8. REFERENCES

Agostina, C., Simona, B., & Giorgia, D. F. (n.d.-a). *Technical-economic comparison of chemical precipitation and ion exchange processes for the removal of phosphorous from wastewater 2*.

Agostina, C., Simona, B., & Giorgia, D. F. (n.d.-b). *Technical-economic comparison of chemical precipitation and ion exchange processes for the removal of phosphorous from wastewater 2*.

Albertsen, M., Karst, S. M., Ziegler, A. S., Kirkegaard, R. H., & Nielsen, P. H. (2015). Back to basics - The influence of DNA extraction and primer choice on phylogenetic analysis of activated sludge communities. *PLoS ONE*, *10*(7). https://doi.org/10.1371/journal.pone.0132783

Alewi, H. K., Abood, E. A., & Ali, G. (2022). An inquiry into the relationships between BOD5, COD, and TOC in Tigris River, Maysan Province, Iraq. *Caspian Journal of Environmental Sciences*, *20*(1), 37–43. https://doi.org/10.22124/CJES.2022.5390

Ali, A., Chiang, Y. W., & Santos, R. M. (2022). X-Ray Diffraction Techniques for Mineral Characterization: A Review for Engineers of the Fundamentals, Applications, and Research Directions. *Minerals*, *12*(2). https://doi.org/10.3390/min12020205

Ali Dawood, S. A., Obaid, H. A., Hashim, T. M., & Jasim, H. K. (2019). Influence of using alum sludge as an aggregate on hot mix Asphalt. *IOP Conference Series: Materials Science and Engineering*, *584*(1). https://doi.org/10.1088/1757-899X/584/1/012032

Aniza, N., Hassan, S., M Nor, M. F., & Kee, K. E. (2015). *Jurnal Teknologi Full Paper INVESTIGATION OF THERMAL DEGRADATION OF POULTRY PROCESSING DEWATERED SLUDGE USING THERMOGRAVIMETRIC ANALYSIS METHOD* (Vol. 76, Issue 5). www.jurnalteknologi.utm.my

Arias, C. A., Bubba, M. Del, & Brix, H. (2001). PHOSPHORUS REMOVAL BY SANDS FOR USE AS MEDIA IN SUBSURFACE FLOW CONSTRUCTED REED BEDS. In *Wat. Res* (Vol. 35, Issue 5).

Babatunde, A. O., & Zhao, Y. Q. (2007). Constructive approaches toward water treatment works sludge management: An international review of beneficial reuses. In *Critical Reviews in Environmental Science and Technology* (Vol. 37, Issue 2, pp. 129–164). https://doi.org/10.1080/10643380600776239

Babatunde, A. O., & Zhao, Y. Q. (2010). Equilibrium and kinetic analysis of phosphorus adsorption from aqueous solution using waste alum sludge. *Journal of Hazardous Materials*, *184*(1–3), 746–752. https://doi.org/10.1016/j.jhazmat.2010.08.102

Babatunde, A. O., Zhao, Y. Q., & Zhao, X. H. (2010). Alum sludge-based constructed wetland system for enhanced removal of P and OM from wastewater: Concept, design and performance analysis. *Bioresource Technology*, *101*(16), 6576–6579. https://doi.org/10.1016/j.biortech.2010.03.066

Balkaya, M. (2016). Evaluation of the use of alum sludge as hydraulic barrier layer and daily cover material in landfills: a finite element analysis study. *Desalination and Water Treatment*, *57*(6), 2400–2412. https://doi.org/10.1080/19443994.2015.1005154

Bashir, A., Wang, L., Deng, S., Liu, J., Tian, J., Qiu, B., & Cheng, X. (2019a). Phosphorus release during alkaline treatment of waste activated sludge from wastewater treatment plants with Al salt enhanced phosphorus removal: Speciation and mechanism clarification. *Science of the Total Environment*, *688*, 87–93. https://doi.org/10.1016/j.scitotenv.2019.06.207

Bashir, A., Wang, L., Deng, S., Liu, J., Tian, J., Qiu, B., & Cheng, X. (2019b). Phosphorus release during alkaline treatment of waste activated sludge from wastewater treatment plants with Al salt enhanced phosphorus removal: Speciation and mechanism clarification. *Science of the Total Environment*, *688*, 87–93. https://doi.org/10.1016/j.scitotenv.2019.06.207

Blott, S. J., & Pye, K. (2006). Particle size distribution analysis of sand-sized particles by laser diffraction: An experimental investigation of instrument sensitivity and the effects of particle shape. *Sedimentology*, *53*(3), 671–685. https://doi.org/10.1111/j.1365-3091.2006.00786.x

