

**Bielski, A., Zymon, W. Kinetics Analysis of Oxidant Content Variations in Water with Chlorine as an Example. *Ochrona Srodowiska* 2015, Vol. 37, No. 1, pp. 11–23.**

**Abstract:** Simple models based on unimolecular reactions of the first or  $n$ -th order currently used to describe redox kinetics may lead to serious errors. More sophisticated kinetic models require solving differential equation systems, which is only possible with an appropriate software to determine multiple parameters. Here, the authors examined the applicability of a bimolecular model of  $m$ -th order to a reducer and  $n$ -th order to an oxidant to analyze the laboratory results of water chlorination. The obtained model described well the process of water contaminant oxidation with chlorine. It allowed for determination of a constant defining the reducer content in water, calculated as equivalent of an oxidant. Chlorine decomposition rate, accompanying the oxidation process, was comparable to the rate of chlorine decay from water. Therefore, oxidant decomposition rate should be included in kinetic equation describing oxidant decay rate. Finally, another kinetic model was proposed, represented by a two-equation system describing oxidation based on a bimolecular mechanism of  $m$ -th and  $n$ -th order, taking into consideration oxidant decomposition according to the first order unimolecular mechanism. A model of this kind could be applied to designing water treatment system and during water supply system operation.

**Keywords:** Chlorination, oxidant decay, contact chambers, water supply system.