



Peracetic Acid Sanitation of Industrial Processing Equipment

- Milk and dairy plants
- Winery, vineyards and breweries
- Meat, poultry, seafood, and egg plants
- Fruit and vegetable processing
- Pulp and paper mills
- Beverage plant high level sanitation

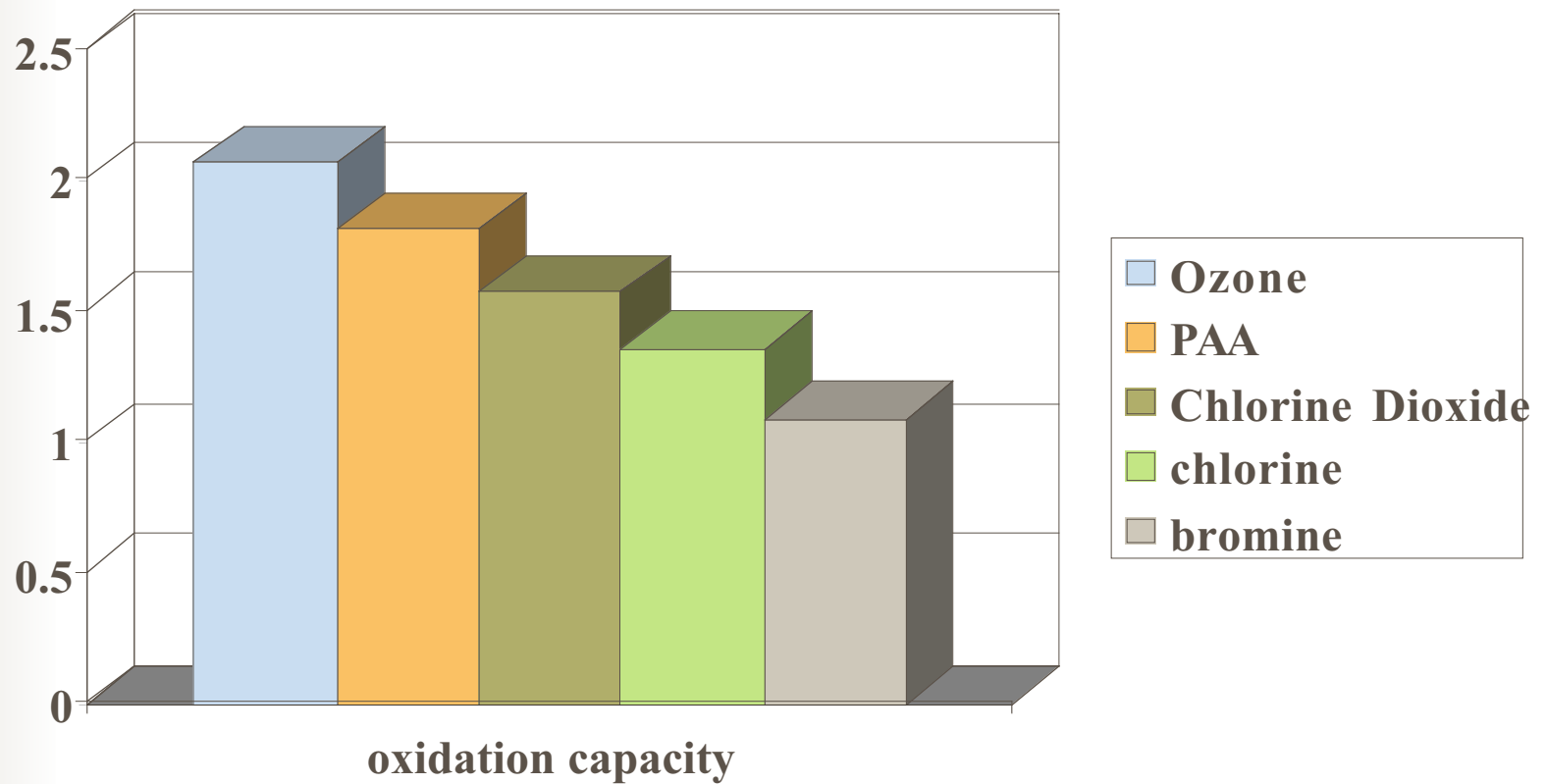


What Is PERASAN 'A' (PAA)?

- Peracetic acid (PAA) 5.6%
- Acetic acid 7.3%
- Hydrogen peroxide 26.5%
- Specific Gravity 1.12



OXIDATION POTENTIAL OF PAA VS OTHER OXIDANTS (e⁻ VOLTS)





Sanitation Benefits

- Disperses/penetrates bio films
- Kills bacteria, mold, fungus, and yeast
- Very fast acting
- Will not oxidize stainless steel or contribute to chloride stress cracking
- Neutralizes alkaline materials and cleans mineral scale
- No rinse required

