

# The use of a sonoplasma discharge for prevention of biocorrosion in oil wells

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Nowadays the problem of biocorrosion of the equipment placed inside oil wells due to injection of unprepared water into the oil reservoirs in order to increase the reservoir pressure becomes more and more urgent. This lead to an adjustment of requirements to water for this purpose. According to the new standard that had been adopted in Russia water for injection into reservoirs should contain no microorganisms.

Technologies, which can be used for sterilization of water are often costly and require the use of chemicals or membranes, which need to be periodically replaced. During the preparation of water for injection wells the use of chemicals is very limited, since such aspects as deposition of reaction products inside the formation and environmental damage should be prevented.

We have developed a method for water sterilization based on the use of the so called sonoplasma discharge: an electrical discharge induced inside a cavitation zone. In water flows such zone may be created using hydrodynamic emitters. Initiation of such a discharge in water leads to a number of effects including: high local pressures and temperatures, UV-radiation, formation of radicals.

We have carried out a research on the effect of the sonoplasma discharge on microorganisms, which revealed that the amount of E.Coli inside the water may be reduced by 98% (in case of initial concentration of  $25 \cdot 10^7$  CFU) and by more that 99,99% after a second cycle. In case of *Saccharomyces cerevisiae* the concentration can be reduced by 84%.

The amount of sonoplasma cycles required to reach the necessary suppression level is determined experimentally based on the initial concentration of the microorganisms in water.

The proposed method is reagent less and waste less. The equipment is simple and can treat up to 20 m<sup>3</sup>/h, but can be easily up scaled to 100 m<sup>3</sup>/h and more.