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Removal of metals from synthetic acid mine drainage (AMD) using an organic bio-mixture in continuous system

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Mining and extraction of specific metals is associated with pollution problems in the environment. An example of this is acid mine drainage (AMD). This corresponds to runoff of sulfate acid solutions, often with a significant content of dissolved metals. The treatment of water contaminated with these metals is significant for the protection of water resources and the environment in general. Therefore, in this work we evaluated the removal of Fe, Mn, Cu and Zn from a synthetic AMD through adsorption studies in continuous system using an organic bio-mixture. For the continuous system, glass columns (32 cm x 5 cm) packed with the bio-mixture (ρ 0.35 gmL⁻¹) was used for breakthrough curves determination. The synthetic effluent was prepared mixing: 102 mgL⁻¹ of Cu, 25 mgL⁻¹ of Mn, 142 mgL⁻¹ of Zn and 456 mgL⁻¹ of Fe. Columns were fed at different hydraulic loads (0.5, 1 and 1.5 mL per min). Lixiviates were collected and analyzed until the column saturation and data were analyzed and adjusted by the Thomas model. The adsorption in continuous system indicated that the bio-mixture has a high adsorption capacity for the metals and the parameters obtained through the Thomas model indicate that as the flow increases, the Thomas rate constant (Kt) is higher. In addition, the amount adsorbed (q_0) decreases as the flow increases. However, the amounts removed from the Cu, Zn, Mn and Fe metals were 86, 92, 90 and 95%. Thus, this bio-mixture could be used as a sustainable sorbent for the more expensive materials in mining effluent treatment due to its adsorptive properties, high availability, large quantities and low cost.

Biography

M Cristina Diez, has completed her PhD in 1993 from Universidad Estadual de Campinas, Brazil. She is a professor at Chemical Engineering Department and the Director of Biotechnological Research Center Applied to the Environment (CIBAMA-BIOREN) of La Frontera University. She has published more than 115 papers in reputed journals (ISI/WoS). She is a member of FONDECYT's technology board. She is serving as an Editorial Board Member of the *Journal of Soil Science and Plant Nutrition*.

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