



"The Chlorine Dioxide People"

Providing you with gaseous chlorine dioxide solutions for your needs

## Material Compatability of Chlorine Dioxide (CD) Gas.

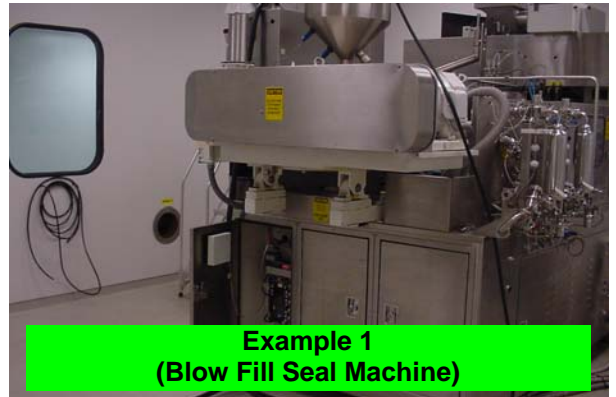
Is gaseous CD corrosive like liquid CD is? NO

Gaseous CD has the unjustified reputation of being corrosive to common materials. Most liquid CD solutions are fairly corrosive, which is where the myth originates, but gaseous CD is not.

- Liquid CD is created through acidification of sodium chlorite
- Liquid CD is corrosive due to both the acids and the sodium chlorite involved in the generation
- Liquid CD requires post exposure wipe down to remove or neutralize the corrosive acidic solution
- Gaseous CD is created through a dry gas process (not acidification process)
- Liquid CD can have a pH of 3 while the gas, when dissolved in water, has a neutral pH

Common Liquid Generation Methods: Mixture of Base + Water + Activator = Acidified Sodium Chlorite + Chlorous Acid + Chlorine Dioxide

ClorDiSys Solutions, Inc. Gaseous Generation Method: Reagent<sub>(gas)</sub> + Sodium Chlorite<sub>(solid)</sub> = Chlorine Dioxide<sub>(gas)</sub> + Salt<sub>(solid)</sub> (Only pure gas is delivered to the chamber, the salt solid remains in the CD Cartridge)



There are no liquids or acidic byproducts in *CSI's* generation method

**A picture is worth a thousand words:**

Some examples that demonstrate that our gaseous chlorine dioxide process is material friendly are shown by the following pictures.

In **Example 1**, a pharmaceutical Blow-Fill-Seal machine is shown. It has been decontaminated in the room shown on a monthly basis since the late 1990's using our process. The room has typical clean room floor and ceiling with painted metal walls. The machine is computer controlled with AC drives, motors, various electronic sensors, expensive tooling, and various gasket materials. Bi's were placed in the electrical enclosure to validate the cycle and the equipment, valued close to \$1,000,000, has shown no adverse effects.

**Example 2** is an operating room which contains X-ray equipment, various monitoring electronics, cabinets, lights, optics, computers, etc. This room is also decontaminated with no adverse effects on any materials or components.



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## Oxidation Potential:

Oxidation / reduction potential is a measure of the tendency of a chemical species to gain electrons and oxidize other chemical species. A higher oxidation / reduction potential means that the species is more likely to gain electrons and is a stronger oxidizer. This gives a numerical value as to how corrosive the agent is.

| Biocidal Agent      | Oxidation / Reduction Potential (V) |
|---------------------|-------------------------------------|
| Ozone               | 2.07                                |
| Peracetic Acid      | 1.81                                |
| Hydrogen Peroxide   | 1.78                                |
| Sodium Hypochlorite | 1.49                                |
| Chlorine Dioxide    | 0.95                                |

**Table 1: Chart of Oxidation / Reduction Potentials Among Biocidal Agents**

Chlorine Dioxide has an oxidation / reduction potential of 0.95V, which is lower than other commonly known decontaminating agents, hydrogen peroxide and bleach. This makes chlorine dioxide scientifically less corrosive than the other oxidative biocidal agents.

| EQUIPMENT EXPOSED TO GASEOUS CHLORINE DIOXIDE WITH NO ADVERSE EFFECTS |           |
|---|-----------|
| Equipment   | Results   |
| Computers – Laptop and Desktop  | No Effect |
| GC's  | No Effect |
| HPLC's  | No Effect |
| Scales / Balances   | No Effect |
| Microscopes   | No Effect |
| Camcorders  | No Effect |
| MRI Machines  | No Effect |
| X-Ray Machines  | No Effect |
| Refridgerators / Freezers   | No Effect |
| Incubators  | No Effect |
| Clocks  | No Effect |
| Fire / Smoke Sensors  | No Effect |
| Temperature / Pressure / Rh Probes                                    | No Effect |
| Refractometers  | No Effect |
| HEPA Filters  | No Effect |
| Sterilizing Filters   | No Effect |
| Solenoid Valves   | No Effect |
| Fire Sprinkler Heads  | No Effect |
| Silocsane Gel   | No Effect |
| Polypropylene   | No Effect |
| Biological Safety Cabinets  | No Effect |
| Flexible Isolators  | No Effect |
| Rigid Plastic / Stainless Steel Isolators                             | No Effect |
| Engines   | No Effect |
| Cage / Rack Washers   | No Effect |
| HVAC ductwork   | No Effect |
| Xenogen IVIS 2001 Imaging System                                      | No Effect |



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