Boczkaj, G., & Fernandes, A. (2017). Wastewater treatment by means of advanced oxidation processes at basic pH conditions: A review. In *Chemical Engineering Journal* (Vol. 320, pp. 608–633). Elsevier B.V. https://doi.org/10.1016/j.cej.2017.03.084

Cai, Y., Han, Z., Lin, X., Duan, Y., Du, J., Ye, Z., & Zhu, J. (2020). Study on removal of phosphorus as struvite from synthetic wastewater using a pilot-scale electrodialysis system with magnesium anode. In *Science of the Total Environment* (Vol. 726). Elsevier B.V. https://doi.org/10.1016/j.scitotenv.2020.138221

Carpenter, S. R. (2001). *Eutrophication of aquatic ecosystems: Bistability and soil phosphorus*. www.pnas.orgcgidoi10.1073pnas.0503959102

Chen, C. (2003). Evaluation of Air Oven Moisture Content Determination Methods for Rough Rice. *Biosystems Engineering*, *86*(4), 447–457. https://doi.org/10.1016/j.biosystemseng.2003.08.010

Chen, Y., Zou, C., Mastalerz, M., Hu, S., Gasaway, C., & Tao, X. (2015). Applications of micro-fourier transform infrared spectroscopy (FTIR) in the geological sciences—A Review. In *International Journal of Molecular Sciences* (Vol. 16, Issue 12, pp. 30223–30250). MDPI AG. https://doi.org/10.3390/ijms161226227

Conley, D. J., Paerl, H. W., Howarth, R. W., Boesch, D. F., Seitzinger, S. P., Havens, K. E., Lancelot, C., & Likens, G. E. (2009). Ecology - Controlling eutrophication: Nitrogen and phosphorus. In *Science* (Vol. 323, Issue 5917, pp. 1014–1015). https://doi.org/10.1126/science.1167755

Corrêa Martins, M. N., de Souza, V. V., & Souza, T. da S. (2016). Genotoxic and mutagenic effects of sewage sludge on higher plants. In *Ecotoxicology and Environmental Safety* (Vol. 124, pp. 489–496). Academic Press. https://doi.org/10.1016/j.ecoenv.2015.11.031

Cummings, L. A., Kurosawa, K., Hoogestraat, D. R., SenGupta, D. J., Candra, F., Doyle, M., Thielges, S., Land, T. A., Rosenthal, C. A., Hoffman, N. G., Salipante, S. J., & Cookson, B. T. (2016). Clinical next generation sequencing outperforms standard microbiological culture for characterizing polymicrobial samples. *Clinical Chemistry*, *62*(11), 1465–1473. https://doi.org/10.1373/clinchem.2016.258806

Dassanayake, K. B., Jayasinghe, G. Y., Surapaneni, A., & Hetherington, C. (2015a). A review on alum sludge reuse with special reference to agricultural applications and future challenges. In *Waste Management* (Vol. 38, Issue 1, pp. 321–335). Elsevier Ltd. https://doi.org/10.1016/j.wasman.2014.11.025

Dassanayake, K. B., Jayasinghe, G. Y., Surapaneni, A., & Hetherington, C. (2015b). A review on alum sludge reuse with special reference to agricultural applications and future challenges. In *Waste Management* (Vol. 38, Issue 1, pp. 321–335). Elsevier Ltd. https://doi.org/10.1016/j.wasman.2014.11.025

de Barros, I. R., Benincá, C., & Zanoelo, E. F. (2023). Kinetics of the precipitation reaction between aluminium and contaminant orthophosphate ions. *Environmental Technology (United Kingdom)*. https://doi.org/10.1080/09593330.2023.2246643

De Carvalho Gomes, S., Zhou, J. L., Li, W., & Long, G. (n.d.). *Progress in manufacture and properties of construction materials incorporating water treatment sludge: a review 2 3 4*.

De-Bashan, L. E., & Bashan, Y. (2004). Recent advances in removing phosphorus from wastewater and its future use as fertilizer (1997-2003). *Water Research*, *38*(19), 4222–4246. https://doi.org/10.1016/j.watres.2004.07.014

Divya, S., Sharmila, P., Dinakaran, J., Yamal, G., Rao, K. S., & Pardha-Saradhi, P. (2020). Specific H+ level is crucial for accurate phosphate quantification using ascorbate as a reductant. *Protoplasma*, *257*(1), 319–330. https://doi.org/10.1007/s00709-019-01424-9

Dodds, W. K., Bouska, W. W., Eitzmann, J. L., Pilger, T. J., Pitts, K. L., Riley, A. J., Schloesser, J. T., & Thornbrugh, D. J. (2009). Eutrophication of U. S. freshwaters: Analysis of potential economic damages. *Environmental Science and Technology*, *43*(1), 12–19. https://doi.org/10.1021/es801217q

