Nitrous Oxide Greenhouse Gas Abatement Catalyst

Among the naturally occurring greenhouse gases, nitrous oxide (N\textsubscript{2}O) is estimated to absorb 310 times more heat per molecule than carbon dioxide, thus contributing substantially to global warming (3). Atmospheric N\textsubscript{2}O is estimated to have increased by ~ 16% since the Industrial Revolution, and has contributed 6 to 11% to enhancing the greenhouse effect. Among the naturally occurring greenhouse gases, N\textsubscript{2}O is estimated to have increased by ~ 16% since the Industrial Revolution, and has contributed 6 to 11% to enhancing the greenhouse effect.

To reduce the production/emission of N\textsubscript{2}O as a waste product from nitric acid plants, the Norwegian nitrogen fertiliser manufacturer Yara International ASA (5) has developed a N\textsubscript{2}O abatement catalyst based on the reaction:

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2\text{N}_2\text{O} \rightarrow 2\text{N}_2 + \text{O}_2
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The de-N\textsubscript{2}O catalyst, which can cope with the high temperatures and corrosive environment of a nitric acid plant, is placed under the rhodium-platinum gauze pack and the catchment gauzes (6). It enables the N\textsubscript{2}O output in most plants to be reduced by 80% or more. The catalyst is of pelleted configuration, and when used with the Pt-Rh catalyst system gives an environmentally enhanced process with highly efficient N\textsubscript{2}O abatement. The catalyst is installed in several nitric acid plants, and more are planned. Johnson Matthey, as a catalyst gauze supplier, will market the catalyst to ‘clean development mechanism’ (CDM) and ‘joint implementation’ (JI) countries as defined by the Kyoto Protocol. N\textsubscript{2}O emission reductions can thus be brought into line with requirements sought by the Kyoto Protocol (7).

2. “Data by gas – N\textsubscript{2}O without LULUCF”, http://ghg.unfccc.int/tables/a2n2owo_lulucf.html

The Author

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