

# Products of the Reaction of OH Radicals with DMS under low-NO<sub>x</sub> Conditions

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Dimethylsulfide (DMS: CH<sub>3</sub>SCH<sub>3</sub>) is produced by biological activity of phytoplankton in the ocean's surface. DMS represents the largest natural source of atmospheric sulphur accounting for approximately 60% of biogenic emissions (Bates *et al.*, 1992, Spiro *et al.*, 1992). The atmospheric degradation of DMS is nearly exclusively initiated by the attack of OH radicals producing among others SO<sub>2</sub> and subsequently sulphuric acid aerosols. According to the CLAW hypothesis the aerosol formation could play an important role for the radiation budget and possibly for climate regulation (Charlson *et al.*, 1987).

Up to now there are a limited number of laboratory studies investigating the reaction of OH radicals with DMS under low-NO<sub>x</sub> conditions as found in the maritime environment. The degradation processes, including SO<sub>2</sub> formation, are not fully understood.

Our experiments were carried out either in a low pressure flow-tube (250 mbar) at a temperature of 295 ± 2 K or in an atmospheric pressure flow-tube maintained at 293 ± 0.5 K. OH radicals have been generated either via the sequence H + O<sub>2</sub> + M → HO<sub>2</sub> + M, H + HO<sub>2</sub> → 2 OH at low pressure (H-atom production from a microwave discharge) or via photolysis of H<sub>2</sub>O<sub>2</sub> or O<sub>3</sub> in the presence of H<sub>2</sub>O vapour at atmospheric pressure. Product formation was followed by means of PTR-MS, on-line GC-MS, long-path FT-IR spectroscopy and by gas monitors for SO<sub>2</sub> and O<sub>3</sub>.

The experimental findings for different reaction conditions are presented (variation of O<sub>2</sub> and DMS concentration, H<sub>2</sub>O vapour content, addition of O<sub>3</sub>) and discussed with respect to the degradation pathways going on. The results are compared with simulations applying the DMS-mechanism within the Master Chemical Mechanism (MCM).

Bates, T. S., *et al.*, *Sulfur Emissions to the Atmosphere from Natural Sources*. J. Atmos. Chem. 14, 315-337 (1992).

Charlson, R. J., *et al.*, *Oceanic phytoplankton, atmospheric sulphur, cloud albedo and climate*. Nature 326, 655-661 (1987).

Spiro, P. A., *et al.*, *Global Inventory of Sulfur Emissions With 1° x 1° Resolution*. J. Geophys. Res. 97, D5, 6023-6036 (1992).