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Adsorptive Bioremediation of Petroleum Refinery Wastewater Effluent

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Considering the vast amounts of water used in a refinery, wastewater treatment constitutes a very significant supporting process for safe operation. Various environmental problems arise throughout the entire petroleum cycle, especially at the stage of oil and gas exploration, production and transportation. Wastewater released from petroleum refineries is characterized by the presence of large quantity of petroleum products, metal derivatives, polycyclic and aromatic hydrocarbons, amines, phenols, surface active substances, dyes and naphthylenic acids. Due to ineffective purification systems, these pollutants finds their way into nearby water bodies and soil with potentially serious consequences on the ecosystem. Biosorption is a physiochemical metaprocess involving solid and liquid phases in which dissolved species to be sorbed. Algae, bacteria, yeast, fungi and waste materials from agricultural and food industries are used as biosorbent.Various waste materials for biosorptive removal of heavy metal ions from wastewater: olive leaves, coconut husk, coffee ground, tea leaves, almond shell residues, hazelnut shell, groundnut husk were selected because of their low cost and a higher biosorption capacity. A waste material, characterized by ligno cellulose composition, availability and low cost was tested for its ability to remove of heavy metal ions from aqueous systems. This study presents the results of the adsorption process of Pb2+ on some adsorbents: white pine sawdust (Pinus durangensis) and beech wood sawdust (Fagus sylvatica). The operating parameters: pH of the solution, adsorbent dosage and initial concentration were effective on the biosorption efficiency. The suitability of the Langmuir, Freundlich and Temkin adsorption models to the equilibrium data were investigated for each metal - adsorbent system, in order to establish all favourable conditions to uptake of Pb2+ from aqueous solution. Conclusion & Significance: The results of this study indicate that waste of wood is an attractive sorbent for removing Pb2+ from the petroleum refinery wastewater effluent.

Recent Publications

1. Argesanu C, Matei M, Song K, Bondarev A, Matei V (2018) The Effects of Modifying the Catalytically Active Phase Through Ni Impregnation of the Cu-Ru Catalyst on Carbon Support in Nitrobenzene Hydrogenation, REV.CHIM., 69, 6: 1451-1454.
2. Gheorghe C, Bondarev A, Onutu I, Assessement of Water Quality Parameters in Some Potential Pollutant Areas from Romania (2018) REV.CHIM., 69, 8:2045-2049.
3. Bondarev A, Pantea O, Mihai S, Calin C, Gheorghe C, Removal of Cadmium from Aqueous Solutions Using Low Cost Sorbents (2016) REV.CHIM., 67, 4: 728-733.
4. Nicolescu N, Lupu F, Pantea O, Gheorghe C, Bondarev A, Calin C (2016) Toxicity Study of Benzene, Toluene and Xylene (BTX) at Exposure on Some Experimental Groups, REV.CHIM., 66, 8: 1181-1183.
5. Bombos D, Ganea R, Matei V, Marinescu C, Bondarev A, Mihai S, Natu T, Tamas I (2014) Modified Bentonite for Purification of Dyeing Waste Water REV. CHIM., 65, 8:976-982.

Biography

Andreea Bondarev has experience in synthesis of organic and inorganic compounds; Chemical analysis: modern instrumentation and methods and techniques (FTIR, UV-VIS, GC), electrochemical methods of analysis; determination of emulsions stability. Research themes: Depollution of wastewaters from refineries; Corrosion studies in petrochemistry industry; Microencapsulation of essential oils by using biocompatible polymers; Synthesis and characterization of surface active compounds.

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