

Basic Sanitizers



Terms

- Sterilize:**

An Agent that will Destroys or Eliminates All Forms of Life, Including All Forms of Vegetative, or Actively Growing Bacteria, Bacterial Spores, Fungi and Viruses.

- Disinfectant:**

An Agent that will Destroy 100% of Vegetative, or Actively Growing Bacteria, or Infectious Fungi. Will not Kill Spores or All Viruses.



Sanitize

The Treatment of a Cleaned Surface with a Chemical or Physical Agent to Destroy Disease / Spoilage Causing Organisms.

Reduces Total Vegetative Cell Population to a “Safe Level”.



Sanitizers

- EPA Registration:
 - No-Rinse Food Contact Surface Sanitizer
 - Non-Food Contact Surface Sanitizer
- FDA: 21CFR 178.1010
 - Compliance and Regulations for Sanitizers
 - Identifies Ingredients for Sanitizer Formulations
 - Identifies Sanitizer Concentrations



Sanitizer

•Food Contact Surfaces:

- By 99.999% or 5 Logs, in 30 Seconds, at 25° C.
 - Concentration Critical for Non-Rinse
 - Surface Must be Allowed to Drain

•Non-Food Contact Surfaces:

- By 99.9% or 3 Logs, Within 5 Minutes.
 - Concentrations Usually Exceed Label Dilutions for “Non-Rinse” Sanitizer.
 - These Include Sanitizing Solutions Used for:
Foot Baths, Foot Foam, Walls, Floors, Drains, Ceilings,
Conveyor Lubricants & Powder Treatments



Label Information

Usage Restrictions:

- Use Concentrations Must be Accurate
 - To High – Violates Regulation
 - To Low – Efficacy Concerns
 - Typically Labels Allow a Range for Concentration
 - (90 ppm to 200 ppm) or (200 ppm to 400 ppm)
- Only Single Use Allowed
- Manual Preparations Should be Done Daily or More Frequently



How Sanitizers Work

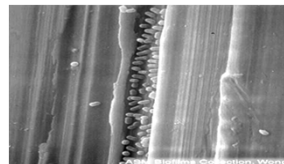
- Reaction Disrupts Cell Membrane
- Reaction Denature Proteins & Inhibit DNA Synthesis
- Reactions Affect Cellular Components



What Can Effect Sanitizer Performance?

Surface Cleanliness

- **You Can't Sanitize a Dirty Surface**
- Soil & Detergent Can:
 - Protect the Microbial Cell
 - Inactivate the Sanitizer



Surface Contact

- Must Contact the Cell Wall
- Non-Smooth Surfaces Can Affect Efficacy

Contact Time

- The Longer the Contact Time the Greater the Efficacy



What Can Effect Sanitizer Performance?

Proper Temperature & Concentration

- Generally: Increased Temperature = Increased Efficacy
 - Be Aware of Gas-Off
 - When in Doubt About Your Temperature Control – Go Ambient
- Increased Concentration = Increased Efficacy
 - Must Remain Within FDA Guidelines (Non-Rinse Compliance)

Numbers & Types of Microorganisms

- The More Organisms the More Difficult to Kill All of Them
- Specific Sanitizers Perform Differently on Different Organisms:
Gram⁻ / Gram⁺ / Biofilms / Spore Formers

pH Conditions



Alkaline Residue Test

TK7200-Z

- 1** Add 2 drops of DI Water (DW4000) to the swab.



STEP 1

- 2** Swab a 4" x 4" area of the surface you are testing.