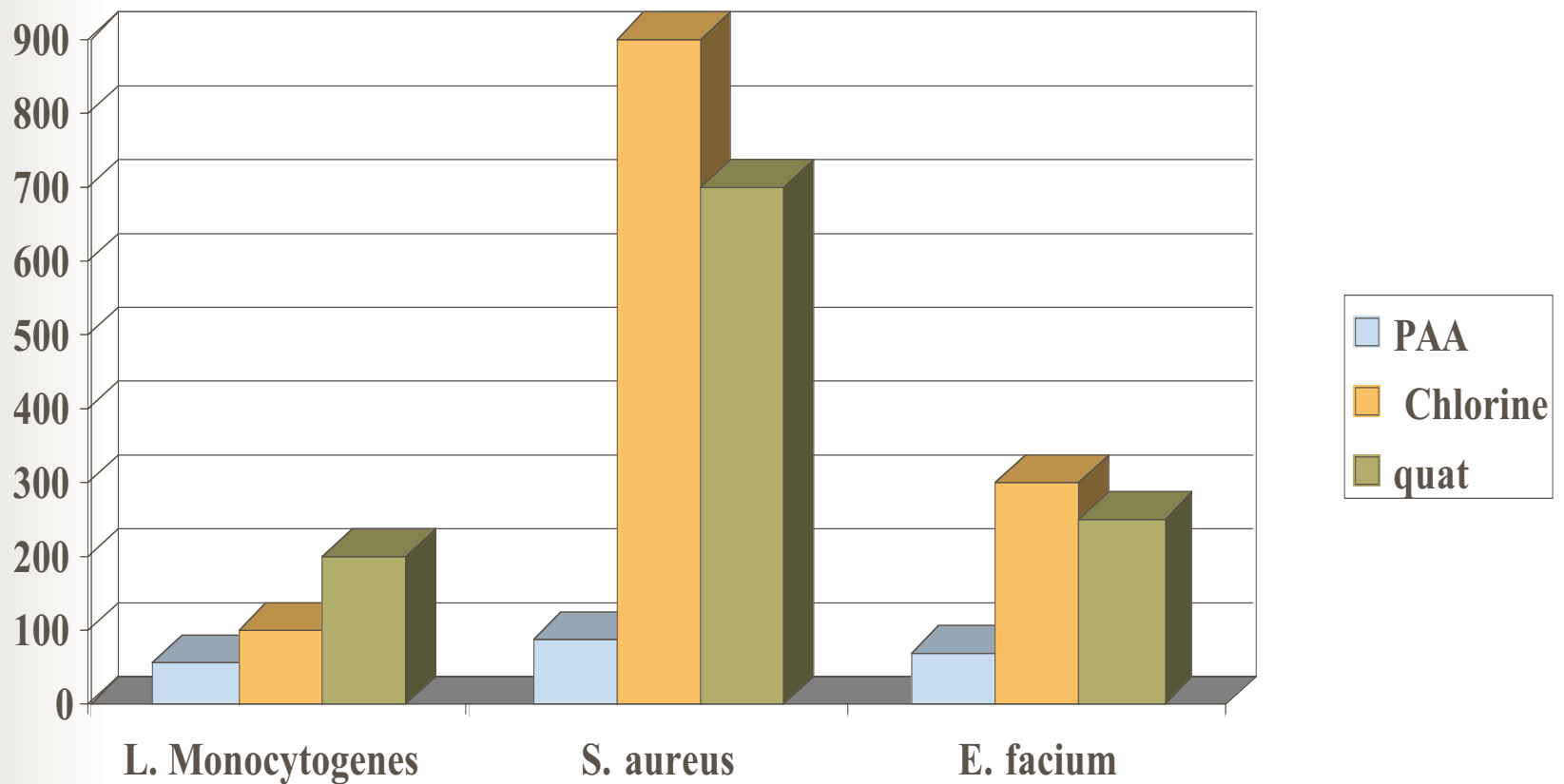



Sanitation Benefits

- Does not add conductivity (TDS)
- Does not form disinfection byproducts
- Non persistent in the environment
- Breaks down into carbon dioxide and water
- No RMP requirement
- Fed as a liquid
- Easy to test for

PAA Efficacy

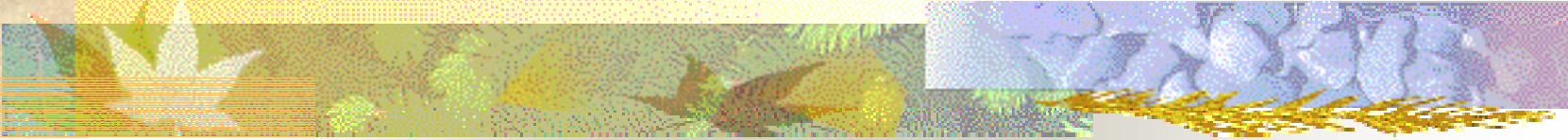
PPM required for lethality in five minutes





PERASAN 'A' Efficacy on Food Bacteria
Independent laboratory test
80 ppm PAA

<i>Species</i>	<i>log kill</i>	<i>time (sec)</i>
Salmonella chloreraesuis	>6.92	30
Listeria monocytogenes	>6.87	30
Staphylococcus aureus	>7.00	30
Escherichia coli	>7.00	30



