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AMMONIA OXIDATION
SOLUTIONS TO AVOID AND
REDUCE N₂O EMISSIONS

When basic chemicals for fertilizers, such as nitric acid, are produced, the process releases N_2O into the atmosphere as a byproduct. This greenhouse gas has roughly 273 times the global warming potential of carbon dioxide and is thereby a major factor in global warming. More than 65 million tons of nitric acid are produced around the world annually, with an estimated 500,000 tons of nitrous oxide generated as a byproduct – equivalent to the average annual carbon dioxide emissions from more than 60 million mid-sized cars.

Heraeus has been offering N_2O abatement technology for over 25 years. Through continuous research and development efforts, Heraeus has successfully created a tailored N_2O abatement system specifically designed for nitric acid plants. This innovative system enables the reduction of emissions by 90%. The N_2O reduction catalyst by Heraeus is suitable for both small scale reactors and commercial installations producing over 1,000 tons of acid per day.

ADVANTAGES OF N_2O ABATEMENT SYSTEM

- The Heraeus system can achieve 90 % reduction in N_2O emissions
- N_2O abatement catalyst can be installed without major reactor modifications
- Adjustable size for specific process conditions
- Low bed heights / light secondary catalyst weights
- High thermal stability
- High mechanical stability
- No sintering / clustering
- Low pressure drop
- Long catalyst lifetime

PRIMARY CATALYST

The catalytic gauze system FTC Flex can use specially developed precious metal alloys which permit a reduction in the emissions of N_2O by up to 70 %.

- N_2O generation depends on pressure, temperature, gas flow, gauze pack characteristics
- The Heraeus FTC Flex system offers low N_2O emissions under the gauze pack

SECONDARY CATALYST

- N_2O decomposition in the heat of ammonia oxidation
- Several active components are nowadays used for N_2O reduction:
 - Precious metals
 - Oxides of aluminium, cerium, cobalt, copper, iron, lanthanum, zinc
- Installation and basket design are essential to maximize the N_2O abatement
- Reduction efficiencies up to 95 %

SECONDARY CATALYST TECHNOLOGIES

Heraeus provides two types of secondary catalysts: precious metal / alumina catalysts and iron oxide / alumina catalysts.

PRECIOUS METAL / ALUMINA CATALYST:

- High N_2O abatement / low bed heights / light secondary catalyst weights
- Reduced pressure drop
- Very high mechanical stability
- Long catalyst lifetime
- Uses the same active elements as the gauze sets
- In forms of rings and spheres

IRON OXIDE / ALUMINA CATALYST:

- Shape: cylindrical standard, adjustable size for specific process conditions
- Independent from precious metal rates
- Long catalyst lifetime
- High N_2O abatement



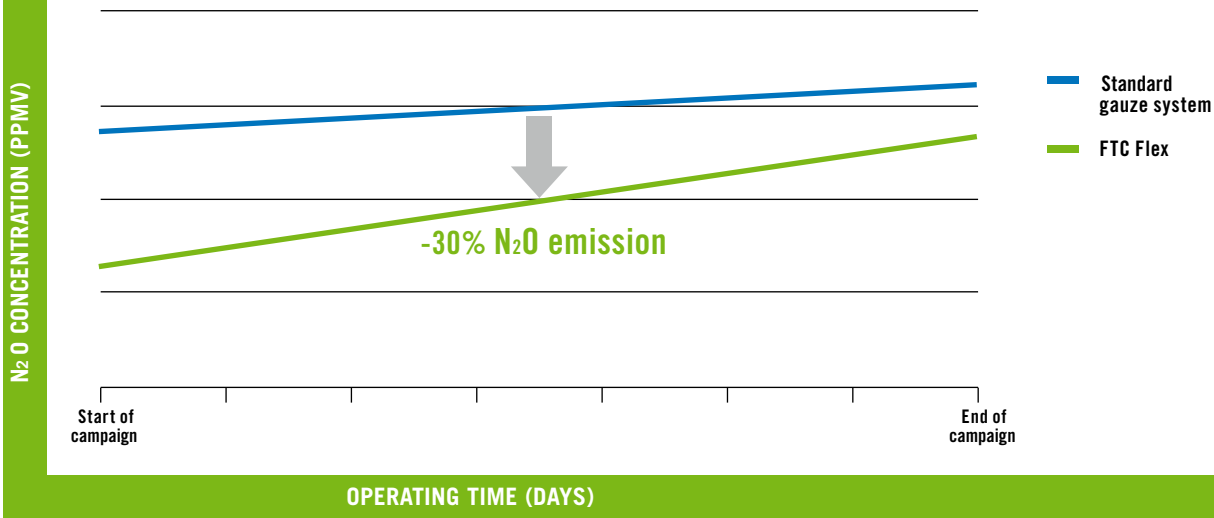
Iron oxide/alumina catalyst



Precious metal /alumina catalyst

LOW N_2O EMISSION WITH FTC FLEX GAUZE SYSTEM

N_2O EMISSION OF GAUZE SYSTEMS



INSTALLATION OF THE N_2O ABATEMENT CATALYST

The secondary catalyst is mounted directly beneath the catalytic gauze system.

Heraeus offers services around basket modifications. By collaborating with experienced partners who possess decades of expertise in components for nitric acid plants, high-quality solutions are ensured.