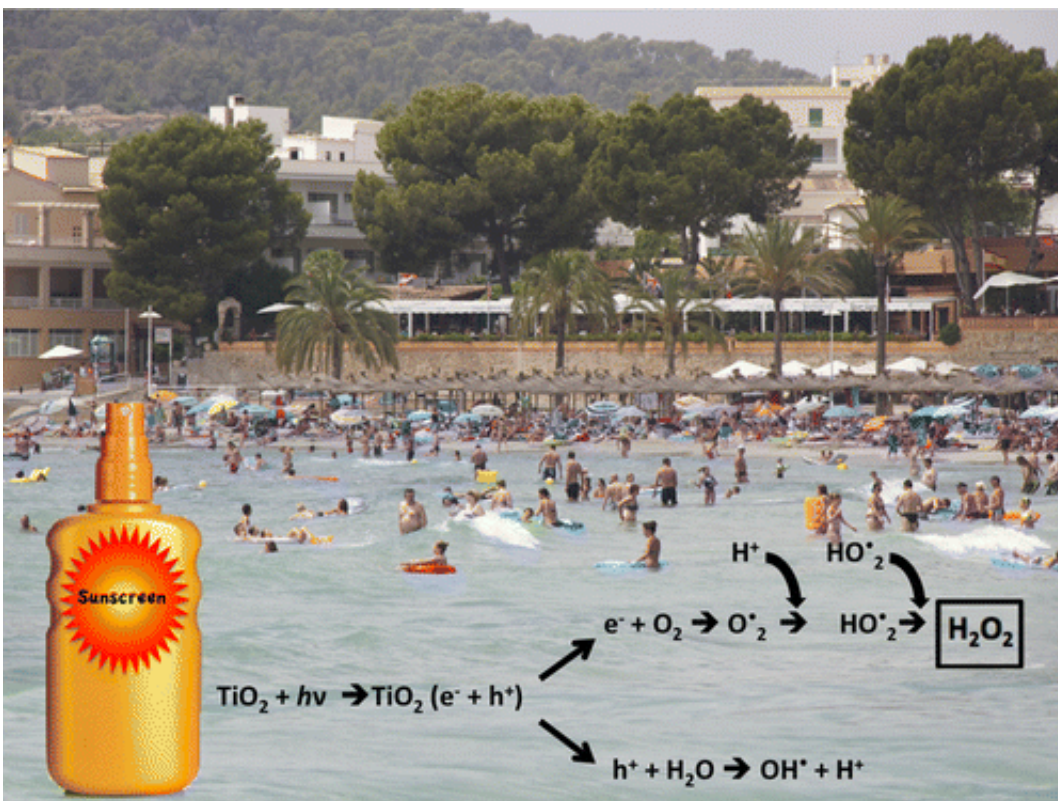


Sunblock poses potential hazard to sea life

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The sweet and salty aroma of sunscreen and seawater signals a relaxing trip to the shore. But scientists are now reporting that the idyllic beach vacation comes with an environmental hitch. When certain sunblock ingredients wash off skin and into the sea, they can become toxic to some of the ocean's tiniest inhabitants, which are the main course for many other marine animals. Their study appears in the ACS journal

Environmental Science & Technology.

Antonio Tovar-Sanchez and David Sánchez-Quiles point out that other than staying indoors, slathering on [sunscreen](#) is currently the best way to protect skin from the sun's harmful rays. But when sunbathers splash into the ocean to cool off, some of their lotions and creams get rinsed into the water. The problem is that [titanium dioxide](#) and zinc oxide nanoparticles, which are common ingredients in sunblock, can react with ultraviolet light from the sun and form new compounds, such as hydrogen peroxide, that could be toxic. High amounts of hydrogen peroxide can harm phytoplankton, the microscopic algae that feed everything from small fish to shrimp to whales. The scientists wanted to figure out just how serious of an impact beachgoers could be having on life in coastal waters.

To investigate the matter, they hit the beach. They went to Majorca Island's Palmira beach on the Mediterranean along with about 10,000 beachgoers, a small portion of the more than 200 million tourists that flock to Mediterranean shores every year. Based on lab tests, seawater sampling and tourism data, the researchers concluded that titanium dioxide from sunblock was largely responsible for a dramatic summertime spike in [hydrogen peroxide](#) levels in coastal waters—with potentially dangerous consequences for aquatic life.

More information: Sunscreens as a Source of Hydrogen Peroxide Production in Coastal Waters, *Environ. Sci. Technol.*, 2014, 48 (16), pp 9037–9042. [DOI: 10.1021/es5020696](https://doi.org/10.1021/es5020696)

Abstract

Sunscreens have been shown to give the most effective protection for human skin from ultraviolet (UV) radiation. Chemicals from sunscreens (i.e., UV filters) accumulate in the sea and have toxic effects on marine organisms. In this report, we demonstrate that photoexcitation of

inorganic UV filters (i.e., TiO₂ and ZnO nanoparticles) under solar radiation produces significant amounts of hydrogen peroxide (H₂O₂), a strong oxidizing agent that generates high levels of stress on marine phytoplankton. Our results indicate that the inorganic oxide nanoparticle content in 1 g of commercial sunscreen produces rates of H₂O₂ in seawater of up to 463 nM/h, directly affecting the growth of phytoplankton. Conservative estimates for a Mediterranean beach reveal that tourism activities during a summer day may release on the order of 4 kg of TiO₂ nanoparticles to the water and produce an increment in the concentration of H₂O₂ of 270 nM/day. Our results, together with the data provided by tourism records in the Mediterranean, point to TiO₂ nanoparticles as the major oxidizing agent entering coastal waters, with direct ecological consequences on the ecosystem.

Provided by American Chemical Society

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