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Cheap nano knowhow cleans arsenic from water

Contaminated water that causes illness and fatal poisoning among millions of people worldwide has been made safe to drink using tiny particles created by nanotechnologists

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Ian Sample, science correspondent
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[The Guardian](#)

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Contaminated water that causes illness and fatal poisoning among millions of people worldwide has been made safe to drink using tiny particles created by nanotechnologists. Scientists at Rice University in Houston are adapting the technique to make it cheap and simple enough to use in developing countries such as Bangladesh, where 57 million people drink water from wells with dangerously high levels of arsenic.

The discovery emerged after tests with precision-engineered particles showed they were 100 to 1,000 times more effective at stripping toxic contaminants from water than existing filters. The scientists have since used the findings to develop a cheap alternative for people to purify water in their own kitchens.

The lack of cheap low-tech ways to decontaminate water is a big problem in developing countries. In Bangladesh an

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estimated 10 million deep tube wells drilled in the 1970s tap into groundwater tainted with naturally-occurring arsenic 10 to 50 times above safe levels. Last year the US National Academy of Engineering announced a \$1m (£0.52m) reward for a cheap, easy-to-use and sustainable way of making the water safe to drink.

The team of scientists, lead by Vicki Colvin, director of Rice University's Centre for Biological and Environmental Nanotechnology, describe in the journal Science today how nanoparticles of iron oxide, measuring 12 nanometres across - or 5,000 times smaller than the width of a human hair - could get arsenic in water below international safety thresholds.

The scientists found that when the particles were mixed into contaminated water they became heavily coated with arsenic, effectively removing it from solution. Surprisingly, when the scientists then tried to remove the particles from the water with magnets they found that they pulled other particles with them, making the job much easier. "We were surprised to find that we didn't need large electromagnets to move our nanoparticles, and that in some cases hand-held magnets could do the trick," said Dr Colvin.

Doug Natelson, a co-author of the report, added: "Once the hand-held magnets start gently pulling on a few nanoparticles and get things going the nanoparticles effectively work together to pull themselves out of the water." The scientists calculated that 15g of the nanoparticles was enough to purify a litre of water.

The researchers have conducted tests showing similar purification can be achieved using clumps of rust, coconut or olive oil and a gas cooker. Experiments by Cafer Yavuz, a scientist on the project, showed flakes of rust could be turned into nanoparticles that could be picked up by a magnet by heating them in oil at 350C. "If the particles are then rinsed they can be used to purify water in the person's own kitchen, without electricity," he said.

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