REMOVAL OF EMERGING NON-STEROIDAL ANTI-INFLAMMATORY CONTAMINANTS FROM AQUEOUS MATRIX BY BIOSORPTION ON RICE HUSK ASH

Bravo-Sánchez L.R. [a], Andi-Grefa D.D. [a], Rodríguez-Díaz J.M. [b]

[a] *Universidad Estatal Amazónica, Km 2 ½ vía Puyo-Tena, Puyo, Pastaza, Ecuador, e-mail: dixon.9572@gmail.com, bravosanchez66@yahoo.es*

[b] *Instituto de Investigaciones de la Universidad Técnica de Manabí. Laboratorio de Análisis Químico, Físico y Biotecnológico, Avenida José María Urbina, Portoviejo, Manabí, Ecuador, e-mail: joanrd9@yahoo.com*

The use of rice husk ash as residual biomass for the removal of organic contaminants[1], in this case, diclofenac and ibuprofen, from aqueous matrix, was evaluated. The adsorbent material was characterized on the basis of the particle size distribution, resulting to be close to normal behavior, with an average diameter between 0.15 and 0.42 mm, afterwards, the zero charge point, at pH = 8, was determined. The relative granulometric uniformity, the range of particle size found and the zero charge point value at which polar and electrostatic interactions with diclofenac and ibuprofen could be favored, allowed to speak in favor of their ability to retain pollutants[2]. The lowest amount of rice husk ash needed to achieve an adequate removal of contaminants from the aqueous matrix was 1g. The elimination process of diclofenac followed a pseudo first order kinetics; nevertheless, for ibuprofen it was pseudo second order. The equilibrium concentration was reached for 4 hours. As a result of the equilibrium study carried out it was verified that the Freundlich and Toth models were the best non-linear fit for both compounds and efficiently represented the ash / drug equilibrium process[3]. HPLC method for simultaneous quantification of ibuprofen and diclofenac was developed[4].

References

1. Lakshmi, U., Chandra Srivastava, V., Deo Mall, I., & Lataye, D., (2009). Rice husk ash as an effective adsorbent: Evaluation of adsorptive characteristics for Indigo Carmine dye. Journal of Environmental Management 90. 710-720.
2. Zambrano, L. (2016). Evaluación del uso de residuos agroindustriales como material adsorbente de colorantes sintéticos en medio acuoso. Universidad Técnica de Manabí. (Proyecto de titulación de pregrado). Portoviejo, Manabí, Ecuador.
3. Taylor, P., Maheshwari, M., Vyas, R. K., & Sharma, M. (2013). Desalination and Water Treatment Kinetics, equilibrium and thermodynamics of ciprofloxacin hydrochloride removal by adsorption on coal fly ash and activated alumina, 37–41.
4. Wahib, S. M. A., Ibrahim, W. A. W., Sanagi, M. M., Kamboh, M. A., & Keyon, A. S. A. (2018). Magnetic sporopollenin-cyanopropyltriethoxysilane-dispersive micro-solid phase extraction coupled with high performance liquid chromatography for the determination of selected non-steroidal anti-inflammatory drugs in water samples. Journal of Chromatography A, 1532, 50-57.