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Landfill leachate treatment using activated carbon obtained from coffee waste**Rodrigo Poblete, Ernesto Cortes and Yolanda Luna**

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A set of experiments were carried out to establish and evaluate the potential of a new activated carbon, produced from coffee waste in adsorption process, in the depuration of landfill leachate, a toxic waste water. Different reagents were studied in the activation of carbon: HCl, HCl+H₂O₂, H₃PO₄, H₃PO₄+H₂O₂, all with an impregnation rate of 1:1. The activated carbon that showed the best global results was activated with H₃PO₄, obtaining a 51.0%, 24.4%, 32.8%, 66.0%, 81.0% and 97.1% elimination of chemical oxygen demand, color, ammonia, total chlorine, bromine and copper, respectively. This activated carbon has a total pore area of 4.85 m²/g and a median pore diameter of 65.32 micrometers. When different loads of this carbon were placed in a stirrer system in contact with landfill leachate, with the aim of evaluating the effect of the adsorption load and contact time, the concentration of ammonia decreased from the beginning of the adsorption process to the end of it and the removal of ammonia increased with the increase in the adsorbent load. However, the trend of the amount adsorbed per unit mass decreased with increased dosage. The model Freundlich equilibrium isotherm fits experimental data adequately, giving R² values of 0.95, 1/n of 0.5183 and a k value of 7.08*10⁻⁵ L/g, being favorable for adsorption process.

Recent Publications

1. Poblete R, Oller I, Maldonado M, Luna Y, Cortes E (2016) Cost estimation of COD and color removal from landfill leachate using combined coffee-waste based activated carbon with advanced oxidation processes. *Journal of Environmental Chemical Engineering*; 5(1): 114-121.

References

1. Xie Z, Wang Z, Wang Q, Zhu C, Wu C (2014) An anaerobic membrane bioreactor (AnDMBR) for landfill leachate treatment: performance and microbial community identification. *Bioresour. Technol.*; 161: 29-39.
2. Cortes-Lorenzo C, Sipkema D, Rodriguez-Diaz M, Fuentes S, Juarez-Jimenez B, Rodelas B, Smidt H, Gonzalez-Lopez J (2014) Microbial community dynamics in a submerged fixed bed bioreactor during biological treatment of saline urban wastewater. *Ecol. Eng.*; 71: 126-132.
3. Nowicki P, Skibiszewska P, Pietrzak R (2014) Hydrogen sulphide removal on carbonaceous adsorbents prepared from coffee industry waste materials. *Chem. Eng. J.*; 248: 208-215.
4. Oloibiri V, Ufomba I, Chys M, Audenaert W, Demeestere K, Van Hulle S (2015) A comparative study on the efficiency of ozonation and coagulation-flocculation as pretreatment to activated carbon adsorption of biologically stabilized landfill leachate. *Waste Manage.*; 43: 335-342.

Biography

Rodrigo Poblete has completed his PhD in Environmental Engineering from the Universidad de Sevilla, Spain and Master's degree in Thermal Energy Systems from the same University. He has his expertise in landfill leachate treatment and the use of waste materials for this purpose. He works as a Professor at Universidad Católica del Norte, Coquimbo, Chile where he Researches and Teaches. He is also the Director of the Master of Environmental Management program at Universidad Católica del Norte.

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