

Superior Removal of Arsenic From Drinking Water

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Reference: Arsenic Removal

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Reference

Wade, D.H., D. Zhao, A.K. SenGupta, C. Lange. (July 2004). "Preparation and Characterization of a New Class of Polymeric Ligand Exchangers for Selective Removal of Trace Contaminants from Water." *Reactive & Functional Polymers* (60) 109-120.

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Overview

Auburn University seeks a licensee or development partner for an invention that uses a tailored commercially-available chelating resin for selective removal of arsenate, As(V), from drinking water. This polymeric ligand exchanger (PLE) can be used by water utilities in cities where the arsenic concentration exceeds the U.S. Environmental Protection Agency (EPA) regulated Maximum Concentration Limit (MCL) of 10 ppb. It can also be employed in small community systems or for home use.

Advantages

- Arsenic content can be reduced to 0-5 ppb
- Inlet concentrations as high as 100 ppb arsenic can be treated
- Remains highly selective for arsenate even in the presence of high concentrations of competing anions (e.g., sulfate, chloride)
- 6,000 bed volumes of As-laden (>100 ppb As) can be processed before regeneration, which is 10 times more than commercial strong-base resins (see figure)
- PLE can be inexpensively and repeatedly regenerated. Overall brine needed is <10% of that for commercial strong-base resins

Description

EPA names ion exchange as one of the best available technologies for arsenic removal. However, the current commercial strong-base resins are not selective for arsenic and can only treat a few hundred bed volumes of water. As a result, large volumes of regenerant brine are needed and large amounts of As-laden process waste residuals are produced. Inorganic sorbents such as iron-based sorbents and activated alumina that have also been used for As removal are minimally regenerable.

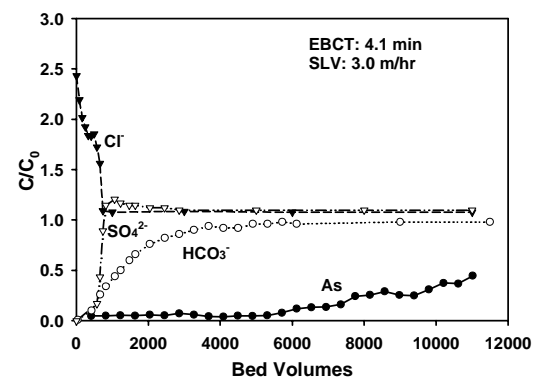
This Auburn University technology uses an innovative ligand exchanger (PLE) for highly selective removal of arsenate. PLE is prepared by loading copper(II) to a commercially available chelating resin known as DOWEX M-4195, a product of The Dow Chemicals Company. PLE offers advantages over other materials such as iron-based media including greater selectivity for As, higher treatment capacity and higher regeneration efficiency. Compared to commercial resins, PLE can treat 10 times more water and reduces the brine needed by more than 90%. The exhausted brine can be treated with iron salts, which allows for reuse of the treated brine at least 5 times with only pH adjustments, resulting in highly stable waste residuals. This technology has the potential to help water utilities cost-effectively comply with the new 10 ppb MCL for arsenic in water established by the EPA which will be in effect beginning January 2006.

Status

- A provisional patent application has been filed
- This process has been successfully verified with laboratory experiments

Licensing Opportunities

- This technology is available for exclusive or non-exclusive licensing
- Joint development opportunities include funded research or field testing



Breakthrough histories of arsenate and competing anions in a multi-component system for the polymeric ligand exchanger