

Evaluation of electrolyzed water as cleaning and disinfection agent on stainless steel as a model surface in the dairy industry

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Abstract

In the dairy industry, cleaning and disinfection of surfaces are important issues and development of innovative strategies may improve [food safety](#). This study was aimed to optimize the combined effect of alkaline electrolyzed water (AEW) and neutral electrolyzed water (NEW) as alternative cleaning and disinfection procedure on stainless steel plates (SSP) with and without electropolishing.

NEW at 10 ppm total available chlorine (TAC), achieved a >5 log CFU/mL reduction of milk spoilage bacterial suspension, grown in trypticase soy broth (8.7 log CFU/mL of each bacterial strain: *Pseudomonas aeruginosa*, *Enterococcus faecalis* and *Micrococcus luteus*) contacted for 30 s.

An optimal design of experiments was used to assess the combined effect of cleaning with AEW, followed by disinfection with NEW (40 ppm TAC, contact time 3 min). Tested factors were contact time (10, 20 and 30 min), concentration of AEW (100, 200 and 300 mg NaOH/L), temperature (30, 40 and 50 °C), and surface type (304-2B SSP with or without electropolishing), using sixteen treatments with two replicates. The response variable was bacterial cells removal (log CFU/cm²). All main effects, two factors interactions and a quadratic term significantly influenced cells removal, and were modeled using a second order polynomial.

Best cleaning procedures were significantly affected by surface roughness; electropolished SSP required 10 min, 100 mg/L AEW at 30 °C, whereas SSP without modification required 30 min, 300 mg/L AEW at 30 °C.

From confirmatory tests cells removed were 3.90 ± 0.25 log CFU/cm² for electropolished SSP, and 3.20 ± 0.20 log CFU/cm² for SSP without modification.

NEW is non-corrosive, and can be advantageously used for environmentally friendly cleaning and disinfection processes.