STEP 2

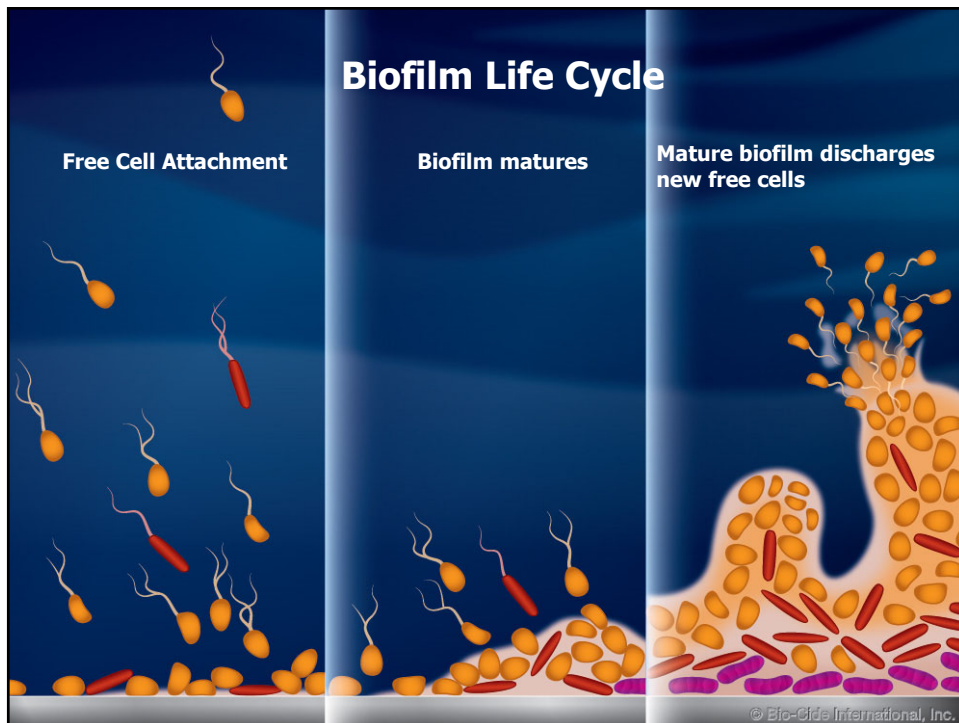
- 3** Add 1 to 2 drops of Phenolphthalein Indicator (PH1605) **onto the swab**. Residual Alkalinity (> pH 8.3) will develop a pink/red color.

