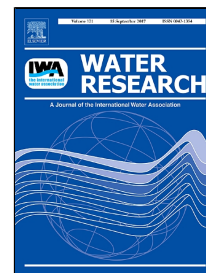


# Accepted Manuscript

Efficient inactivation of MS-2 virus in water by hydrodynamic cavitation

Janez Kosel, Ion Gutiérrez-Aguirre, Nejc Rački, Maja Ravnikar, Matevž Dular



PII: S0043-1354(17)30650-4  
DOI: 10.1016/j.watres.2017.07.077  
Reference: WR 13120  
To appear in: *Water Research*  
Received Date: 22 May 2017  
Revised Date: 07 July 2017  
Accepted Date: 31 July 2017

Please cite this article as: Janez Kosel, Ion Gutiérrez-Aguirre, Nejc Rački, Maja Ravnikar, Matevž Dular, Efficient inactivation of MS-2 virus in water by hydrodynamic cavitation, *Water Research* (2017), doi: 10.1016/j.watres.2017.07.077

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Efficient inactivation of MS-2 virus in water by hydrodynamic cavitation

Janez Kosel<sup>1,2</sup>, Ion Gutiérrez-Aguirre<sup>2</sup>, Nejc Rački<sup>2</sup>, Maja Ravnikar<sup>2</sup>, Matevž Dular<sup>1\*</sup>

<sup>1</sup>Department of Power Engineering, Faculty of Mechanical Engineering, University of Ljubljana, Aškerčeva 6, 1000 Ljubljana, Slovenia

<sup>2</sup>National Institute of Biology, Večna pot 111, 1000 Ljubljana, Slovenia

\*Correspondence to: matevz.dular@fs.uni-lj.si

## Abstract

The aim of this study was to accurately quantify the impact of hydrodynamic cavitation on the infectivity of bacteriophage MS2, a norovirus surrogate, and to develop a small scale reactor for testing the effect of hydrodynamic cavitation on human enteric viruses, which cannot be easily prepared in large quantities. For this purpose, 3 mL scale and 1 L scale reactors were constructed and tested. Both devices were efficient in generating hydrodynamic cavitation and in reducing the infectivity of MS2 virus. Furthermore, they reached more than 4 logs reductions of viral infectivity, thus confirming the scalability of hydrodynamic cavitation for this particular application. As for the mechanism of virus inactivation, we suspect that cavitation generated OH<sup>•</sup> radicals formed an advanced oxidation process, which could have damaged the host's recognition receptors located on the surface of the bacteriophage. Additional damage could arise from the high shear forces inside the cavity. Moreover, the effectiveness of the cavitation was higher for suspensions containing low initial viral titers that are in similar concentration to the ones found in real water samples. According to this,

Download English Version:

<https://daneshyari.com/en/article/5758745>

Download Persian Version:

<https://daneshyari.com/article/5758745>

[Daneshyari.com](https://daneshyari.com)