PureLine™

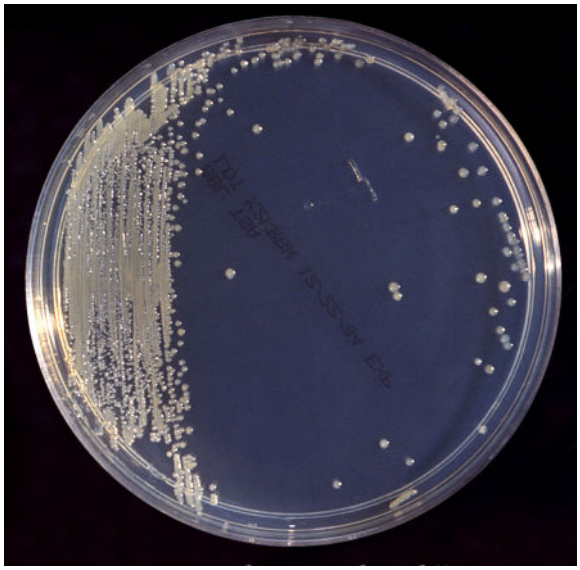
The Efficacy of Chlorine Dioxide Gas in Combatting *Cronobacter* Bacteria in Food and Beverage Applications

INTRODUCTION

Food safety is paramount in ensuring the health and well-being of consumers worldwide. One of the most pressing concerns in the food industry is the contamination caused by harmful bacteria, such as *Cronobacter*. *Cronobacter* bacteria, often found in powdered food products, pose a significant health risk, especially to infants and the elderly. As food and beverage companies look for disinfection products and services for their manufacturing facilities, chlorine dioxide gas emerges as a viable and effective solution.

CRONOBACTER: A DEEPER DIVE

Cronobacter species, formerly known as Enterobacter sakazakii, belong to the Enterobacteriaceae family. These Gram-negative, motile rods are facultatively anaerobic. The genus comprises several species, including C. sakazakii, C. malonaticus, C. turicensis, C. muytjensii, C. dublinensis, C. universalis, and C. condimenti. Among these, C. sakazakii, C. malonaticus, and C. turicensis are considered the primary pathogenic species responsible for the majority of severe illnesses[1].
Notably, *Cronobacter* species are desiccationresistant and are recognized as opportunistic pathogens.



THE PROBLEM: *CRONOBACTER* CONTAMINATION

Cronobacter, a genus of Gram-negative bacteria, can lead to severe and sometimes fatal infections, especially in infants under two months, premature infants, and those with weakened immune systems[2]. These bacteria thrive in dry environments, making powdered food products like baby formula a potential hotspot for contamination. Over the years, there have been multiple instances of food recalls and outbreaks due to *Cronobacter* contamination, emphasizing the need for effective decontamination solutions.

The United States Food and Drug Administration (FDA) has taken significant actions to prevent *Cronobacter* sakazakii illnesses, primarily associated with the consumption of powdered infant formula[2]. Some of these actions have include hiring a dedicated team of investigators for infant formula inspections and supporting the elevation of *Cronobacter* to a nationally notifiable disease, which was adopted by the Council of State and Territorial Epidemiologists (CSTE) on June 29, 2023.

The US government's heightened focus on *Cronobacter* should bring about further visibility and transparency regarding infections, but what solutions can food manufacturers look to for mitigating the spread of the bacteria in processing facilities?

THE SOLUTION: CHLORINE DIOXIDE GAS

Chlorine dioxide (ClO2) gas emerges as a promising solution to this pressing issue. Unlike liquid treatments, ClO2 gas does not leave residues, making it ideal for dry food products as it does not introduce moisture into the manufacturing environment. No-post treatment cleanup is required prior to resuming manufacturing operations. Recent studies have shown its efficacy against harmful bacteria strains like Salmonella enterica and Enterococcus faecium in low water activity foods[3]. Furthermore, gaseous treatments, such as ClO2, can penetrate deeper and more effectively than typical treatments, offering a comprehensive decontamination solution[4].

Under the proper contact time concentrations, chlorine dioxide gas has been proven to achieve 6-log pathogen reductions; effectively resetting the pathogenic environment on food processing equipment and surfaces.

EVIDENCE-BASED BENEFITS

The use of chlorine dioxide gas goes beyond just theoretical benefits. Research has consistently shown its effectiveness in various applications:

- A study on low water activity foods demonstrated that ClO2 gas effectively reduced the presence of Salmonella enterica and Enterococcus faecium[3].
- Gaseous treatments have a distinct advantage over other nonthermal techniques, especially in low-moisture foods, due to their superior penetration capabilities[4].
- In laboratory settings, chlorine dioxide gas has been successfully used to decontaminate equipment, showcasing its versatility and effectiveness[5].

PURELINE'S CHLORINE DIOXIDE GAS SOLUTIONS

PureLine stands at the forefront of food safety solutions, with a rich history of providing effective decontamination services. Our chlorine dioxide fumigation services are tailored to meet the unique needs of the food and beverage industry, with a 6-log pathogen reduction guarantee with each treatment. Partnering with PureLine ensures not only top-tier solutions but also the expertise and support of a dedicated team committed to food safety.

PICTURED: PURELINE'S PUREFLO (LEFT) & MOBILECLEAN (RIGHT)

CRONOBACTER BACTERIA ELIMINATION

CONTACT PURELINE TODAY

The threat posed by *Cronobacter* bacteria is real and pressing. However, with comprehensive solutions like chlorine dioxide gas, the food and beverage industry can take proactive steps to ensure consumer safety. Given its proven efficacy and the backing of scientific research, chlorine dioxide gas emerges as a leading solution in the fight against foodborne pathogens. Don't compromise on safety. Reach out to PureLine today and explore how our chlorine dioxide gas solutions can elevate your food safety standards.

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5. Low-cost, Small-scale Decontamination of Laboratory Equipment by Using Chlorine Dioxide Gas

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