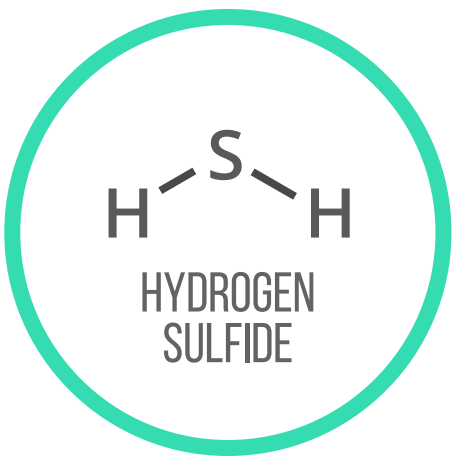
Aroma Chemistry

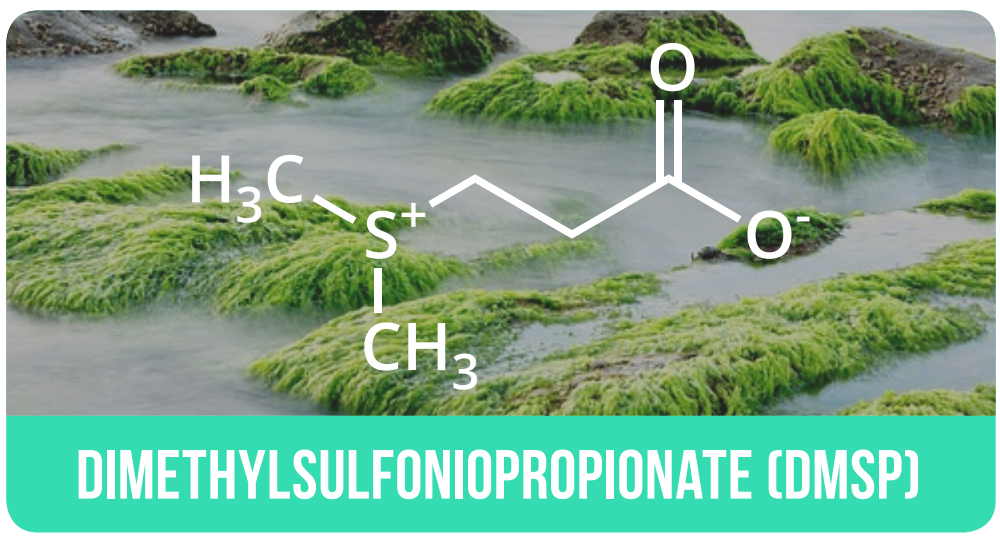
THE AROMA OF THE SEASIDE

The characteristic smell of the seaside stems from volatile organic compounds that contain sulfur. Some of these compounds are emitted by algae in the sea, as a result of enzymatic activity or bacterial action, whilst others can be emitted by decomposing seaweed on the beach itself.

COMPOUNDS FROM BACTERIA

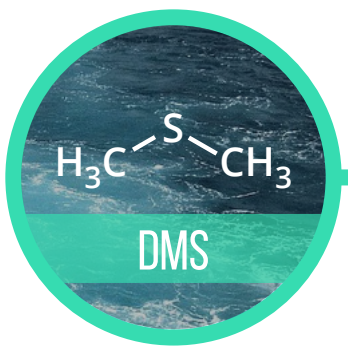
Hydrogen sulfide gas is produced by decomposing seaweed; the anaerobic breakdown of sulfates in the seaweed leads to the production of the gas. It is toxic in high concentrations, but as it is produced naturally in the body, humans have mechanisms to break it down, so can tolerate low concentrations.





DIMETHYLSULFONIOPROPIONATE (DMSP)

Dimethylsulfoniopropionate (DMSP) is a compound found in algae cells, which acts as an osmolyte (maintains cell volume and water levels). This compound can be broken down by both enzymes and bacteria, and this can produce dimethylsulfide (DMS). DMS is considered a major component of the smell of the sea.



DMS also has a role in cloud formation. Less than 10% of the DMS formed in the ocean gets to the atmosphere. Chemical reactions in the air can break it down into aerosols (tiny particles of a solid or liquid suspended in air). Water vapour can condense around these particles, and result in cloud formation. Other, non-DMS-derived aerosols also contribute, including dust and soot.