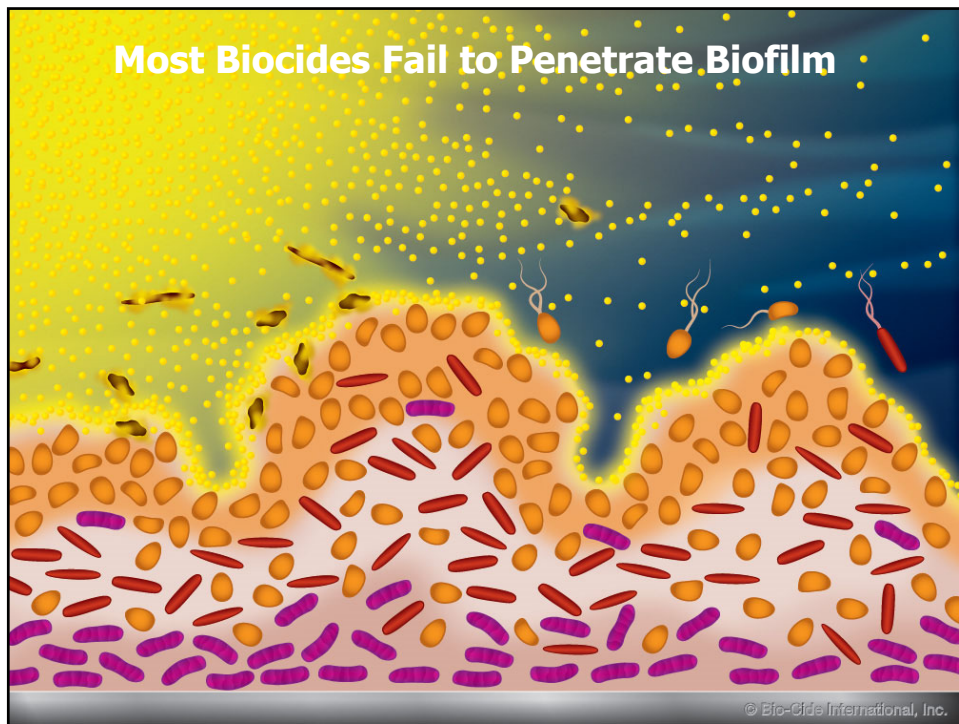


STEP 3



Biofilms





Build Up of Resistance

- Continued Exposure to Sub-Lethal Levels of Sanitizer Results in an Increase in Resistance.
- Applications Less Than Lethal and in Short Duration can Result in **Selective Culturing** of Resistant Strains.
- Be Sure Concentration Levels are Met, Maintained and Recorded
- Insure Adequate Contact Time is Reached
- Alternate Between Differing Sanitizers???
- Occasional Shocking of the System

Test – Test - Test



Log Results!!!

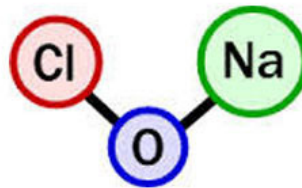
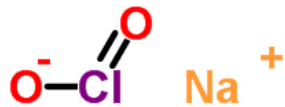


Types of Sanitizers

- Chlorine
- Chlorine Dioxide & Acidified Sodium Chlorite
- Acid Sanitizers
- Peracetic Acid
- Quats
- Per-Quat
- Iodine
- SDC (Silver Dihydrogen Citrate)
- Alcohol
- Ozone



Chlorine (Sodium Hypochlorite)



Chlorine

Advantages:

1. Broad Spectrum
2. Kills Spores and Phage
3. Liquids or Powders
4. OK in Hard Water
5. Inexpensive

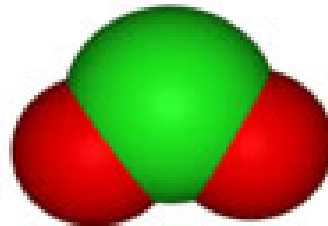
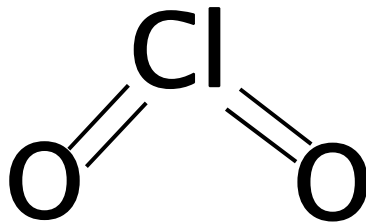
Disadvantages:

1. Corrosive
2. Irritating to Skin
3. Very pH Sensitive
4. Sensitive to Organics
5. Keep Below 120° F.
6. Organoleptic Impact
7. THM's (Trihalomethanes)

Chlorine Sanitizer

- 25 ppm on E. Coli Contamination:
- pH <7: 15-30 Seconds
- pH 8: 5 Minutes
- pH 10: 10 Minutes

Chlorine Dioxide



Chlorine Dioxide

- More Effective than “Regular” Chlorine.
- Chlorine has 2 Electron Receivers, Chlorine Dioxide has Five.
2 ½ more Oxidizing Power.
- Oxidizer
- Generated On-Site.
- Excellent for Water Treatment.
- ClO₂



Chlorine Dioxide

Advantages:

1. Broad Spectrum
2. Kills Spores / Phages
3. OK in Hard Water
4. Very Economical
5. Safe for Environment
6. Wide pH Range
7. No THM's (Trihalomethanes) 
8. Bio-film Removal
9. Tolerate High Organic Load
10. Low Organoleptic Impact
11. Very Active Against Bio-films

Disadvantages:

1. May Gas-Off
2. On-Site Generators
3. Needs Special Training
4. Must Follow Directions



Acidified Sodium Chlorite

- The Active Ingredient is Acidified Sodium Chlorite that Generates Chlorine Dioxide.
- To Increase the Speed of Kill and Efficacy, the pH of the Solution can be Reduced with any Food Grade GRAS Acid to Acidify the Sodium Chlorite.
- Activation May be Accomplished Manually in Low Volume as Batch Applications or with a Generation System.
- Some Vendor's ASC is Kosher Certified.



