



# MONOLITHIC CATALYST SYSTEM FOR REMOVING NITROUS OXIDE

(PROJECT N° P-243)

## Greenhouse gas: N<sub>2</sub>O:

Nitrous oxide (N<sub>2</sub>O) is a greenhouse gas with a large Global Warming Potential (GWP). The ability to trap heat in the atmosphere per one molecule of N<sub>2</sub>O

is 298 times higher in comparison to carbon dioxide (CO<sub>2</sub>). Also, N<sub>2</sub>O emission currently is the single most important Ozone-Depleting Substance (ODS) emission and is expected to remain the largest throughout the 21st century.

N<sub>2</sub>O is an invisible by-product of the manufacture of nitric acid by the Ostwald process. Nitric acid production is currently the largest source of nitrous oxide emissions in the chemical industry. Emission regulations on

nitrogen oxide and nitrous oxide from nitric acid plants are being implemented in more and more areas around the world, and in other areas, emission level requirements are being tightened.

## Monolithic system reduces the costs of the catalyst:

The monolithic catalyst system is dedicated to low- and medium-temperature decomposition of nitrous oxide in the exhaust gases from the installation, mainly in nitric acid plants. The system comprises an active phase consisting of cobalt oxide and zinc oxide, an intermediate phase consisting of zinc oxide and cerium oxide and the promoters in the form of alkali metal (Na, K) enhancing the activity of the system. The use of a monolithic catalyst instead of solid allows for limiting the amount of cobalt, which is the most expensive part of the system. Also, it results in a significant increase in the rate of decomposition of nitrous oxide in comparison to the catalyst in the form of pellets having a similar composition of the active phase.

The offer is a monolithic catalyst system for low- and medium temperature decomposition of nitrous oxide, which is dedicated to industrial installations in which the concentration of nitrous oxide in the exhaust gas stream does not exceed 3% by volume. Operating temperature of the catalyst is in the range of 200 to 600 °C.

Application: removing of N<sub>2</sub>O in nitric acid plants

## Information:

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The main features of the invention are:

The active phase (cobalt):

< 1% Wt.

Promotors:

Na, K

Concentration of nitrous oxide in the exhaust gas stream:

≤ 3% vol.

Operating temperature:

200 – 600 °C

Conversion of N<sub>2</sub>O:

≥ 90%

N<sub>2</sub>O decomposition products:

O<sub>2</sub>, N<sub>2</sub>

The material is the subject of patent application and the invention is still developed by the scientists from Faculty of Chemistry, Jagiellonian University in cooperation with the Institute of New Chemical Synthesis. In 2014 a pilot installation of the catalyst system was launched.

Currently the Centre for Innovation, Technology Transfer and University Development (CITTRU) is looking for the entities interested in the commercial applications of the described solution. CITTRU is looking for the business partners for joint research and development projects involving the above research topic.

more:

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