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NATURAL WATER AUTO PURIFICATION CAPACITY THROUGH THE REDOX PROCESS (2018)

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This paper presents the results of the evaluation of the natural water auto purification capacity through chemical oxidation processes during the year 2018. The monitoring was carried out by measuring H_2O_2 and the peroxidase reducers (Red) contents which were the criteria for determining of kinetic waters redox state as oxidizing, unstable or reducing. Another indicator was the inhibitory capacity ($\Sigma k_i S_i$), an indicator of water pollution with OH radical scavengers. The water objects monitored were Nistru river, in Dubasari-Vadul Voda segment dam, its tributaries, Raut and Ichel rivers, at the confluence rivers segments, as well as two accumulation lakes located in the hydrographic basin of Nistru river, Ghidighici and Danceni lakes. In the investigated waters, more frequently, low or lack of H_2O_2 was found, thus confirming its consumption in water auto purification and inappropriate conditions for its regeneration, such as the oxygen oxidation processes. Recorded H_2O_2 concentrations, often < 100 μg/l, are insufficient for effective auto purification processes and for appropriate biological habitate value. The redox oxidant character of the Nistru waters was provided by H_2O_2 in 10.0-21.9 μg/l concentrations. In the tributaries waters, more often, the reducers concentration exceeded the H_2O_2 one. Peroxidase substrates were found in higher concentrations in Ichel river (2.0-10.0 μg/l) than in Raut (0.3-2.8 μg/l). The H_2O_2 concentration in Ichel river was observed only in June (36.7 μg/l), when in Raut the highest contents of H_2O_2 (34.9 μg/l) was recorded during the monitored period. Except March, in Ghidighici waters the H_2O_2 concentration was in 13.2-19.3 μg/l interval, while in those of Danceni lake, except for September (16.8 μg/l), when the H_2O_2 was missing.

In Nistru waters, the content of substances that disrupt the auto purification chain with OH radicals was lower than for the rest of the aquatic objects. Following the inhibitory capacity dynamics ($\Sigma k_i S_i$), in all monitored objects was shown that during the spring months the waters of all aquatic objects contain large concentrations of OH radical scavengers $(3.8\text{-}20.0)\cdot 10^{-5}$ s^{-1}. In the following periods, water pollution with these substances decreases. Thus, in Nistrusriver inhibitory capacity ranges between $0.3\cdot 10^{-5}$ s^{-1} and $2.7\cdot 10^{-5}$ s^{-1}. For the tributaries waters, this parameter has the values for Raut and Ichel rivers $(3.3\text{-}6.6)\cdot 10^{-5}$ s^{-1} and $(1.3\text{-}5.3)\cdot 10^{-5}$ s^{-1} respectively. Approximately at the same level is the pollution degree with OH radical scavengers in Ghidighici $(1.2\text{-}4.0)\cdot 10^{-5}$ s^{-1} and Danceni water lacks $(2.2\text{-}4.3)\cdot 10^{-5}$ s^{-1}. The monitoring revealed that the auto purification capacity through chemical oxidation processes is higher in Nistru river compared to tributaries and lakes.