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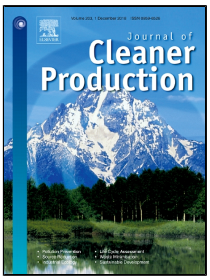

Metal-air fuel cell electrocoagulation techniques for the treatment of arsenic in water

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Metal-air fuel cell electrocoagulation techniques for the treatment of arsenic in water

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Abstract

There is growing interest in advanced, novel water treatment technologies that are simple, cheap, and highly efficient for removal of pollutants because of the pollution of fresh water sources that has accompanied the increase in the world's population. Thus, one of the most persistent challenges in the 21st century is to develop adequate clean water supply technologies for natural aquifers that are contaminated by various pollutants, including arsenic (As). Attention has also been directed toward treating wastewater as a potential resource. Electrocoagulation (EC) is a promising and efficient electrochemical process for nutrient recovery and remediation of a wide range of contaminants including heavy metals and organic matter. However, its large electric consumption is considered a main limiting factor. Further, the formation of an oxide (or passivation layer) on the metal anode electrode surface may reduce removal efficiency. The addition of gelatinous hydroxide (as a supporting electrolyte) is also required to increase solution conductivity. Recently, an alternative approach known as metal-air fuel cell electrocoagulation (MAFCEC) was proposed to address many shortcomings related to conventional EC process. This combined concept of EC and a fuel cell was effectively optimized to treat As contained in water. This review was organized to describe MAFCEC as one of the most energy-effective treatment methods for As based on a performance evaluation and a comparison to other relevant options. This review will help in the development of sustainable, cost-effective, and efficient technologies for removal of pollutants.

Key words: Metal-air fuel cell electrocoagulation, Arsenic treatment, Supporting electrolyte, Initial pH.

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