Ebeling, J. M., Sibrell, P. L., Ogden, S. R., & Summerfelt, S. T. (2003). Evaluation of chemical coagulation-flocculation aids for the removal of suspended solids and phosphorus from intensive recirculating aquaculture effluent discharge. *Aquacultural Engineering*, *29*(1–2), 23–42. https://doi.org/10.1016/S0144-8609(03)00029-3

Egle, L., Rechberger, H., Krampe, J., & Zessner, M. (2016). Phosphorus recovery from municipal wastewater: An integrated comparative technological, environmental and economic assessment of P recovery technologies. *Science of the Total Environment*, *571*, 522–542. https://doi.org/10.1016/j.scitotenv.2016.07.019

Everaert, M., Bergmans, J., Broos, K., Hermans, B., & Michielsen, B. (2021). Granulation and calcination of alum sludge for the development of a phosphorus adsorbent: From lab scale to pilot scale. *Journal of Environmental Management*, *279*. https://doi.org/10.1016/j.jenvman.2020.111525

Franco, D., Lee, J., Arbelaez, S., Cohen, N., & Kim, J. Y. (2017). Removal of phosphate from surface and wastewater via electrocoagulation. *Ecological Engineering*, *108*, 589–596. https://doi.org/10.1016/j.ecoleng.2017.07.031

Fu, J. F., Zhao, Y. Q., Razali, M., & Bruen, M. (n.d.). *Response surface optimization of phosphorus species adsorption onto powdered alum sludge*.

Gallardo-Gonzalez, J., Baraket, A., Boudjaoui, S., Metzner, T., Hauser, F., Rößler, T., Krause, S., Zine, N., Streklas, A., Alcácer, A., Bausells, J., & Errachid, A. (2019). A fully integrated passive microfluidic Lab-on-a-Chip for real-time electrochemical detection of ammonium: Sewage applications. *Science of the Total Environment*, *653*, 1223–1230. https://doi.org/10.1016/j.scitotenv.2018.11.002

Ge, H., Batstone, D. J., & Keller, J. (2015). Biological phosphorus removal from abattoir wastewater at very short sludge ages mediated bynovel PAO clade Comamonadaceae. *Water Research*, *69*, 173–182. https://doi.org/10.1016/j.watres.2014.11.026

Genz, A., Kornmüller, A., & Jekel, M. (2004). Advanced phosphorus removal from membrane filtrates by adsorption on activated aluminium oxide and granulated ferric hydroxide. *Water Research*, *38*(16), 3523–3530. https://doi.org/10.1016/j.watres.2004.06.006

Georgantas, D. A., & Grigoropoulou, H. P. (n.d.). *Phosphorus removal from synthetic and municipal wastewater using spent alum sludge*. http://iwaponline.com/wst/article-pdf/52/10-11/525/433647/525.pdf

Georgantas, D. A., Matsis, V. M., & Grigoropoulou, H. P. (2006). Soluble phosphorus removal through adsorption on spent alum sludge. *Environmental Technology*, *27*(10), 1081–1088. https://doi.org/10.1080/09593332708618726

Ghafari, S., Aziz, H. A., Isa, M. H., & Zinatizadeh, A. A. (2009a). Application of response surface methodology (RSM) to optimize coagulation-flocculation treatment of leachate using poly-aluminum chloride (PAC) and alum. *Journal of Hazardous Materials*, *163*(2–3), 650–656. https://doi.org/10.1016/j.jhazmat.2008.07.090

Ghafari, S., Aziz, H. A., Isa, M. H., & Zinatizadeh, A. A. (2009b). Application of response surface methodology (RSM) to optimize coagulation-flocculation treatment of leachate using poly-aluminum chloride (PAC) and alum. *Journal of Hazardous Materials*, *163*(2–3), 650–656. https://doi.org/10.1016/j.jhazmat.2008.07.090

González, L. T., Longoria Rodríguez, F. E., Sánchez-Domínguez, M., Cavazos, A., Leyva-Porras, C., Silva-Vidaurri, L. G., Askar, K. A., Kharissov, B. I., Villarreal Chiu, J. F., & Alfaro Barbosa, J. M. (2017). Determination of trace metals in TSP and PM2.5 materials collected in the Metropolitan Area of Monterrey, Mexico: A characterization study by XPS, ICP-AES and SEM-EDS. *Atmospheric Research*, *196*, 8–22. https://doi.org/10.1016/j.atmosres.2017.05.009

Guo, J., Ni, B. J., Han, X., Chen, X., Bond, P., Peng, Y., & Yuan, Z. (2017). Unraveling microbial structure and diversity of activated sludge in a full-scale simultaneous nitrogen and phosphorus removal plant using metagenomic sequencing. *Enzyme and Microbial Technology*, *102*, 16–25. https://doi.org/10.1016/j.enzmictec.2017.03.009

