

Nawrocki, J., Fijolek, L. **Mechanisms and Efficiency of Catalytic Ozonation in Water Treatment.** *Ochrona Srodowiska* 2009, Vol. 31, No. 3, pp. 3–16.

Abstract: The paper gives a critical account of state-of-the-art methods and mechanisms dealt with in catalytic ozonation and analyzes their applicability to water treatment. Catalytic ozonation is classified as an advanced oxidation process and its efficiency generally depends on the generation of hydroxyl radicals. The main advantages of catalytic ozonation over processes involving ozonation alone are emphasized (the high rate of the process, the substantially higher efficiency of organic matter mineralization, and the notably higher extent of ozone utilization). An analysis is performed of the phenomena occurring both in homogeneous and heterogeneous catalysis. It has been demonstrated that during homogeneous catalytic ozonation hydroxyl radicals are formed predominantly in the consecutive reactions of ozone with organic–metal ion complexes. Heterogeneous catalytic ozonation is analyzed according to the types of the catalysts being used (metal oxides, ceramic materials, supported metals, and active carbon). Consideration is also given to some nonpolar systems stabilizing molecular ozone, as well as to their potential use in support of the ozonation process. A review of publications dealing with the catalytic ozonation issue makes it clear that many of the results and conclusions reported in the literature are inconsistent, contradictory and controversial, specifically those relating to the mechanisms governing the formation of hydroxyl radicals.

Keywords: Water treatment, organic matter mineralization, heterogeneous catalytic ozonation, homogeneous catalytic ozonation, hydroxyl radical.