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MS2 and ΦX174 inactivation by high frequency ultrasound

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Biocolloid inactivation in water with the use of ultrasound can be quite effective, because the implosion of cavitation bubbles can generate high temperatures and pressures at the heart of collapsed bubbles. Biocolloid inactivation by cavitation takes place due to a combination of simultaneously acting processes involving mechanical effects (caused by turbulence generation, microstreaming, liquid circulation currents, and shear stresses), chemical effects of cavitation (generation of active free radicals), and heat effects (generation of local hot spots). Generally, the mechanical effects are more responsible for biocolloid disinfection, whereas the chemical and heat effects play only a supporting role. The present study focuses on inactivation of MS2 and Φ174 at three different relatively high frequencies (i.e. 582, 862, and 1142 kHz). The experimental results indicate that, for all three frequencies and power input of 133 W, both phages were at least 90% inactivated after 60 min of sonication.