ClorDiSys

"The Chlorine Dioxide People"

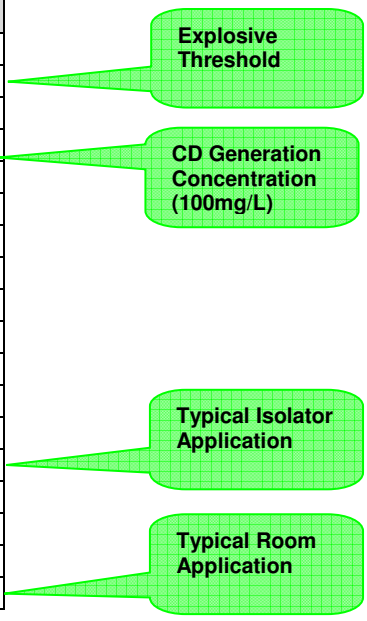
Decomposition of Chlorine Dioxide

Design of ClorDiSys Solutions Sterilization Systems utilizes established parameters with a substantial margin of safety. The system is concentration limited by the reagent gas so that only 4% chlorine dioxide is produced. The system uses 2% chlorine in 98% nitrogen. This 2% chlorine stoichiometrically produces 4% chlorine dioxide thus limiting how much chlorine dioxide can be produced. Thus the partial pressure of the chlorine dioxide charge gas is approximately 30mmHg. This is substantially less than the potentially unsafe 100mmHg[1]. When further diluted to use concentration in the target chamber, the partial pressure of chlorine dioxide is typically in the 1-3mmHg range (approximately 1-10 mg/liter). These concentrations are far below the "puffing" threshold for chlorine dioxide. However, detonation has NEVER been observed, even at much higher concentrations (310 mmHg) at temperatures less than 42°C[1].

Of further note is that dilution with air at atmospheric pressure, such as is done in typical isolator, room or decontamination chamber applications, has been reported to increase the margin to safe use to pressures greater than 300mmHg. It is also reported that when chlorine dioxide is diluted with humidity, decomposition rates are also lowered[1]. The ClorDiSys Solutions process uses room temperatures, air dilutions and adds humidity, which even lowers the possibility.

Chlorine Dioxide
Concentration Conversion Table

P_{ClO2} MmHg	%ClO2 by Vol	mg/L ClO2 (1mg/L= 360ppm)
120	15.8	438.6
100	13.2	365.5
76	10	277.8
30.4	4.0	111.1
15.2	2.0	55.6
10.0	1.3	36.5
8.2	1.1	30.0
7.6	1.0	27.8
5.0	0.66	18.3
3.8	0.5	13.9
3.0	0.4	11.0
2.74	0.36	10.0
2.0	0.26	7.3
1.37	0.18	5.0
1.1	0.14	4.0
0.82	0.11	3.0
0.55	0.07	2.0
0.3	0.04	1.0



1 Cowley, G. Safety in the Design of Chlorine Dioxide Plants, Loss Prevention Bulletin 113, Sterling Pulp Chemicals Ltd, Toronto Canada.
2 www.clo2.com/factsheet/properties (9/27/2000)