Acidified Sodium Chlorite

Advantages:

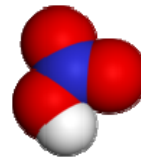
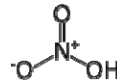
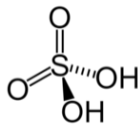
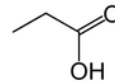
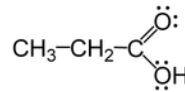
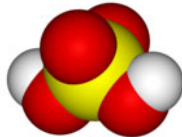
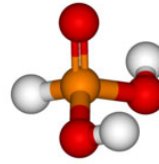
1. High Efficacy
2. Residual Benefit
3. Increased Shelf Life
4. Environmentally Safe
5. Can be Applied Up to 1200 ppm
6. Can be Applied At or Near a Neutral pH
7. Does Not Create Organoleptic Issues
8. Can be Applied Throughout the Production Process, to Include Direct Food Contact.
9. Specific FCN for Un-Activated
10. Is Less Corrosive Than Ozone or PAA

Disadvantages:

1. Binary Product Requires Mixing Step.
2. Needs Special Training
3. Must Follow Directions



Acid Sanitizer



Acid Sanitizers

- **Combinations of Acids and Surfactants or Fatty Acids.**
- **They Kill by Shutting Down the Cell Membrane & Denature Proteins**
- **Many Different Types.**
- **Used Since 1954.**

Acid Sanitizers

Advantages:

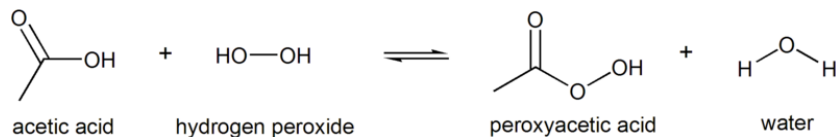
1. Broad Spectrum
2. High Anti-microbial Against G-
3. Organic Tolerant
4. Acid Rinse
5. Stable Solutions
6. Non-Corrosive to SS
7. OK in Hard Water
8. CIP and Manual Use
9. Wide Temperature Range

Disadvantages:

1. pH Sensitive (> pH3)
2. Some Foam in CIP
3. Variable Spore & Phage Kill
4. Contains Phosphate
5. Corrosive to Soft Metals



Peracetic Acid



Peracetic Acid

- Combination of Acetic Acid and H_2O_2 .
- Used World Wide Since Around 1902.
- Used in U.S. Since mid-80s.
- Oxidizer



Peracetic Acid

Advantages:

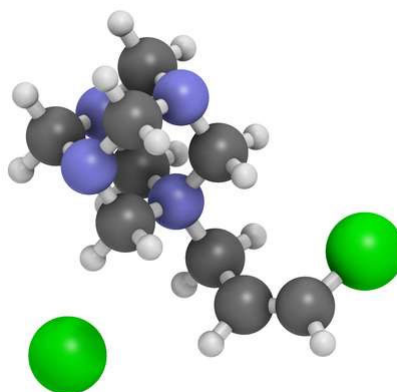
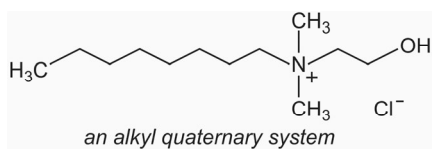
1. Broad Spectrum
2. Kills Spores
3. No Foam
4. Environmentally Safe
5. Good on Bio-films
6. Stable Solutions
7. Wide pH Range

Disadvantages:

1. Strong Oxidizer
2. Pungent Odor
3. Not an Acid Rinse
4. Special Training Needed
5. Limited Manual Use



Quats



CleanLogix

Quats

- **Combination of Cationic Surfactants and Water.**
- **Many Varied Formulas.**
- **Kills by Shutting Down the Cell Membrane.**
- **Usually Product of Choice for Environmental Sanitizing**
- **Also Available in Powder for Entryway Sanitation**



Quats

Advantages:

1. Low Toxicity
2. Non-Irritating
3. Non-Corrosive
4. Heat / Organic Stable
5. High Activity for G+
6. Yeast / Mold Control
7. Residual
8. Non-Volatile
9. Can be Acidified

