

October 2009 - American Scientists Raise New Issues

Nitrous Oxide (N₂O): the dominant ozone-depleting substance emitted in the 21st Century

Science. 2009 Oct 2 ;326(5949):123-5.

Ravishankara AR, Daniel JS, Portmann RW.

By comparing the ozone depletion potential-weighted anthropogenic emissions of N₂O with those of other ozone-depleting substances, we show that N₂O emission currently is the single most important ozone-depleting emission and is expected to remain the largest throughout the 21st century. N₂O is unregulated by the Montreal Protocol. Limiting future N₂O emissions would enhance the recovery of the ozone layer from its depleted state and would also reduce the anthropogenic forcing of the climate system, representing a win-win for both ozone and climate.

Nitrous Oxide emission during wastewater treatment

Water Res. 2009 Sep;43(17):4093-103.

Kampschreur MJ, Temmink H, Kleerebezem R, Jetten MS, van Loosdrecht MC.

Nitrous oxide (N₂O), a potent greenhouse gas, can be emitted during wastewater treatment, significantly contributing to the greenhouse gas footprint. Measurements at lab-scale and full-scale wastewater treatment plants (WWTPs) have demonstrated that N₂O can be emitted in substantial amounts during nitrogen removal in WWTPs, however, a large variation in reported emission values exists. Analysis of literature data enabled the identification of the most important operational parameters leading to N₂O emission in WWTPs:

- (i) low dissolved oxygen concentration in the nitrification and denitrification stages,
- (ii) increased nitrite concentrations in both nitrification and denitrification stages, and
- (iii) low COD/N ratio in the denitrification stage.

From the literature it remains unclear whether nitrifying or denitrifying microorganisms are the main source of N₂O emissions. Operational strategies to prevent N₂O emission from WWTPs are discussed and areas in which further research is urgently required are identified.