. N., & P, D. Y. (2022). Kemampuan Koagulan Kitosan dalam Penurunan Konsentrasi TSS dan COD Pengolahan Limbah Cair (Review Jurnal). *Tecnoscienza*, 6(2).
- Widyaningsih, T. (2023). Pengolahan Limbah Cair Laundry Dengan Menggunakan Bahan Koagulan Tawas Menjadi Air Bersih Dengan Biaya Rendah. *Jurnal Pendidikan Indonesia : Teori, Penelitian, Dan Inovasi*, 3(3). <https://doi.org/10.59818/jpi.v3i3.495>
- Wiewiórska, I., & Rybicki, S. M. (2022). Analysis of a coagulation sludge contamination with metals using X-ray crystallography. *Desalination and Water Treatment*, 254(October 2021), 151–159. <https://doi.org/10.5004/dwt.2022.28372>
- Winarni. (2024). Penggunaan Alum dan PAC Pada Proses Koagulasi Air Permukaan. *Makalah*. https://repository.karyailmiah.trisakti.ac.id/documents/repository/laporan-penelitian_winarni-penggunaan-alum-dan-pac-pada-proses-koagulasi-air-permukaan.pdf
- Yudo, S., & Said, N. I. (2019). Kondisi Kualitas Air Sungai Surabaya Studi Kasus: Peningkatan Kualitas Air Baku PDAM Surabaya. *Jurnal Teknologi Lingkungan*, 20(1), 19. <https://doi.org/10.29122/jtl.v20i1.2547>
- Yulis, P. A. R. (2018). Analisis Kadar Logam Merkuri (Hg) dan pH Air Sungai Kuantan Terdampak Penambangan Emas Tanpa Izin (Peti). *Jurnal Pendidikan Kimia Orbital: Jurnal Pendidikan Kimia Volum 2, Nomor 1, Juni 2018* 37,

Volume2, N, 37–42.

Yuliyani, L., & Widayatno, T. (2020). Pengaruh Variasi Waktu Tinggal Dan Kuat Arus Terhadap Penurunan Kadar COD , TSS Dan BOD Limbah Cair Industri Tahu Menggunakan Elektrokoagulasi Secara Kontinyu. *The 11th University Research Colloquium 2020*, 48–55.

Zedan, T., Mossad, M., Fouad, M., & Mahanna, H. (2022). Potential application of natural coagulant extraction from walnut seeds for water turbidity removal. *Water Practice and Technology*, 17(3 684), 698. <https://doi.org/10.2166/wpt.2022.019>