



Hydrogen in biogas and its impact to the atmosphere

S. Walter (1), S. Laukenmann (2), A.J.M. Stams (3), and T. Röckmann (1)

(1) IMAU, Utrecht University, Utrecht, The Netherlands, (2) Department of Atmospheric Chemistry, MPI for Chemistry, Mainz, Germany, (3) Laboratory of Microbiology, Wageningen University, Wageningen, The Netherlands

The shortage and increase in cost of fossil fuels leads to an increased interest in renewable energy sources. One important renewable energy source is biogas, produced by fermentation of organic material. During the last ten years the number of biogas plants has continuously increased and it is expected to increase further. Biogas is a mixture of mainly methane and carbon dioxide but contains also molecular hydrogen (H₂). The hydrogen content of biogas depends on the used substrate and the production process. Hydrogen is also produced by conversion of biogas. Although hydrogen is considered as one of the most important future energy carriers, little is known about the global biogeochemical cycle of this trace gas (Rhee et al. 2006) and its impact to the atmosphere is discussed controversially. In order to assess the impact of an expected increasing H₂ concentration to the atmosphere a fundamental understanding of the sources and sinks of the global H₂ cycle is indispensable (Tromp et al. 2003, Warwick et al. 2004). Due to the large mass difference between hydrogen and deuterium the isotope composition is one possibility to obtain further information about the sources and sinks. Here we will present first results of the isotope composition of hydrogen in biogas.

Literature

Rhee, T.S., C.A.M. Brenninkmeijer, and T. Röckmann; The overwhelming role of soils in the global atmospheric hydrogen cycle, *Atmos. Chem. Phys.*, 6, 1611-1625, 2006.

Tromp, T.K., Shi, R.-L., Allen, M., Eiler, J.M., and Y. L. Yung1; Potential Environmental Impact of a Hydrogen Economy on the Stratosphere, *Science*, 300, 1740-1742, 2003.

Warwick, N.J., Bekki, S., Nisbet, E.G., and J.A. Pyle; Impact of a hydrogen economy on the stratosphere and troposphere studied in a 2-D model; *Geo.Res.Lett.*, 31, L05107, doi:10.1029/2003GL019224, 2004.