

Non-Chemical Water Treatment in Unified Light and Sound Field

(Безреагентный метод водоподготовки в едином светозвуковом поле)

Авторы:

Лебедев Олег (Lebedev Oleg), ООО «Новотех-ЭКО», eco@alexplus.ru

Лебедев Николай (Lebedev Nikolay), ООО «Александра-Плюс», mail@alexplus.ru

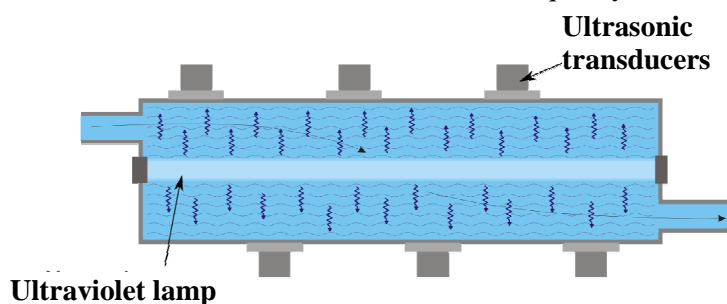
Доцент Гаврилов Юрий (Gavrilov Yuri), Вологодский Государственный Университет, gavr10@mail.ru

The widely used method of non chemical water treatment based on ultraviolet radiation has a number of significant drawbacks. In general these drawbacks exist due to limited light permeability on the surface of protecting covers of quartz lamps because of pollution as well as presence of nontransparent conglomerates containing bacteria and viruses on organic substrate. Besides, ultraviolet disinfection doesn't solve the problem of biofouling of equipment and pipelines which require periodical chemical treatment. Dangerous bacteria and viruses which survived this process are characterized by higher tolerance and reproduction capability. Present methods of combined ultrasonic and ultraviolet treatment are not effective enough due to their separate use or local exposure of ultrasonic oscillations.

Alexandra-Plus develops and produces the equipment, based on power ultrasound use to intensify technical processes in various industrial spheres. In many cases the positive result is achieved due to a resonance oscillations phenomenon in ultrasound area of both equipment elements and cavitation objects. This effect is successfully applied while manufacturing ultrasonic units where a tube element with outside ultrasonic heads is used as a general resonator.

This engineering solution has been successfully used to provide combined ultrasonic and ultraviolet treatment for disinfection of not only drinking and waste water, but of other process liquids as well. Novotech-ECO company was created in 2004 to develop this direction further and to commercialize it.

The disinfection module is a flow unit with ultraviolet lamps inside, their number and power varies according to its capacity. The unit casing is provided with piezoceramic ultrasonic transducers which turn the casing into an oscillator of mechanical vibrations of ultrasonic frequency.



In water ultrasound creates *cavitation* (local microexplosions throughout the entire volume) and *acoustic flows*. These phenomena have a double function.

Firstly, they continually clean the quartz cover of the UV lamp and it remains transparent for a long time. Thus, there is no need to suspend the process for unit cleaning as it often happens with equipment using ultraviolet only.

Secondly, ultrasound itself has a disinfecting effect as cavitation breaks bacteria clumps and hits cell membranes making them more vulnerable to ultraviolet rays. Thus, one can speak about *water disinfection in a unified light and sound field*.

The technology has been tested repeatedly and shown excellent results.

Disinfection units can be installed at municipal wastewater treatment plants after all treatment stages and before discharge into a natural reservoir. It is recommended to place units in such a way that treated water passes through them by gravity. It allows to reduce spending on pump devices.

Implementation results:

1. Abandonment of chlorine and other chemicals:
 - There is no need to buy and store chemicals;
 - There is no need to maintain the dangerous facility;
 - The amount of harmful substances in water is significantly reduced.
2. Power consumption reduction in comparison with hypochlorite disinfection.
3. Rapid payback (12—18 months), low operating expenses.

Novoteh-ECO is ready to cooperate in the directions:

- direct sales of equipment;
- coproduction organization;
- organization of the service center.