Disadvantages:

1. Low Activity for G-
2. Anionic Contamination Reduces Activity
3. Residual
4. Foam in CIP



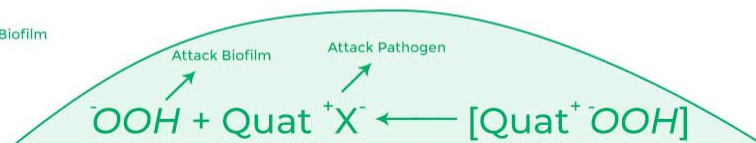
PerQuat™

Water phase



Oxidative and hydrolytic OOH- anion transported by Phase Transfer Catalyst

Biofilm



PerQuat™

- **Proprietary Disinfectant / Sanitizer Specifically Designed to Remove Biofilms & Kill Biofilm Bacteria**
- **Used on Food Contact Surfaces (Must be Rinsed), Environmental Surfaces, Injection Systems, Floors, Walls & Drains.**
- **PerQuat™ Technology also Available in a Powdered Floor Application**



PerQuat™

Advantages:

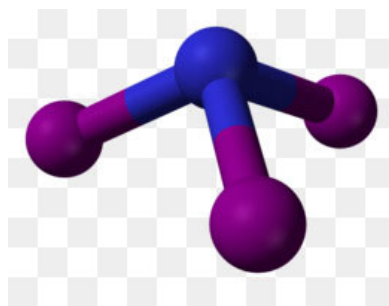
1. Recommended by USDA as a “Best Practice” for Listeria Control
2. Allows for Disinfection Past the Trap
3. Used on a Rotational Basis
4. Superior Drain Bacteria Control

Disadvantages:

1. Cost
2. 2-Part System – Must be Mixed
3. Short Shelf Life After Mixing
4. Requires a Potable Water Rinse



Iodophor



Iodine

- **Very Successful Since the 1940s.**
- **Surfactant + Iodine = Iodophor**
- **Disrupts Cell Membrane & Denatures Proteins**
- **Used at Very Low Concentrations.**

Iodine

Advantages:

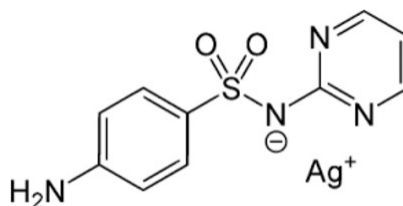
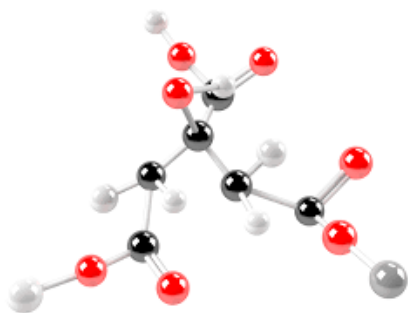
1. Broad Spectrum
2. Color Coded
3. Non-Irritating
4. Manual Use
5. Stable Solutions
6. CIP Use
7. Economical

Disadvantages:

1. pH Sensitive
2. Use Under 120° F
3. Odor
4. Corrosive if Abused



Silver Dihydrogen Citrate (SDC)



Silver Dihydrogen Citrate (SDC)

- Patented Technology Developed by Pure Bioscience
- Ready-to-Use: Citric Acid & Silver Ions (12 ppm to 50 ppm)
- Applied as a Fine Mist or Spray
- NSF Registered D2 Classification & Non-Toxic – EPA Category IV
- EPA-Registered - Ready-To-Use Product Approved for:
 - Food-Contact Surface Sanitization with No Rinse
 - Environmental Surface Sanitization & Disinfection
 - No Rinse Disinfection with 24 Hour Residual Protection



SDC

Advantages:

