

## WP# 24 Temperature Effects on Gaseous Chlorine Dioxide – Jan 17, 2022

Chlorine dioxide (CD) gas is a true gas at room temperatures. The boiling point for the gas is 11 deg C at 100% concentrations. At lower concentrations CD exists as a gas at low temperatures of -40 Deg C at approximately 1 mg/liter and -20 Deg C at 30 mg/liter.<sup>i</sup> It was also found that “chlorine dioxide is not enhanced either by conducting the process at temperatures above (37°C) or below (15°C) vs. room temperatures (e.g. 20-30°C).”<sup>ii</sup> Since CD is a true gas at room temperatures, it will not condense on surfaces making it effective across a wide temperature range. Higher or lower temperatures do not make CD more or less effective. There might be some variances, but this is more likely due to the specific organism having temperature effects compared to CD having more or less efficacy at different temperatures. In other studies performed, effective results with CD gas were demonstrated at temperatures of 9-28.8 Deg C.<sup>iii</sup> In this study, Isolates of common juice spoilage microorganisms such as two bacteria; *L. buchneri* and *L. mesenteroides*, two molds; *Eurotium* spp. and *Penicillium* spp., and two yeast; *Candida* spp. and *S. cerevisiae* were used.

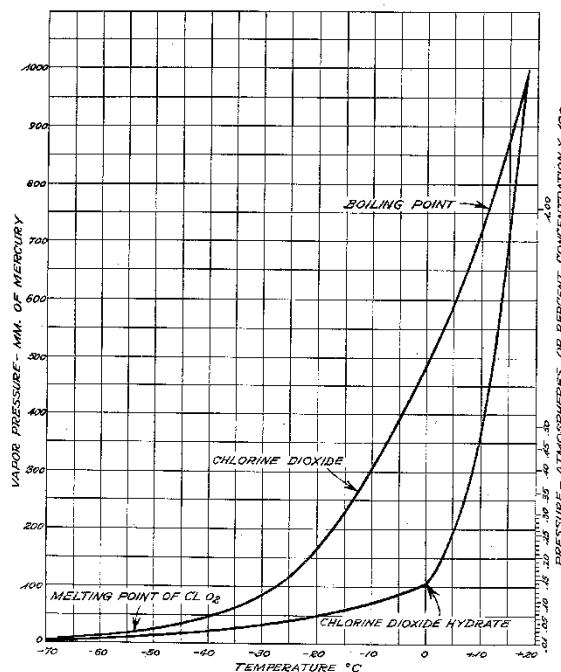


Figure 1: chlorine dioxide hydrate composition. Boiling point of 11 Deg C at 100% CD gas. At low use concentrations (1mg/L or 0.04%) the gas exists at approximately -40 Deg C.

<sup>i</sup> Williamson, H.V., Hampel, C. A., United States Patent 2,683,651 Issue Date: July 13, 1954, NONEXPLOSIVE CHLORINE DIOXIDE HYDRATE COMPOSITION AND PROCESS FOR PRODUCING SAME

<sup>ii</sup> Rosenblatt et al. United States Patent. Patent Number: 4,681,739, Date of Patent: "Jul. 21, 1987, USE OF CHLORINE DIOXIDE GAS AS A CHEMOSTERILIZING AGENT

<sup>iii</sup> Han, Y., Guentert, A.M., Smith R.S., Linton R.H. and Nelson, P.E., Efficacy of chlorine dioxide gas as a sanitizer for tanks used for aseptic juice storage, Food Microbiology, 16: 53-61 (1999)