

P-47: Microbial pollutants removal from water with use of complex adsorption-ultrasound technology

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The main sources of natural waters pollution are atmospheric waters, city waste waters, industrial waste waters. The existing water treatment technologies do not provide a high degree of treatment of polluted water, and do not meet modern requirements of resulting water quality. This led a situation where the degree of pollution of natural waters is so high that without the introduction of new technologies it is impossible to prepare a water for household needs which would meet the sanitary standards. Therefore, complex methods of water preparations are needed.

In this study a combination of ultrasound cavitation and use of natural sorbents was studied.

Ultrasonic is an effective reagentless highly ecological method of water purification from organic and microbiological components.

During the cavities collapse the emitted energy causes the processes of microorganism destruction. The pathogenic microflora is destructed and active radicals are formed around the collapse points. Cavities develop in the ultrasonic emitter chamber with the frequency of several tens of kilohertz mainly on inhomogeneities that are represented by spores of mushrooms and bacteria.

Water treatment with use of natural sorbents has several advantages, such as: the natural sorbents are widely distributed all over the Ukrainian territory, they are available and inexpensive materials, the used natural adsorbent does not require the regeneration, adsorption technologies using natural dispersed sorbents provide the high quality level of water treatment process.

The most known natural sorbents which can be used for water treatment are bentonites, zeolites, glauconites.

Experiments were performed in two stages. First, water was put into the ultrasonic reactor, during the whole process O₂ was bubbled through the test water. The reactor was cooled constantly by water. After treatment in ultrasonic reactor, different types of sorbents (bentonites, zeolites, glauconites) were added to water in different concentrations and mixed using magnetic stirrer (sorption time – 1h).

Sampling was made before the treatment, after ultrasound treatment and after sorption process. Samples were analyzed for Microbial Number (MN).

Results showed that with sorbent concentration increase the level of microbial pollution decreases consequently. The level of pathogens removal at concentration of sorbent 35 g/L was: for bentonite 91%, for zeolite – 93%, for glauconite – 94%.

It may be concluded that with a combination of ultrasound and sorption methods much higher level of treatment can be achieved. That is why it is selected as a perspective method of water treatment from organic and microbiological pollutants.

References

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