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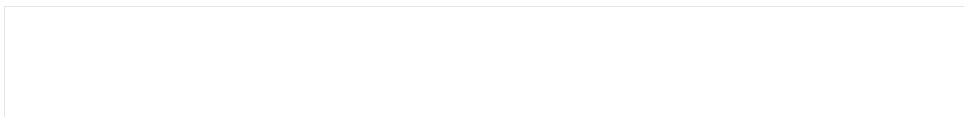
Uranium Extraction from Seawater Takes a Major Step Forward

Earth's oceans hold four billion tons of the element used to power nuclear plants

By Jennifer Hackett on July 1, 2016



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The earth's oceans hold enough uranium to power all the world's major cities for thousands of years—if we can extract it. A project funded by the U.S. Department of Energy is making notable advances in this quest: scientists at Oak Ridge National Laboratory and Pacific Northwest National Laboratory have developed a material that can effectively pull uranium out of seawater. The material builds on work

by researchers in Japan and consists of braided polyethylene fibers coated with the chemical amidoxime. In seawater, amidoxime attracts and binds uranium dioxide to the surface of the braids, which can be on the order of 15 centimeters in diameter and run multiple meters in length depending on where they are deployed. Later, an acidic treatment recovers the uranium in the form of uranyl ions, a product that requires processing and enrichment before becoming fuel. The procedure was described in a special report this spring in *Industrial & Engineering Chemistry Research*.

The process is still inefficient and expensive, but finding alternatives to uranium ore mining is a necessary step in planning for the future of nuclear energy, says Stephen Kung of the DOE's Office of Nuclear Energy, who was not involved in the project. Terrestrial sources of uranium are expected to last for only another 100 to 200 more years. "We need to take the longer view on this resource," Kung says.

BY THE NUMBERS

3.3 Micrograms Per Liter

Concentration of uranium in seawater

4 Billion Tons

Total uranium available in all Earth's seawater

6 Grams

Weight of uranium extracted per kilogram of adsorbent material

8 Weeks

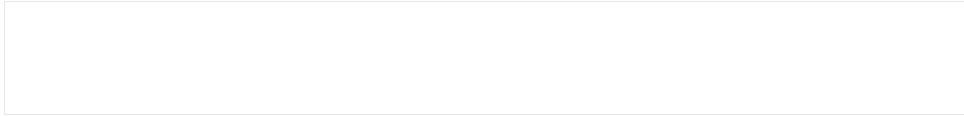
Time required to extract 6 grams

27,000 Kilograms

Amount of uranium fuel needed to run a 1-gigawatt nuclear power plant
for one year

SOURCES: COSTAS TSOURIS Oak Ridge National Laboratory (first, third and fourth items); COSTAS TSOURIS Oak Ridge National Laboratory AND STEPHEN KUNG Office of Nuclear Energy, Department of Energy (second item); WORLD NUCLEAR ASSOCIATION (fifth item)

This article was originally published with the title "Water Power"



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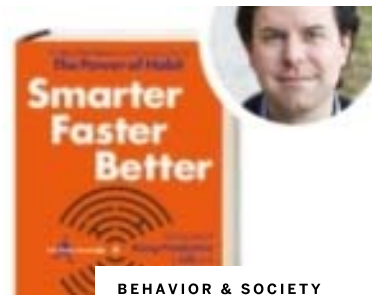
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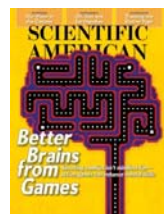
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