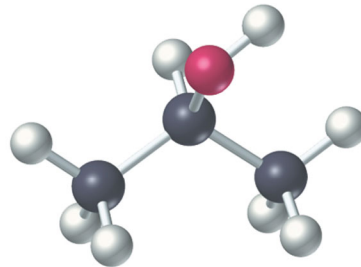
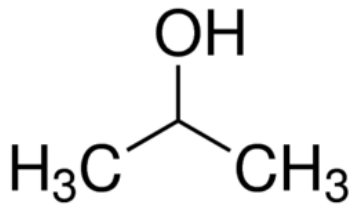
1. Broad-Spectrum Efficacy
2. Residual Activity
3. Safe / Non-Toxic
4. Does not Induce Bacterial Resistance
5. Tasteless, Odorless, Colorless
6. Non-Corrosive / Non-Flammable
7. Stable Solution
8. Doesn't Stain Or Bleach Fabric

Disadvantages:

1. Residual Activity
2. Tasteless, Odorless, Colorless



Alcohol



Isopropyl alcohol
(CH₃)₂CHOH

Alcohol-Based D2 Surface Sanitizers

What to Look for When Selecting an Alcohol-Based Food Surface Sanitizer:

- Is it EPA Registered?
- What are the Kill Claims?
- What are the Dwell Times?
- Is it NSF Listed?
- Does it have Kosher, Pareve and Halal Certifications?

Alcohol-Based D2 Surface Sanitizers

Advantages:

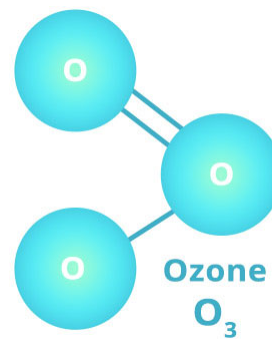
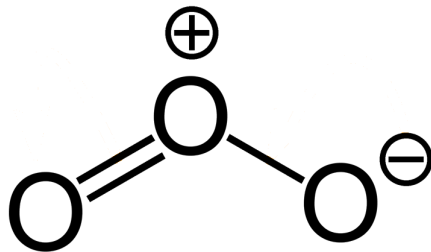
- Ready-to-Use: No Mixing & Reduced Room for Error
- No Rinse Options
- Certain Sanitizers have a 60 Second Kill on Food Contact Surfaces
- Certain Sanitizers have a 10 Second Kill Claim on Non-Food Contact Surfaces Such as Rubber Footwear.
- Highly Evaporative (Quick Drying) / Ideal for Low-Moisture Environments

Disadvantages:

- Cost of a Ready-to-Use Over a Concentrate That can be Diluted



Ozone



Ozone

- Ozone is Formed When Oxygen Molecules Collide with Oxygen Atoms to Produce O_3
- Is an Effective Antimicrobial Agent
- Oxidizer
- Is a Powerful & Naturally Unstable Oxidizing Gas
- Excellent Broad Spectrum of Germicidal Activity



Ozone

Advantages:

- Very Strong Oxidizer & is Fast Reacting
- Decomposes Rapidly with No Harmful Residual
- Superior Antimicrobial Properties
- Effective Against a Wide Spectrum of Microorganisms

Disadvantages:

- Extremely Unstable – As a Result Must be Generated On Site
- Safety Concern: Is Very Irritating
- Extremely Reactive and Corrosive
- Temperature Sensitive
- No Measurable Residual to Detect for Efficacy
- No Organic Tolerances
- Costly: Initial Capital Cost of Generator and Operational Costs
- Special Training Needed



Organic Processing

- **USDA National Organic Program (NOP): Fed Regulatory**
- **Certification by: State – Non-Profit – Private Agencies**
 - i.e. Organic Materials Review Institute (OMRI)
- **Sanitizers are Certified “Organic”**
 - Chlorine & ClO₂ / ASC – Ozone – Peracetic Acid – H₂O₂
 - Quats & Alcohol (?) are Not Certified for Food Contact Surfaces
- **Cleaners are Not Certified**



Proper Sanitizer Application

- **When to Apply**
 - **Immediately After Cleaning**
 - **Manual Step**
 - Flood Sanitizing
 - **Automated Program Step**
 - CIP System
 - **Separate Program Step (i.e. Pre Start-Up)**
 - **Re-Sanitize After 4 Hours of Non-Use**



