Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

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Concept of a System for Photocatalytic Reduction of Nitrate in Water

Nitrate is the most prevalent pollutant of ground water in the United States and is very common worldwide. Common sources of nitrates are fertilizers, animal feedlots, municipal wastewater, and septic systems. The level of nitrate is regulated in drinking water because high nitrate levels are known to cause Methemoglobinemia, a disease that prevents blood from collecting and carrying oxygen efficiently. Another disease caused by high nitrate levels is Blue Baby Syndrome, this malady causes an increase in bacteria which convert the nitrate into nitrite and poisons infants. Animals are also affected by this disease. Removing nitrate from contaminated water is very difficult. The most common treatment processes use ion exchange systems, but these processes only remove the nitrates from water, they do not detoxify the compound. After purification, the toxic material must be securely disposed of to prevent it from leaching into ground water.

Researchers at Arizona State University have developed a system that purifies water by removing nitrate and detoxifying the remaining compound. The system includes a water pretreatment component that controls the flow of fluid and removes organic matter, which can interfere with the photocatalytic process. The fluid is then processed through a photocatalytic reactor that converts the nitrate into an inert material. The new compound can be disposed of in a landfill with no concern of contaminating ground water. The innovation is equipped with sensors to monitor the fluid to determine the quality of the purification process. The process is self-adjusting and changes the flow of fluid and light intensity to insure the best quality of purified water. This innovation provides low-cost, purified water and removes hazardous material from the environment.

Potential Applications

- Water Purification
- Textile Industry
- Agricultural Industry
- Electronics Industry

Benefits and Advantages

- Lower Costs – Uses inexpensive equipment with low maintenance costs
- Better Quality – The process is self-monitoring and self-adjusting
- Retrofit – Can be easily installed in existing manufacturing processes

For more information about the inventor(s) and their research, please see Dr. Paul Westerhoff's directory webpage

Dr. Kiril Hristovski's directory webpage