



**AMMONIA OXIDATION**

**SOLUTIONS TO AVOID AND  
REDUCE N<sub>2</sub>O 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 265 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 offered  $N_2O$  abatement technology for more than 25 years. We have developed a  $N_2O$  abatement system for nitric acid plants which enables the reduction of emissions to any desired level. The Heraeus  $N_2O$  reduction catalyst can be used in small scale reactors as well as in commercial installations with an output of more than 1,000 tons of acid per day.

## ADVANTAGES OF $N_2O$ ABATEMENT SYSTEM

- The Heraeus system can achieve over 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
- No critical elements for health or environment
- Low pressure drop
- Long catalyst lifetime

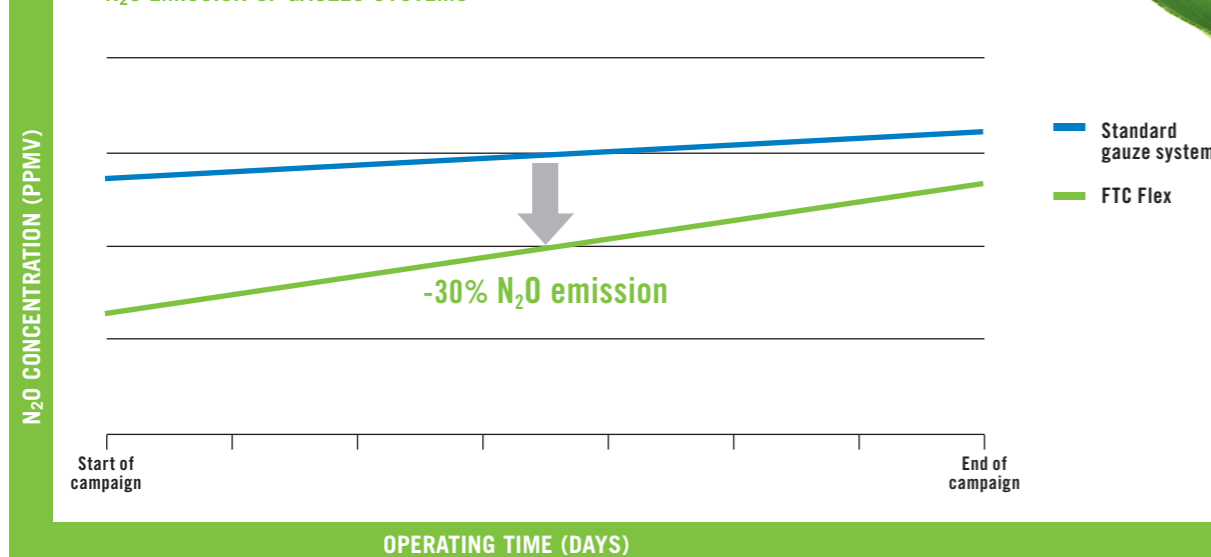
## PRIMARY CATALYST

The Heraeus FTC Flex system uses 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

### LOW $N_2O$ EMISSION WITH FTC FLEX GAUZE SYSTEM

$N_2O$  EMISSION OF GAUZES SYSTEMS



## 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 %



Iron oxide / alumina catalyst

### SECONDARY CATALYST TECHNOLOGIES

Heraeus provides two types of secondary catalysts (HR-SC): 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



Precious metal / alumina catalyst

#### IRON OXIDE / ALUMINA CATALYST:

- Shape: cylindrical standard, adjustable size for specific process conditions
- No critical elements for health or environment
- Independent from precious metal rates
- Long catalyst lifetime
- High  $N_2O$  abatement

### INSTALLATION OF THE $N_2O$ ABATEMENT CATALYST

The HR-SC is mounted directly beneath the primary gauze catalyst. In most cases, there are no modifications to be made prior to the installation of the Heraeus secondary catalyst.

For example: Sometimes it's necessary to modify the basket for the secondary catalyst installation. Heraeus provides full services for the basket modification: detailed design, strength and stability analysis, documentation, manufacturing of components and basket, shipment of the basket to customer's site, assembling of the basket into the burner. Heraeus works together with partners who have decades of experience with components for nitric acid plants.

## CONTACT

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