

## Influence of a high-intensity ultrasonic field on the removal of natural organic compounds from water

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### ABSTRACT

Organic compounds, which are considered water pollutants, have the ability to react with chlorine or other oxidants leading to the formation of products which pose a significant threat to human health. Humic substances play an important role in the formation of disinfection by-products. Therefore, the removal of organic compounds in the process of water treatment is of great importance. The application of ultrasound initiates a number of physicochemical processes in water which can be used in water treatment technologies, e.g. coagulation or adsorption. These methods, as well as the ion-exchange process, are applied in order to remove organic contaminants. With reference to the theoretical fundamentals of ultrasound, some sonochemical processes can result in a decrease in the content of color organic compounds in water. Increasing the intensity of ultrasonic field enhances the occurrence of sonochemical processes including the destruction of high-molecular organic compounds or the oxidation reactions with radicals. The effect of the ultrasonic field is investigated as a method of water treatment by removal of color contaminants from water. Water samples were subjected to an ultrasonic field generated by the UP-400S ultrasound generator with a frequency of 24 kHz and useful power of 300 W. The samples were exposed to sonification for the time periods of 1 and 5 min; the range of the applied amplitude vibration was 18–90  $\mu\text{m}$ , and the ultrasonic field intensity was in the range 21–105  $\text{W}/\text{cm}^2$ . The applied parameters allowed for the observation of changes in the content of organic compounds in water. The effect of the ultrasonic field was investigated for surface water. The water analysis included TOC, oxygen consumption and color. The efficiency of the investigated process (30–40%) was achieved for the highest value of the applied amplitude.

*Keywords:* Ultrasounds; Sonochemical processes; Water treatment; Organic contaminants

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