

CONTROL OF FIRE BLIGHT WITH SODIUM CHLORITE/CHLORINE DIOXIDE



Presentation to IR-4 IS00368 Anne Crow, Ph. D September 23, 2019



Seeking EPA Registration for Use on Growing Food Crops

- Preliminary results spraying chlorine dioxide treated water on apple orchards shows promise in controlling fire blight (*Erwinia* amylovora)
- Residual levels of chlorine dioxide in range of drinking water and organic standards
- Applications to vineyards, pome, stone crops



Sodium Chlorite/Chlorine Dioxide Overview

- Chlorine dioxide is powerful antimicrobial
- Chlorine dioxide is NOT: chlorine or bleach.
- Chlorine dioxide does not produce halogenated by-products.
- Degrades in sunlight to chloride, chlorite, chlorate



Regulatory Overview

Sodium chlorite/chlorine dioxide currently registered as antimicrobial for use in many applications, including:

- Human drinking water
- Agricultural post harvest
- Agricultural irrigation water systems
- ➤ We are seeking EPA registration for use on growing food crops

Preliminary Results Promising

Lab tests on Erwynia amylovora
 Amit Dhingra, Ph. D., Biotechnology Program,
 Washington State University

Field Tests

- Apple trees, foliar spray
- 2 to 25 ppm chlorine dioxide in water solution
- 100-300 gallons treated water solution per acre
- From pre-bloom to petal fall, any blight incidents



Field Test Results



Neighbor

Trial Orchard

2ppm	5ppm	10ppm	25ppm	Entire Ranch
2 strikes per area	0 strike per area	1 strike per area	1 strike per area	Averaged 4-5 blight strikes per <u>tree</u>



Application Residuals

October 2018

Collection Point	ClO2 (ppm)
Spray tank	18.3
Tree Drip	0.13
Ground	0.14
Drinking Water MRDL	0.8











Drinking Water and Certified Organic



Comprehensive Disinfectants and Disinfection Byproducts Rules (Stage 1 and Stage 2): Quick Reference Guide

Regulated Disinfectants	MRDL ³ (mg/L)	MRDLG ³ (mg/L)	MRDL (mg/L)	MRDLG (mg/L)		
Chlorine	4.0 as Cl ₂	4	Unchanged ²	Unchanged ²		
Chloramines	4.0 as Cl ₂	4	Unchanged ²	Unchanged ²		
Chlorine dioxide	0.8	0.8	Unchanged ²	Unchanged ²		
¹ A new analytical method for bromate was established with the Stage 2 DBPR.						
² Stage 2 DBPR did not revise the MCL or MRDL for this contaminant/disinfectant.						
³ Stage 1 DBPR included MRDLs and MRDLGs for disinfectants, which are similar to MCLs and MCLGs.						

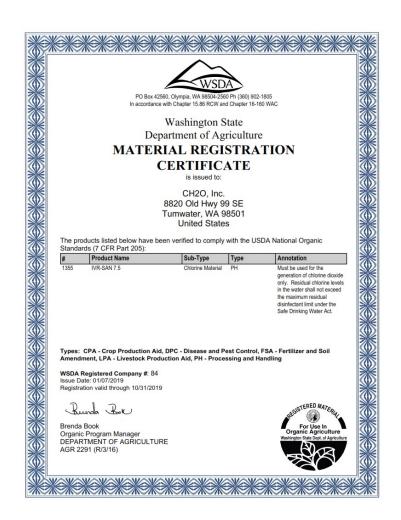


OFFICIAL LISTING

NSF International Certifies that the products appearing on this Listing conform to the requirements of NSF/ANSI Standard 60 - Drinking Water Treatment Chemicals - Health Effects

Sodium Chlorite [CL]			- 5
Aqua-Clear 15	Disinfection & Oxidation	35	mg/L
	Oxidant		
Freeze Fresh 15	Oxidant	35	mg/L
IVR-SAN 15	Disinfection & Oxidation	35	mg/L
	Oxidant		
IVR-SAN 7.5	Disinfection & Oxidation	70	mg/L

[CL] The residual levels of chlorine (hypochlorite ion and hypochlorous acid), chlorine dioxide, chlorate ion, chloramine and disinfection by-products shall be monitored in the finished drinking water to ensure compliance to all applicable regulations.



Proposed Tolerance Amendment

Current Tolerances:

- 40 CFR 180.940(b) and (c) –oxychlorospecies in antimicrobial formulation exempt when applied to dairy and food processing equipment and utensils
- 40 CFR 180.1070 sodium chlorite is exempted from the requirement of a tolerance for residues when used in accordance with good agricultural practice as a seed-soak treatment in the growing of the raw agricultural commodities vegetable, brassica, leafy, group 5, and radish, roots and radish, tops.

Proposed Tolerance Amendment:

• 40 CFR 180.1070 —sodium chlorite is exempted from the requirement of a tolerance for residues when: (a) used in accordance with good agricultural practice as a seed-soak treatment ... (b) used as a microbiocide in accordance with good agricultural practice on the growing crops pome fruit, stone fruit, tree nut, and grape.



Proposed Label: AQUA CLEAR 7.5

- Sublabel A- Antimicrobial/Industrial Uses
 - All industrial uses currently approved
 - Substantially similar to EPA Reg. No. 9150-7
- Sublabel B Agricultural Food Crop Uses
 - Control fire blight in apples, pears, cherries, almonds
 - Control gray mold, sour rot, powdery mildew,
 Phomopsis in grapes



Proposed Label (cont'd) AQUA CLEAR 7.5

Use Rates

- Solution per acre 100-300 gal
- Equivalent lbs chloride dioxide per acre 0.0002-0.06
- Maximum yearly application rate per acre 3.75 lbsClO2
- Maximum single application rate per acre 0.06 lbsClO2
- Retreatment interval 24-hr (during blossom)

7-days (thereafter)

- Pre-harvest interval
 0 days
- Re-entry interval4 hours



Where Do We Go From Here?

21CFR173.325
Raw Agricultural Commodities







Contact: Tony McNamara, President, CH2O, Inc.