Hansford, G. M., Turner, S. M. R., Degryse, P., & Shortland, A. J. (2017). High-resolution X-ray diffraction with no sample preparation. *Acta Crystallographica Section A: Foundations and Advances*, *73*(4), 293–311. https://doi.org/10.1107/S2053273317008592

Harrison, E. Z., Oakes, S. R., Hysell, M., & Hay, A. (2006). Organic chemicals in sewage sludges. In *Science of the Total Environment* (Vol. 367, Issues 2–3, pp. 481–497). https://doi.org/10.1016/j.scitotenv.2006.04.002

Hassan, S. H. A., Van Ginkel, S. W., Hussein, M. A. M., Abskharon, R., & Oh, S. E. (2016). Toxicity assessment using different bioassays and microbial biosensors. In *Environment International* (Vols. 92–93, pp. 106–118). Elsevier Ltd. https://doi.org/10.1016/j.envint.2016.03.003

Haydar, S., & Aziz, J. A. (2009). Coagulation-flocculation studies of tannery wastewater using combination of alum with cationic and anionic polymers. *Journal of Hazardous Materials*, *168*(2–3), 1035–1040. https://doi.org/10.1016/j.jhazmat.2009.02.140

Heikkinen, J. M., Hordijk, J. C., De Jong, W., & Spliethoff, H. (2004). Thermogravimetry as a tool to classify waste components to be used for energy generation. *Journal of Analytical and Applied Pyrolysis*, *71*(2), 883–900. https://doi.org/10.1016/j.jaap.2003.12.001

Holbrook, R. D., Wagner, M. S., Mahoney, C. M., & Wight, S. A. (2006). Investigating Activated Sludge Flocs using Microanalytical Techniques: Demonstration of

Environmental Scanning Electron Microscopy and Time-of-Flight Secondary Ion Mass Spectrometry for Wastewater Applications. *Water Environment Research*, *78*(4), 381–391. https://doi.org/10.2175/106143005x90092

Jeon, E. K., Ryu, S., Park, S. W., Wang, L., Tsang, D. C. W., & Baek, K. (2018). Enhanced adsorption of arsenic onto alum sludge modified by calcination. *Journal of Cleaner Production*, *176*, 54–62. https://doi.org/10.1016/j.jclepro.2017.12.153

Karageorgiou, K., Paschalis, M., & Anastassakis, G. N. (2007). Removal of phosphate species from solution by adsorption onto calcite used as natural adsorbent. *Journal of Hazardous Materials*, *139*(3), 447–452. https://doi.org/10.1016/j.jhazmat.2006.02.038

Karunanithi, R., Ok, Y. S., Dharmarajan, R., Ahmad, M., Seshadri, B., Bolan, N., & Naidu, R. (2017a). Sorption, kinetics and thermodynamics of phosphate sorption onto soybean stover derived biochar. *Environmental Technology and Innovation*, *8*, 113–125. https://doi.org/10.1016/j.eti.2017.06.002

Karunanithi, R., Ok, Y. S., Dharmarajan, R., Ahmad, M., Seshadri, B., Bolan, N., & Naidu, R. (2017b). Sorption, kinetics and thermodynamics of phosphate sorption onto soybean stover derived biochar. *Environmental Technology and Innovation*, *8*, 113–125. https://doi.org/10.1016/j.eti.2017.06.002

Keating, C., Chin, J. P., Hughes, D., Manesiotis, P., Cysneiros, D., Mahony, T., Smith, C. J., McGrath, J. W., & O'Flaherty, V. (2016). Biological phosphorus removal during high-rate, low-temperature, anaerobic digestion of wastewater. *Frontiers in Microbiology*, *7*(MAR). https://doi.org/10.3389/fmicb.2016.00226

Keeley, J., Smith, A. D., Judd, S. J., & Jarvis, P. (2016). Acidified and ultrafiltered recovered coagulants from water treatment 1 works sludge for removal of phosphorus from wastewater 2 3. In *Water Research* (Vol. 88).

Kim, J. G., Kim, J. H., Moon, H. S., Chon, C. M., & Ahn, J. S. (2002a). Removal capacity of water plant alum sludge for phosphorus in aqueous solutions. *Chemical Speciation and Bioavailability*, *14*(1–4), 67–73. https://doi.org/10.3184/095422902782775344

Kim, J. G., Kim, J. H., Moon, H. S., Chon, C. M., & Ahn, J. S. (2002b). Removal capacity of water plant alum sludge for phosphorus in aqueous solutions. *Chemical Speciation and Bioavailability*, *14*(1–4), 67–73. https://doi.org/10.3184/095422902782775344