Sanitizers

Coverage & Contact Time is Critical

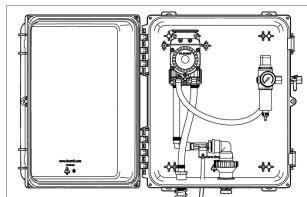


 **FOAM-iT**

 **CleanLogix**

Sanitizers: Concentration is Critical

- Hose Injector Systems
- Portable Tank Sprayers
- Pump-Up Sprayers
- In-Line Injecting
 - Venturi Action
 - Dosatron (Water Driven)
 - Metering Pumps



 **FOAM-iT**

 **CleanLogix**

Get Airborne

Fog and Mist Units

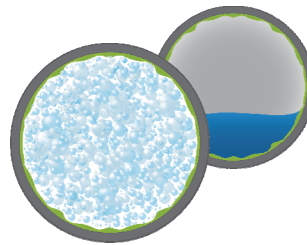
- Portable and Wall-Mounted Systems
- Different Nozzles / Micron Sizes are Available
- Delay Timer (Optional)



360° Contact

Foam for Drain Sanitation

- Foam Pushes Through Drains, Providing 360° Chemical Contact with Pipe Walls
- Liquid Products May not Contact the Entire Pipe Wall
- Drain Foam Attachments for Floor, Trench and Sink Drains
- Also Use with a Battery Foam Unit for Maximum Portability (No Air Lines)



360° contact

Foam for Drain Sanitation



Comparing Properties of Common Sanitizers



Microbial Specificity

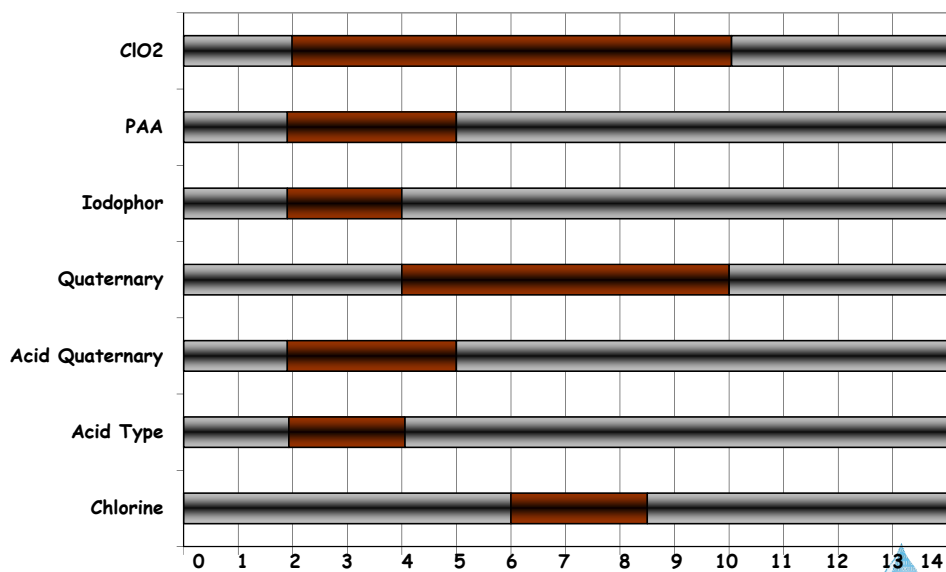
	<u>Gram Negative</u>	<u>Gram Positive</u>	<u>Yeast</u>	<u>Mold</u>	<u>Spore Former</u>
PAA -	☺	☺	☺	☺	☺
Iodophor -	☺	☺	☺	☺	☺
Acid Quaternary -	☺	☺	☺	☺	☹
Quaternary -	☹	☺	☺	☺	☹
Acid Type -	☺	☺	☺	☺	☺
Chlorine / ClO ₂ -	☺	☺	☺	☺	☺

Recommended = ☺

Mixed Bag = ☺

Poor = ☹

Effective pH Range



Contact Information

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