



Australian Society of Cosmetic Chemists

ASCC POSITION STATEMENT on the "REEF SAFE SUNSCREENS - STATUS AND CONSIDERATIONS"

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Studies in enclosed waters have indicated concerns for accumulation of ingredients of products applied prior to swimming and other water related activities⁽¹⁾. The major concern of late seems to relate to the potential for damage to corals, especially on the Great Barrier Reef⁽²⁾. Whilst this has taken a back seat this summer season due to heat induced coral bleaching, overall concern seems to have intensified in recent years. This is reflected by the increase in the number of formulations claiming to be "reef safe"⁽³⁾.

Professionals involved in the coral reef ecotourism industry have implemented best practice including not taking dive and snorkel parties to enclosed atolls, as well as recommending certain sunscreens over others⁽⁴⁾.

In one instance Hawaii, a state of USA has moved to ban two specific actives (oxybenzone and octinoxate). Hawaii Gov. David Ige, on June 30, 2018, signed the first bill in the country that will ban sunscreens containing chemicals harmful to coral reefs. The bill, which was passed by state lawmakers in May, will go into effect January 1, 2021. At that point, the sale or distribution of over-the-counter sunscreens containing oxybenzone and octinoxate, which help filter UV rays, will be prohibited⁽⁵⁾.

Products making claims of friendliness appear to vary in their list of "good and bad" actives. Whilst some products base their aquatic safety on inorganic actives, others implicate specific organic actives. Issues suggested include UV suppression and toxicity to the coral polyp and or its symbiotic algae⁽⁶⁾.

An overall issue for sunscreens is the need to utilise UV light absorption and comparative photo-stability, which may run counter to biodegradability for some actives⁽⁷⁾.

In order to truly validate lack of toxic effect on marine organisms, a suite of tests needs to be successfully undertaken. Such specialty toxicity tests already exist in the aquatic effluent testing arena.

The toxicity and the biodegradability of a substance are the two main characteristics which need to be studied in order to confirm lack of impact of a substance or a product on the marine ecosystems. Adding to a toxicity tests, the ecotoxicity assays and the biodegradability parameter give more details regarding a product, such as a sunscreen, which has the potential to end up in the up environment.

Ecotoxicity Tests in Marine Environment

- Marine Algae (*Phaeodactylum tricornutum*): NF EN ISO 10253
- Crustaceans copepods (*Acartia tonsa*): FD ISO 14669
- Crustaceans (*Artemia salina*): from FD ISO 14669
- Amphipods (*Corophium arenarium*) : NF ISO 16712
- Bacteria (*Vibrio fischeri*): NF EN ISO 11348-3
- Bivalves (Oysters : *Crassostrea gigas*): NF ISO 17244
- Echinoids (*Paracentrotus lividus*): from EPA 1008 Purple urchin
- Coral test (*Seriatopora hystrix*): Intern Method

Biodegradability Tests

There are a number of these to choose from and at least one should be considered;

- OECD 301 Readily biodegradability
- OECD 301A: DOC Die-Away
- OECD 301B: CO₂ Evolution (Modified Sturm Test)
- OECD 301D: Closed Bole
- OECD 301F: Manometric Respirometry
- OECD 302 Inherent Biodegradability
- OECD 302B: Zahn-Wellens/ EVPA Test

Water Resistant Sunscreens

Sunscreens that comply with Australian Standards are inherently more coral reef and aquatic environment friendly!

Most formulators are aware of the comparatively high cost of SPF actives and thus do not usually construct the product based on an overage allowance for high wash off. However, in the E.U. and most other countries, the label claim SPF can be based on up to 50% wash off. In effect, half of the sunscreen in each application can distribute into the aqueous environment, whilst the performance of Primary Sunscreens in Australia is required to be much higher. AS/NZS 2604 requires that the claimed SPF of a water-resistant product be based on post water immersion,

then it is likely that, in most cases, a 2 or 4 hr water resistant sunscreen will almost NOT WASH OFF at all. So, is it still necessary to conduct the extensive and comparatively expensive suite of supporting tests, or do we maybe just need to formulate to the maximum (4 hrs) water resistance and confirm lack of wash off in soft, hard and salt water conditions?

Whatever the tests, they probably need to be conducted on water sampled following full body application and human immersion.

Water resistant sunscreens formulated to pass Australian test conditions are likely to be vastly less of an issue than those with the "50% discount" approach to claim support.

Putting the Risk in Perspective

Around the world reefs are severely affected by global warming aggravated coral bleaching, agricultural runoff and human development. The impact of sunscreen wash-off has so far shown to be localised and impacts are likely to be restricted to inshore enclosed reef areas and high use dive zones visited by tourist groups.

Reef Safe Claim

For marketers, the consideration of a reef safe claim is a personal choice. In Australia, TGA requires that secondary claims for sunscreens be supported by valid evidence. For those wishing to make such claims, consideration of all of the issues listed above is advised.

References

1. Marianne E. Balmer, Hans-Rudolf Buser, Markus D. Müller, and Thomas Poiger. Occurrence of Some Organic UV Filters in Wastewater, in Surface Waters, and in Fish from Swiss Lakes *Environ. Sci. Technol.*, 2005, 39 (4), pp 953–962
2. <http://www.greatbarrierreef.org.au/sunscreen-kills-coral-reefs-worldwide/>
3. google images: reef friendly sunscreen
4. https://cdhc.noaa.gov/docs/Site%20Bulletin_Sunscreen_final.pdf
5. https://www.capitol.hawaii.gov/measure_indiv.aspx?billtype=SB&billnumber=2571&year=2018
<https://edition.cnn.com/2018/07/03/health/hawaii-sunscreen-ban/index.html>
6. Danovaro. R et al Sunscreens Cause Coral Bleaching by Promoting Viral Infections *Environmental Health Perspectives Vol 1116 number 4 April 2008*
7. Rodil, R et al Photostability and Phytotoxicity of selected sunscreen agents and their degradation mixtures in water *Anal Bioanal Chem (2009) 395: 1513-1524*