Kralchevska, R. P., Prucek, R., Kolařík, J., Tuček, J., Machala, L., Filip, J., Sharma, V. K., & Zbořil, R. (2016). Remarkable efficiency of phosphate removal: Ferrate(VI)-induced in situ sorption on core-shell nanoparticles. *Water Research*, *103*, 83–91. https://doi.org/10.1016/j.watres.2016.07.021

Kumar, M., Badruzzaman, M., Adham, S., & Oppenheimer, J. (2007). Beneficial phosphate recovery from reverse osmosis (RO) concentrate of an integrated membrane system using polymeric ligand exchanger (PLE). *Water Research*, *41*(10), 2211–2219. https://doi.org/10.1016/j.watres.2007.01.042

Lee, J., Lee, S., Yu, S., & Rhew, D. (2016). Relationships between water quality parameters in rivers and lakes: BOD5, COD, NBOPs, and TOC. *Environmental Monitoring and Assessment*, *188*(4). https://doi.org/10.1007/s10661-016-5251-1

Lee, L. Y., Wang, B., Guo, H., Hu, J. Y., & Ong, S. L. (2015). Aluminum-Based Water Treatment Residue Reuse for Phosphorus Removal. *Water (Switzerland)*, *7*(4), 1480–1496. https://doi.org/10.3390/W7041480

Lee, S. H., Vigneswaran, S., & Moon, H. (1997). Adsorption of phosphorus in saturated slag media columns. In *Separation HPurification Technology Separation and Purification Technology* (Vol. 12).

Loganathan, P., Vigneswaran, S., Kandasamy, J., & Bolan, N. S. (2014). Removal and recovery of phosphate from water using sorption. *Critical Reviews in Environmental Science and Technology*, *44*(8), 847–907. https://doi.org/10.1080/10643389.2012.741311

Long, F., Gong, J. L., Zeng, G. M., Chen, L., Wang, X. Y., Deng, J. H., Niu, Q. Y., Zhang, H. Y., & Zhang, X. R. (2011). Removal of phosphate from aqueous solution by magnetic Fe-Zr binary oxide. *Chemical Engineering Journal*, *171*(2), 448–455. https://doi.org/10.1016/j.cej.2011.03.102

Lopes, C. de C. A., Limirio, P. H. J. O., Novais, V. R., & Dechichi, P. (2018). Fourier transform infrared spectroscopy (FTIR) application chemical characterization of enamel, dentin and bone. In *Applied Spectroscopy Reviews* (Vol. 53, Issue 9, pp. 747–769). Taylor and Francis Inc. https://doi.org/10.1080/05704928.2018.1431923

Maher, C., Neethling, J. B., Murthy, S., & Pagilla, K. (2015). Kinetics and capacities of phosphorus sorption to tertiary stage wastewater alum solids, and process implications for achieving low-level phosphorus effluents. *Water Research*, *85*, 226–234. https://doi.org/10.1016/j.watres.2015.08.025

Maqbool, N., Khan, Z., & Asghar, A. (2016). Reuse of alum sludge for phosphorus removal from municipal wastewater. *Desalination and Water Treatment*, *57*(28), 13246–13254. https://doi.org/10.1080/19443994.2015.1055806

Mazari, L., Szymczyk, A., Mazari, L., Abdessemed, ; D, & Szymczyk, A. (2018a). *Evaluating Reuse of Alum Sludge as Coagulant for Tertiary Wastewater Treatment Nitrogen and phosphorus removal at the membrane bioreactor and the conventional activated sludge View project Membranes !!! View project Evaluating Reuse of Alum Sludge as Coagulant for Tertiary Wastewater Treatment*. https://doi.org/10.1061/(ASCE)EE.1943

Mazari, L., Szymczyk, A., Mazari, L., Abdessemed, ; D, & Szymczyk, A. (2018b). *Evaluating Reuse of Alum Sludge as Coagulant for Tertiary Wastewater Treatment Nitrogen and phosphorus removal at the membrane bioreactor and the* *conventional activated sludge View project Membranes !!! View project Evaluating Reuse of Alum Sludge as Coagulant for Tertiary Wastewater Treatment*. https://doi.org/10.1061/(ASCE)EE.1943

Meissl, K., Smidt, E., & Schwanninger, M. (2007). Prediction of humic acid content and respiration activity of biogenic waste by means of Fourier transform infrared (FTIR) spectra and partial least squares regression (PLS-R) models. *Talanta, 72*(2), 791–799. https://doi.org/10.1016/j.talanta.2006.12.005

Mejía-Piña, K. G., Huerta-Diaz, M. A., & González-Yajimovich, O. (2016). Calibration of handheld X-ray fluorescence (XRF) equipment for optimum determination of elemental concentrations in sediment samples. *Talanta*, *161*, 359–367. https://doi.org/10.1016/j.talanta.2016.08.066

