

Specific and ultra-rapid removal of harmful constituents in water — A new system for production of drinking water during crises —

Overview

Specific and rapid removal of harmful constituents in water is essential for the design of a miniaturized system for water purification with advantages in portability and cost. AIST has developed novel ion-exchangers with specific uptake of harmful poly-atomic anions, and recently, through a cooperative project with Teijin Ltd et al., has succeeded in synthesis of a novel fiber with semi-micron size ion-exchanger particles which are well distributed, not kept in any contact with a porous polymer-matrix phase. This makes possible a novel system for production of drinking water during crises.

Technology

Practical use of a specific inorganic ion-exchanger essentially requires immobilization of well-distributed semi-micron size ion-exchanger particles in a porous polymer matrix without reduction in function. The above-mentioned fiber achieves rapid diffusion of target ions to reach the ion-exchange sites, particularly because there is no covering of the particles with a polymer phase. Thus, for example, when a column loaded with such fibers for specific uptake of nitrate ions is contacted with flowing ground water contaminated with nitrate, cleaned water satisfying the standard of drinking water of lower than 10 ppm-N is obtained at a rapid space velocity of 20-120 h⁻¹, with almost no pressure loss. Therefore, our technology is very useful for a micro-miniaturized system producing drinking water without a power supply in almost all cases. Several functional materials also can be used in this system for removing harmful ions such as NO₃⁻ and As(III, V).

Application

- A system for production of drinking water during crises
- Production of drinking water from ground water contaminated with nitrate and As(III and V)
- Removal of organic materials for maintenance of membrane systems

Patents

- JP 2005-296773 Ion-exchangers for selective uptake of nitrate ions
- JP 2006-316214 (Application No.) Fibers with particles of ion-exchanger for nitrate ions
- WO 2007/043545 Molded article and method of producing the same

Contact

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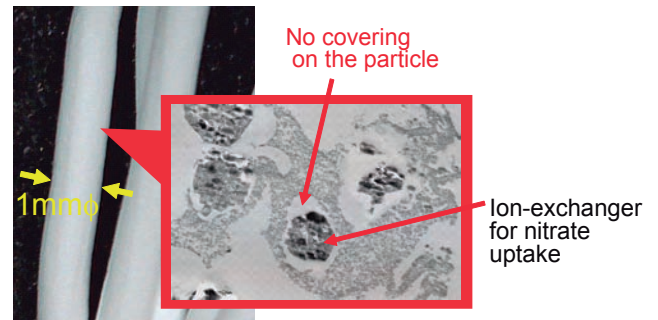


Fig. 1. Ion-exchange fiber with no contact interfaces

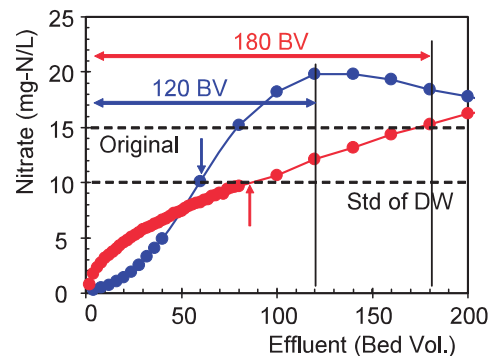


Fig. 2. Purification of ground water by a column process. Space velocities (h⁻¹): 20 (blue) and 120 (red)

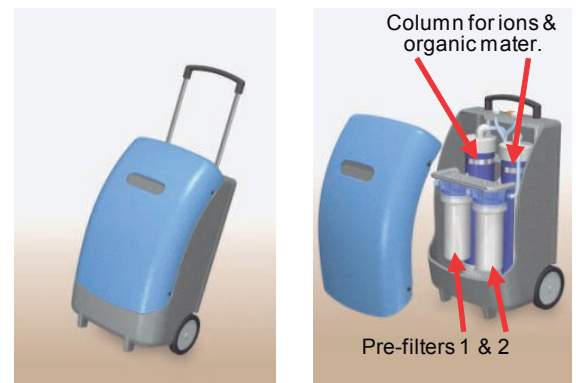


Fig. 3. A new model for rapid production of drinking water during crises