# Mathematical modeling for inactivation of MS2 virus by catalytic peroxidation in wet phase to improve the quality of drinking water in Nariño-Colombia

Eduardo Ibargüen-Mondragón[1], Dolly Revelo[3], Arsenio Hidalgo[1], Hernan Garcia[1], Luis-Alejandro Galeano[2], Alvaro Burbano[1]

[1] Dpto. Matemáticas y Estadística, Universidad de Nariño, edbargun@udenar.edu.co

[2] Dpto. de Química, Universidad de Nariño, alejandrogaleano@udenar.edu.co

[3] Dpto. de Biología, Universidad de Nariño, margo.revelo@gmail.com

*Keywords: Mathematical modeling, inactivation, MS2 coliphage, catalytic peroxidation in wet phase.*

The PCFH is an alternative technology to conventional disinfection methods used to control the microbial quality of water. To verify its effectiveness, it is necessary to generate new information related to inactivation kinetics of MS2 coliphage by PCFH. Therefore, in this research we studied the mathematical modeling of the virus inactivation by PCFH-Al/Fe-PILC in presence of a synthetic pattern of natural organic matter. The inactivation constant was subjected to two approximations, finding out that the experimental data were adjusted to the pseudo-first order Chick-Watson model with constant inactivation rate. With the PCFH technology it was possible to obtain the maximum inactivation constant $k = 0.1648\, min^{-1}$ in the catalytic tests MS2-3 and MS2-7, kinetics indicates that a rapid inactivation occurs in the first minutes of the reaction, followed by a slow inactivation in the rest of the reaction time. This research suggests the potential of PCFH to improve the quality of drinking water

## References

[1] CX. Sun, M. Kitajima, KY. Gin, *Sunlight inactivation of somatic coliphage in the presence of natural organic matter*. Science of the Total Environment, **541** (2016), 17.

[2] L.A Galeano, A. Gil and M.A. Vicente, *Effect of the atomic active metal ratio in $Al/Fe-$, $Al/Cu-$ and $Al/(Fe-Cu)-$ intercalating solutions on the physicochemical properties and catalytic activity of pillared clays in the CWPO of methyl orange*, App. Cat. B Envi., **100**(2010), 271-281.

[3] E. Ibargën-Mondragón, L.A. Galeano, E.A. Gómez-Hernández, *Qualitative Analysis of a Mathematical Model for Kinetic Mechanisms of Complete Mineralization of Phenol by $Fe^{2+}$ ; $Fe^{3+}$ and $H_2O_2$*, Applied Mathematical Sciences, **11**(2017), 1261-1269.