Remediation of aquifers contaminated with Mercurry

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ABSTRACT

Population growth, deforestation, industrialization and lack of environmental controls are the main reasons for the ecosystem pollution. The large amount of waste dumped in the environment, has led to the contamination of different water sources such as groundwater, which represents the most important stock of drinkable water.

Among carcinogenic substances present in the aquifers, mercury is one of heavy metals more dangerous for human health. This contaminant is very diffuse more than in other side of the world in South of America. In fact, the South American continent is reach in large reserves of precious minerals, that have been exploited for centuries and even today they represent a great source of wealth for some countries. However, the methods for the extraction of these metals have a serious environmental impact, mainly caused by illegal mining and inadequate “handmade” mining practices that produce the discharge into the rivers of a very high quantity of mercury.

This problem leaded to the research of innovative solutions for in situ remediation, characterized by environmental sustainability, low energy consumption, economical feasibility, even for small towns with limited economic resources, focusing on the cost-benefit ratio. In these last years the permeable reactive barriers (PRB), represented an important answer for the aforementioned requirements. PRB installations can be realized with different reactive materials, which play an important role in contaminants removing by means of adsorption and/or precipitation mechanisms. The aim of this research is to study innovative materials, i.e. plant fibers and other eco-friendly materials, producing the chemical adsorption of heavy metals in contaminated soils and aquifers. Some of the investigated materials are Brooms, Broom fibers and zeolites, which have been investigated to determinate the hydrodynamic and cleaning properties. Batch and column tests performed for the determination of the degradation constant (λ) and the evaluation of the adsorption capacity of heavy metals will be presented.