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KINETICS AND MECHANISM OF ORGANIC COMPOUNDS OXIDATION BY PULSED CORONA DISCHARGE

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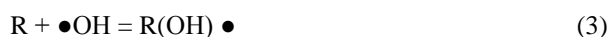
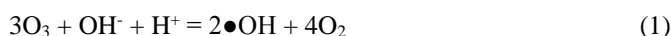
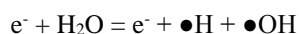
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Nowadays there are huge variety of wastewater treatment methods and oxidation is one of the mostly used. It is not a secret that an dvanced oxidation processes showed their efficiency and methods based on using chemicals to oxidize pollutants becomes a secondary. Ozone is an efficient oxidant of organic matter but its production is expensive. The process of hydroxyl radical generation from ozone/hydrogen peroxide modelled in the 1980s, which made it possible to optimize the use of ozone in the elimination of hazardous pollutants, such as pesticides, PAHs, etc. Now the system ozone/hydrogen peroxide is a new choice for water reclamation and potable reuse. The use of the ozone/hydrogen peroxide system as a tertiary treatment of domestic and urban wastewater could provide reclaimed water to use in agriculture or industrial processes [1]. In the present work, the kinetic and mechanism of organic compounds oxidation have studied. As an oxidation method, we used representative of advanced oxidation processes – pulsed corona discharge oxidation. The effectiveness of electrical discharges generated by high voltage has been proven to degrade pollutants in wastewater [2] also widely used for disinfection of microbial contaminated liquids [3]. In water, high voltage discharge includes a non-thermal plasma method for producing ozone and hydroxyl radicals from water and oxygen [4]. Mechanism for highly reactive oxidants producing based on ozone decomposition follows to these reactions (1-3):



Hydroxyl radicals resulting from the reaction between ozone and hydroxide ions can be generated by either direct attack of the molecular ozone or indirect attack of the hydroxyl radicals. Mostly researches on the ozone decomposition in water based on descriptions of overall kinetics founded for “pure water”. Even so, systems of primary decomposition of ozone are kinetically complex because of free radicals producing, which may react with further ozone to produce more free radicals. The kinetics of this reaction depend on many parameters and the rate reported in the literature is rather difficult and the results from different authors seem contradictory [5].

As objects of research, oxalic acid and phenol have chosen. Pulsed corona discharge reactor was a generator of active oxidants and pulse frequency was changing from 300 to 833 pps. To define temperature dependence there were two different temperature rates: from 10⁰C to 45⁰C in the different pulse frequency conditions, in spite of that fact, the same energy has delivered. According the data about concentration after oxidation, it makes sense say that mechanism of degradation goes by directly ozone influence. The reaction rate constants determined assuming that the combined

effect of the oxidants result in a second order reaction rate: first order relative to the target pollutant and first order relative towards the oxidant. It has found out the most efficient degradation of oxalic acid usually goes on the 60th minute of reaction (833pps) and on the 80.3th minute in 300 pps pulse frequency level.

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ИССЛЕДОВАНИЕ ПРОЦЕССА РЕГЕНЕРАЦИИ СЕРЕБРА НА ТВЕРДОФАЗНОМ КАТАЛИЗАТОРЕ ИЗ ТЕХНОЛОГИЧЕСКИХ ПРОДУКТОВ ЭКСТРАКЦИОННОГО ПЕРЕДЕЛА ПРОИЗВОДСТВА МОКС-ТОПЛИВА НА ФГУП ФЯО «ГХК»

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В технологии производства МОКС-топлива на площадке ФГУП ФЯО «ГХК» процесс растворения исходного диоксида плутония проводится в присутствии электрохимически регенерируемых катионов Ag^{2+} , имеющих высокий редокс-потенциал. После проведения экстракционных операций требуется максимально полное выделение серебра из рафината с целью его регенерации для возврата в процесс и отделения от продуктов естественного распада.

Целью работы являлась разработка технологически пригодного способа количественного выделения серебра из технологических азотнокислых растворов производства МОКС-топлива с его последующей регенерацией для возвращения в «голову» процесса (на стадию растворения диоксида плутония). Процесс извлечения серебра из раствора проводили путем его восстановления из модельных растворов технологических продуктов (рафинатов) экстракционного передела производства МОКС-топлива в компактном виде на поверхности (зернистом слое) твердофазного катализатора в присутствии восстановителя гидразин-нитрата с последующей регенерацией выделенного серебра в промывной азотнокислый раствор (4-5М) для возвращения в «голову» процесса:

