As a result of this work, the necessity of creating a quality assurance program in the context of a particular PET department was substantiated, the purpose of which is to control the key characteristics of the scanner to ensure its correct operation.

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PHOTODEGRADATION OF CAFFEINE OVER PLASMA TREATED ZNO-BASED CATALYSTS DOPED WITH AG NANOPARTICLES

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The photocatalytic degradation of caffeine was studied over ZnO-based catalysts. The activity of catalysts in reaction of photodegradation of caffeine was compared with that in reaction of degradation of methyl orange. It was shown that plasma treated ZnO-based photocatalysts doped with Ag nanoparticles can be used to treat the pharmaceutical wastewater.

Keywords: photocatalyst, photodegradation, ZnO, photometry, methyl orange, nanoparticles, Ag, optical density, pharmaceutical waste.

Within the last few years, occurrence of pharmaceutical wastes and their metabolites in environmental have attracted scientific interest. The pharmaceuticals consists of biologically active compounds which are hard to be destructed by conventional technology [1, 2]. Heterogeneous photocatalysis is considered to be one of the promising method to remove the pharmaceuticals from the water [1, 2].

The aim of this study was to investigate degradation kinetics of caffeine by plasma treated ZnO-based catalysts. Enhancement of photocatalysis by doping of catalyst with Ag nanoparticles (NPs) was also evaluated. The experimental details can be found elsewhere [3]. The activity of catalysts in reaction of photodegradation of caffeine was compared with that in reaction of degradation of methyl orange (MO). The photocatalytic reaction was monitored spectrophotometrically by observing absorbance of caffeine and methyl orange at the peak absorbance wavelength (λ_{max} = 272 nm and λ_{max} = 465 nm, respectivelly). The rate of decomposition (C_r) was calculated as:

$$C_r = \frac{C}{C_0} \cdot 100\% = \frac{A_t}{A_0} \cdot 100\%,$$

where C_0 is initial concentration of dye (caffeine) solution, C is concentration of dye (caffeine) solution at any time t after photoirradiation, A_0 and A_t are the initial absorption and absorption at photoirradiation time t at the λ_{max} = 272 nm or λ_{max} = 465 nm. As it is seen from Figure 1 the ZnO-based catalyst doped with Ag-NPS is as effective in the caffeine photodegradation reaction (ZnO DBD Ag caffeine) as in the methyl orange dye photodegradation reaction (ZnO DBD Ag MO). The photodegradation reactions of caffeine and methyl orange at initial concentrations of 300 mg/L and 50 mg/L in the presence of a silver-doped ZnO-based catalyst have the same reaction rate – $k = 3.6\ 10^{-3}\ s^{-1}$. Figure 1 also shows data on the photodegradation kinetics of methyl orange in the presence of untreated ZnO-based catalyst. The reaction rate constant was $k = 1{,}4\ 10^{-3}\ s^{-1}$.

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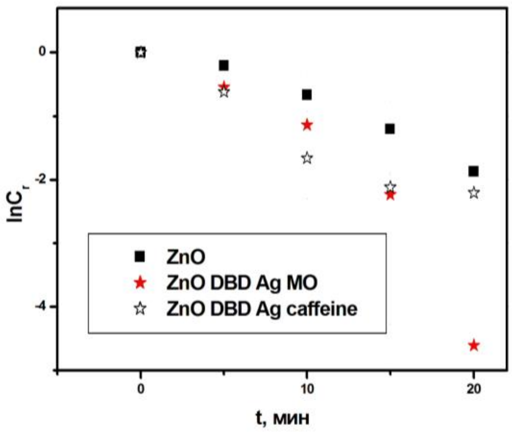

Fig. 1. – Kinetics of the degradation of caffeine MO under UV-irradiation

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ASSESSMENT OF POLLUTION SOURCES AND SURFACE WATER QUALITY IN MINSK

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The study considers the main sources of pollution of surface water bodies of Minsk and pollutants. Based on the analysis of the data of the National Statistical Committee and the Ministry of Natural Resources and Environmental Protection, the purpose and objectives of the ongoing master's study are formulated.

Keywords: pollution, water pollution, surface water, water monitoring, automobile transport, transport, oil.

At the present stage of development of society there is a problem of getting into the environment of the substances and elements not characteristic for its natural state. With the increase in urbanization, expansion and consolidation of the road network of the city of Minsk, one of the types of anthropogenic impact on surface water bodies was the influence of various types of chemicals entering the water from vehicles.

The main focus of the research is aimed at assessing water pollution from vehicles. The complexity of the assessment is due to the lack of certain places where the potential pollutant enters the water, i.e. the source is not clearly differentiated in space and the pollutant enters and is distributed diffusely in the water by flushing from roads directly or through the system of urban storm sewers.

According to the National Statistical Committee of the Republic of Belarus, the number of cars in personal use of citizens of the Republic from 2015 to 2018 has increased by more than one hundred thousand units t (most of which were passenger vehicles). For the city of Minsk, at the end of 2018, the total number of cars was more than six hundred thousand units, which is 1.5 cars for every third resident of the city [1]. In this regard, due to the large number of cars in the city, there is a need to assess the quality of surface water bodies of Minsk, which are under anthropogenic load.

Pollutants from automobile transport that may get into water: hydrocarbons and products of their combustion (in particular, petroleum products, aromatic hydrocarbons, benz (a) pyrene), nitrogen compounds, sulfur com-