Mitchell, D., Grave, P., Maccheroni, M., & Gelman, E. (2012). Geochemical characterisation of north Asian glazed stonewares: A comparative analysis of NAA, ICP-OES and non-destructive pXRF. *Journal of Archaeological Science, 39*(9), 2921–2933. https://doi.org/10.1016/j.jas.2012.04.044

Mohammed, W. T., & Rashid, S. A. (2012). Phosphorus removal from wastewater using oven-dried alum sludge. *International Journal of Chemical Engineering*. https://doi.org/10.1155/2012/125296

Moseson, D. E., Jordan, M. A., Shah, D. D., Corum, I. D., Alvarenga, B. R., & Taylor, L. S. (2020). *Application and Limitations of Thermogravimetric Analysis to Delineate the Hot Melt Extrusion Chemical Stability Processing Window*.

Muisa, N., Nhapi, I., Ruziwa, W., & Manyuchi, M. M. (2020a). Utilization of alum sludge as adsorbent for phosphorus removal in municipal wastewater: A review. In *Journal of Water Process Engineering* (Vol. 35). Elsevier Ltd. https://doi.org/10.1016/j.jwpe.2020.101187

Muisa, N., Nhapi, I., Ruziwa, W., & Manyuchi, M. M. (2020b). Utilization of alum sludge as adsorbent for phosphorus removal in municipal wastewater: A review. In *Journal of Water Process Engineering* (Vol. 35). Elsevier Ltd. https://doi.org/10.1016/j.jwpe.2020.101187

Nadeem, K., ALLIET Queralt PLANA, M., Bernier, J., Azimi, S., & Albasi, C. (2021). *Modeling, simulation and control of biological and chemical P-removal processes for membrane bioreactors (MBRs) from lab to full-scale applications: state of the art*.

Nandiyanto, A. B. D., Oktiani, R., & Ragadhita, R. (2019). How to read and interpret ftir spectroscope of organic material. *Indonesian Journal of Science and Technology*, *4*(1), 97–118. https://doi.org/10.17509/ijost.v4i1.15806

Nayl, A. E. A., Elkhashab, R. A., El Malah, T., Yakout, S. M., El-Khateeb, M. A., Ali, M. M. S., & Ali, H. M. (2017). Adsorption studies on the removal of COD and BOD from treated sewage using activated carbon prepared from date palm waste.

Environmental Science and Pollution Research, *24*(28), 22284–22293. https://doi.org/10.1007/s11356-017-9878-4

Odimegwu, T. C., Zakaria, I., Abood, M. M., Nketsiah, C. B. K., & Ahmad, M. (2018). Review on Different Beneficial Ways of Applying Alum Sludge in a Sustainable Disposal Manner. *Civil Engineering Journal*, *4*(9), 2230. https://doi.org/10.28991/cej-03091153

Odziomek, K., Ushizima, D., Oberbek, P., Kurzydłowski, K. J., Puzyn, T., & Haranczyk, M. (2017). Scanning electron microscopy image representativeness: morphological data on nanoparticles. *Journal of Microscopy*, *265*(1), 34–50. https://doi.org/10.1111/jmi.12461

Oehmen, A., Lemos, P. C., Carvalho, G., Yuan, Z., Keller, J., Blackall, L. L., & Reis, M. A. M. (2007). Advances in enhanced biological phosphorus removal: From micro to macro scale. In *Water Research* (Vol. 41, Issue 11, pp. 2271–2300). Elsevier Ltd. https://doi.org/10.1016/j.watres.2007.02.030

Ojha, B., Sharma, R. K., & Amatya, I. M. (n.d.). *Application of Alum Sludge in Phosphate Phosphorus Removal from Contaminated Water*.

Owaid, H. M. (2013). *Physical and Mechanical Properties of High Performance Concrete with Alum Sludge as Partial Cement Replacement*. www.jurnalteknologi.utm.my

Pradel, M., & Aissani, L. (2019). Environmental impacts of phosphorus recovery from a "product" Life Cycle Assessment perspective: Allocating burdens of wastewater treatment in the production of sludge-based phosphate fertilizers. *Science of the Total Environment*, *656*, 55–69. https://doi.org/10.1016/j.scitotenv.2018.11.356ï

Pradhan, J., Das, J., Das, S., & Thakur, R. S. (1998). *Adsorption of Phosphate from Aqueous Solution Using Activated Red Mud*.

Prescher, C., & Prakapenka, V. B. (2015). DIOPTAS: A program for reduction of two-dimensional X-ray diffraction data and data exploration. *High Pressure Research*, *35*(3), 223–230. https://doi.org/10.1080/08957959.2015.1059835

Rahman, M. A., Lee, S. H., Ji, H. C., Kabir, A. H., Jones, C. S., & Lee, K. W. (2018). Importance of mineral nutrition for mitigating aluminum toxicity in plants on acidic soils: Current status and opportunities. In *International Journal of Molecular Sciences* (Vol. 19, Issue 10). MDPI AG. https://doi.org/10.3390/ijms19103073

Renou, S., Givaudan, J. G., Poulain, S., Dirassouyan, F., & Moulin, P. (2008). Landfill leachate treatment: Review and opportunity. In *Journal of Hazardous Materials* (Vol. 150, Issue 3, pp. 468–493). https://doi.org/10.1016/j.jhazmat.2007.09.077

Schindler, D. W., Hecky, R. E., Findlay, D. L., Stainton, M. P., Parker, B. R., Paterson, M. J., Beaty, K. G., Lyng, M., & Kasian, S. E. M. (2008). *Eutrophication of lakes* *cannot be controlled by reducing nitrogen input: Results of a 37-year whole-ecosystem experiment*. www.pnas.org/cgi/content/full/

Seleiman, M. F., Santanen, A., & Mäkelä, S. A. (n.d.). *Recycling sludge on cropland as fertilizer-advantages and risks 1*.

Shamaki, M., Adu-Amankwah, S., & Black, L. (2021). Reuse of UK alum water treatment sludge in cement-based materials. *Construction and Building Materials*, *275*. https://doi.org/10.1016/j.conbuildmat.2020.122047

Sibrell, P. L., Montgomery, G. A., Ritenour, K. L., & Tucker, T. W. (2009). Removal of phosphorus from agricultural wastewaters using adsorption media prepared from acid mine drainage sludge. *Water Research*, *43*(8), 2240–2250. https://doi.org/10.1016/j.watres.2009.02.010

Smith, V. H., Joye, S. B., & Howarth, R. W. (2006). Eutrophication of freshwater and marine ecosystems. *Limnology and Oceanography*, *51*(1 II), 351–355. https://doi.org/10.4319/lo.2006.51.1_part_2.0351

Smoczyński, L., Ratnaweera, H., Kosobucka, M., & Smoczyński, M. (2014). Image analysis of sludge aggregates. *Separation and Purification Technology*, *122*, 412–420. https://doi.org/10.1016/j.seppur.2013.09.030

Szabó, A., Takács, I., Murthy, S., Daigger, G. T., Licskó, I., & Smith, S. (2008). Significance of Design and Operational Variables in Chemical Phosphorus Removal. *Water Environment Research*, *80*(5), 407–416. https://doi.org/10.2175/106143008x268498

Tibebe, D., Kassa, Y., & Bhaskarwar, A. N. (2019). Treatment and characterization of phosphorus from synthetic wastewater using aluminum plate electrodes in the electrocoagulation process. *BMC Chemistry*, *13*(1). https://doi.org/10.1186/s13065-019-0628-1

Tomei, M. C., Stazi, V., Daneshgar, S., & Capodaglio, A. G. (2020). Holistic approach to phosphorus recovery from urban wastewater: Enhanced biological removal combined with precipitation. *Sustainability (Switzerland)*, *12*(2). https://doi.org/10.3390/su12020575

Truong, V. T., & Kim, D. J. (2021). Phosphate removal using thermally regenerated Al adsorbent from drinking water treatment sludge. *Environmental Research*, *196*. https://doi.org/10.1016/j.envres.2021.110877

Truong, T. Van, Tiwari, D., Mok, Y. S., & Kim, D. J. (2021). Recovery of aluminum from water treatment sludge for phosphorus removal by combined calcination and extraction. *Journal of Industrial and Engineering Chemistry*, *103*, 195–204. https://doi.org/10.1016/j.jiec.2021.07.033

Ugurlu, A., & Salman, B. (1998). PHOSPHORUS REMOVAL BY FLY ASH. In *Pergamon Environment International* (Vol. 24, Issue 8).

Usman, M. O., Aturagaba, G., Ntale, M., & Nyakairu, G. W. (2022). A review of adsorption techniques for removal of phosphates from wastewater. In *Water Science and Technology* (Vol. 86, Issue 12, pp. 3113–3132). IWA Publishing. https://doi.org/10.2166/wst.2022.382

van Dam, J. W., Trenfield, M. A., Harries, S. J., Streten, C., Harford, A. J., Parry, D., & van Dam, R. A. (2016). A novel bioassay using the barnacle Amphibalanus amphitrite to evaluate chronic effects of aluminium, gallium and molybdenum in tropical marine receiving environments. *Marine Pollution Bulletin*, *112*(1–2), 427–435. https://doi.org/10.1016/j.marpolbul.2016.07.015

Vigdorowitsch, M., Pchelintsev, A., Tsygankova, L., & Tanygina, E. (2021). Freundlich isotherm: An adsorption model complete framework. In *Applied Sciences (Switzerland)* (Vol. 11, Issue 17). MDPI. https://doi.org/10.3390/app11178078

