

Reef Safety Review

Zinc Oxide versus Titanium Dioxide and Organic Sunscreens

- 4,000 to 6,000 tons of sunscreen enters reef areas annually [\[1\]](#)
- 90% of snorkeling/diving tourists are concentrated on 10% of the world's reefs [\[1\]](#)
- Oxybenzone leaches coral of its nutrients and damages DNA, bleaching it of its fluorescent color. Only 62 parts per trillion of Oxybenzone is needed to inflict this damage [\[2\]](#)
- Organic UV filters can induce the lytic viral cycle in zooxanthellae with latent infections [\[3\]](#). Zooxanthellae are single-celled dinoflagellates that live in symbiosis with marine invertebrates such as corals, jellyfish, and sea anemones [\[4\]](#)
- Oxybenzone can react with chlorine, producing hazardous reactive by-products that can concentrate in swimming pools and wastewater treatment plants [\[5\]](#)
- UV filters are not completely removed during waste water treatment and may be carried over into the environment [\[6\]](#).
- Gene expression models of the effects of nanoparticle TiO₂ on Caribbean reef-building coral using *Montastraea faveolata* have been studied. Though there was significant zooxanthellae expulsion in all the colonies, there was no link to mortality in the star coral [\[7\]](#)
- Nanoparticle ZnO had a higher solubility in seawater than that of larger-sized ZnO and thus potentially more toxic towards algae, but it is relatively less toxic towards crustaceans and fish. The toxicity of nZnO is mainly attributed to dissolved Zn²⁺ ions [\[8\]](#)
- At high enough concentrations, ZnO encapsulated nanoparticles are shown to be toxic to mussels, but these levels are unlikely to be reached in natural marine water [\[9\]](#)

Zinc Oxide is the superior choice for formulating a reef-safe sunscreen product

References

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