Zeolites, a group of microporous, crystalline aluminosilicates, are one of the main pillars of industry and heterogeneous catalysis [1]. Their strong acidic sites are located inside the channels available through windows with diameters not exceeding 1 nm. This constraint appears to limit accessibility of catalytic sites and does not allow complete utilization of the potential of these materials, both in acid and redox catalysis. This leads to an increased interest in the synthesis of new and modifications of already known zeolites with more open structures. Zeolites containing transition-metal ions often show promising activity as heterogeneous catalysts in pollution abatement and selective redox reactions. One of the most important greenhouse pollutants, characterized as a strong and long-lived absorber of infrared radiation is nitrous oxide. The first choices for decomposition of N\textsubscript{2}O from a cost-effective point of view are cobalt oxide-containing catalysts which show excellent catalytic activities due to its relatively high redox properties [2].

On this field very promising seem to be relatively new class of zeolites named lamellar or two-dimensional zeolites, characterized by the enhanced accessibility of active centers [3]. One of the most interesting lamellar zeolite is MCM-56, belonging to the MWW family. MCM-56 consists of 2.5 nm thick monolayers and is an intermediate product transforming to the classical three-dimensional MCM-49. To improve its textural and ion-exchange properties, the parent MCM-56 was treated with nitric acid and a novel method, with the use of HF solution in NH\textsubscript{4}F, recently published by Valtchev et al. [4]. After acid treatment the classical ion-exchange for cobalt cations was carried out. Such treatment led to the formation of zeolite having relatively high loading of cobalt (0.4–0.7 wt%, depending on the pretreatment procedure). Co was present mainly in the form of the small clusters of cobalt oxides, with nominal oxidation state of cobalt equal 3\textsuperscript{+} and well-dispersed Co\textsuperscript{2+} cations. FTIR spectroscopy confirmed that cobalt speciation and properties strongly depend on the calcination temperature. At standard activation temperature (450°C), cobalt-containing MCM-56 strongly adsorbed N\textsubscript{2}O, with minimum interaction with the NO. When the sample was activated above 500°C, NO was adsorbed mainly as the –ONO moieties and transformed into more stable nitrates. For that reason, cobalt-containing MCM-56 was tested as a potential catalyst for deNO\textsubscript{x} process.

Keywords: MWW; cobalt; NO\textsubscript{x} decomposition

Acknowledgment
Financial support from National Science Centre in Poland, grant no 2016/21/B/ST5/00858 is gratefully acknowledged.

References