Vohla, C., Kõiv, M., Bavor, H. J., Chazarenc, F., & Mander, Ü. (2011). Filter materials for phosphorus removal from wastewater in treatment wetlands-A review. *Ecological Engineering*, *37*(1), 70–89. https://doi.org/10.1016/j.ecoleng.2009.08.003

Wan, J., Wu, B., & Lo, I. M. C. (2020). Development of Fe0/Fe3O4 composites with tunable properties facilitated by Fe2+ for phosphate removal from river water. *Chemical Engineering Journal*, *388*. https://doi.org/10.1016/j.cej.2020.124242

Weerasinghe, R. M., Pannila, A. S., Jayananda, M. K., & Sonnadara, D. U. J. (2015). Automated Rain Sampler for Real time pH and Conductivity Measurements. In *Proceedings of the Technical Sessions* (Vol. 31).

Withers, P. J. A., & Jarvie, H. P. (2008). Delivery and cycling of phosphorus in rivers: A review. *Science of the Total Environment*, *400*(1–3), 379–395. https://doi.org/10.1016/j.scitotenv.2008.08.002

Wu, B., Xia, J., Zhang, S., Fu, Q., Zhang, H., Xie, X., & Liu, Z. (2023). Elemental composition x-ray fluorescence analysis with a TES-based high-resolution x-ray spectrometer. *Chinese Physics B*, *32*(9). https://doi.org/10.1088/1674-1056/acd926

Wu, H. F., Wang, J. P., Duan, E. G., Feng, Y. F., Wan, Z. Y., Wu, Y. X., & Lu, Y. Q. (2019). Study on the preparation of granular alum sludge adsorbent for phosphorus removal. *Water Science and Technology*, *79*(12), 2378–2386. https://doi.org/10.2166/wst.2019.241

Yang, Y., Tomlinson, D., Kennedy, S., & Zhao, Y. Q. (2006). Dewatered alum sludge: A potential adsorbent for phosphorus removal. *Water Science and Technology*, *54*(5), 207–213. https://doi.org/10.2166/wst.2006.564

Zeng, L., Li, X., & Liu, J. (2004). Adsorptive removal of phosphate from aqueous solutions using iron oxide tailings. *Water Research*, *38*(5), 1318–1326. https://doi.org/10.1016/j.watres.2003.12.009

Zhang, Y., Qin, J., & Yi, Y. (2021a). Biochar and hydrochar derived from freshwater sludge: Characterization and possible applications. *Science of the Total Environment*, *763*. https://doi.org/10.1016/j.scitotenv.2020.144550

Zhang, Y., Qin, J., & Yi, Y. (2021b). Biochar and hydrochar derived from freshwater sludge: Characterization and possible applications. *Science of the Total Environment*, *763*. https://doi.org/10.1016/j.scitotenv.2020.144550

Zhao, R., Feng, J., Liu, J., Fu, W., Li, X., & Li, B. (2019). Deciphering of microbial community and antibiotic resistance genes in activated sludge reactors under high selective pressure of different antibiotics. *Water Research*, *151*, 388–402. https://doi.org/10.1016/j.watres.2018.12.034

Zhao, W., Xie, H., Li, J., Zhang, L., & Zhao, Y. (2021). Application of alum sludge in wastewater treatment processes: "Science" of reuse and reclamation pathways. *Processes*, *9*(4). https://doi.org/10.3390/pr9040612

Zhao, Y. Q., Babatunde, A. O., Hu, Y. S., Kumar, J. L. G., & Zhao, X. H. (2011). Pilot field-scale demonstration of a novel alum sludge-based constructed wetland system for enhanced wastewater treatment. *Process Biochemistry*, *46*(1), 278–283. https://doi.org/10.1016/j.procbio.2010.08.023

Zhao, Y. Q., Zhao, X. H., & Babatunde, A. O. (2009). Use of dewatered alum sludge as main substrate in treatment reed bed receiving agricultural wastewater: Long-term trial. *Bioresource Technology*, *100*(2), 644–648. https://doi.org/10.1016/j.biortech.2008.07.040

Zheng, X., Liu, T., Guo, M., Li, D., Gou, N., Cao, X., Qiu, X., Li, X., Zhang, Y., Sheng, G., Pan, B., Gu, A. Z., & Li, Z. (2020). Impact of heavy metals on the formation and properties of solvable microbiological products released from activated sludge in biological wastewater treatment. *Water Research*, *179*. https://doi.org/10.1016/j.watres.2020.115895

Zhou, Y.-F., & Haynes, R. J. (2010). Water treatment sludge can be used as an adsorbent for heavy metals in wastewater streams. *WIT Transactions on Ecology and the Environment*, *1*, 1743–3541. https://doi.org/10.2495/0