PERASAN 'A' Efficacy on Food Bacteria

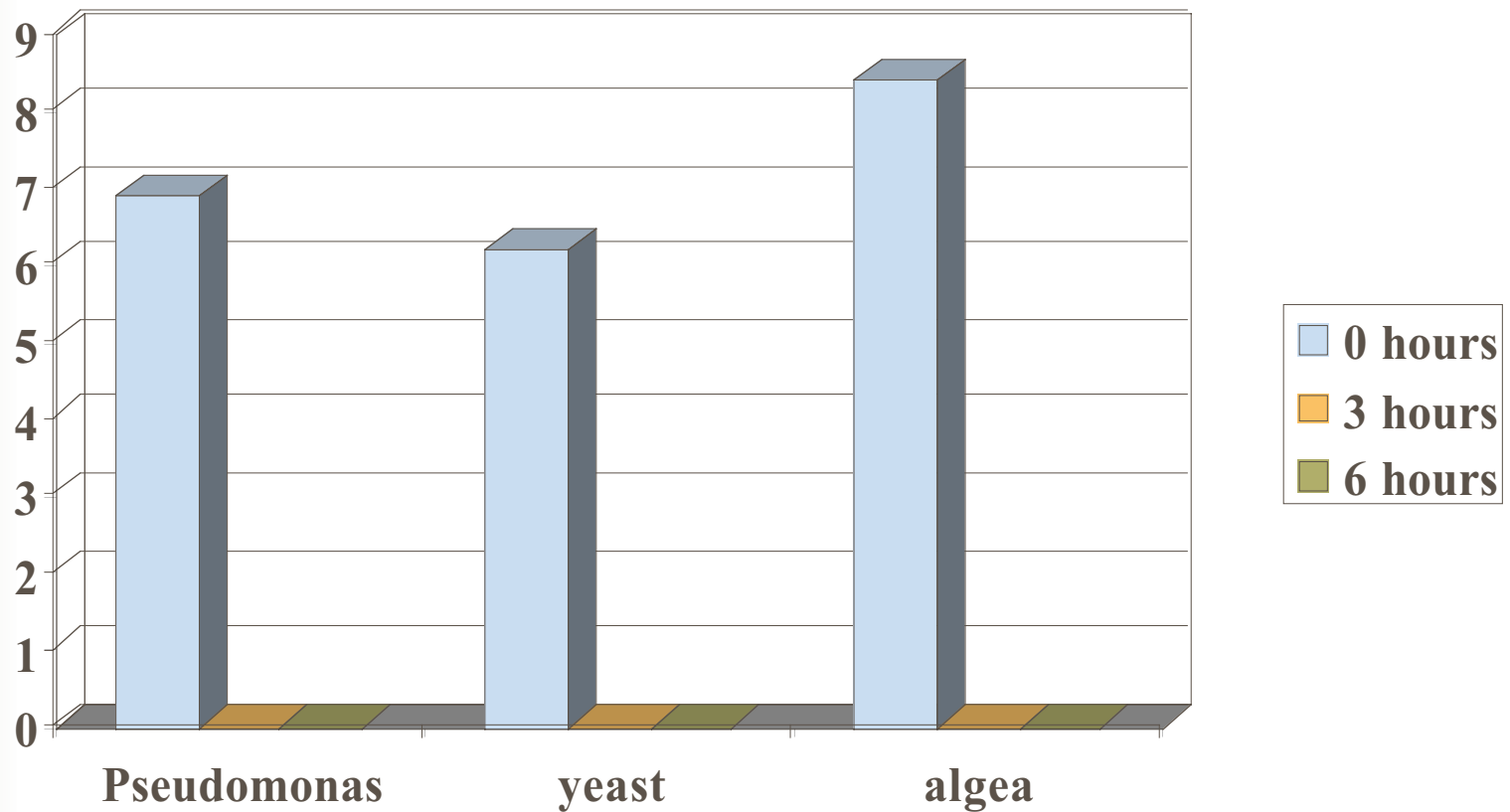
Independent laboratory test

1000 ppm PAA at 46° C

<i>Species</i>	<i>Control*</i>	<i>Log kill</i>	<i>time (sec)</i>
Bacillus subtilis	6.2	> 6.2	15
Byssochlamys fulva	5.1	> 5.1	15
Aspergillus niger	5.1	> 5.2	15

* Log 10

PERASAN 'A' SHOWS A COMPLETE KILL AT 9 PPM (LOG REMAINING)





PAA Limitations

- Not compatible with chlorine
- PAA is consumed by sulfites and sulfides
- Reduced half life above ph 8.5
- Rapid decomposition in the presence of metals
- Cannot be stored in mild steel or contaminated containers



PAA Sanitation-Regulatory

- EPA approved as a pesticide
 - 40 CFR 152.25 (a) EPA #63838-1
- FDA approved for direct food contact
 - 21 CFR 173.315 (fruits, vegetables)
 - 21 CFR 173.370 (meat, poultry, seafood)
- FDA approved as sanitizer on food contact surfaces
 - 21 CFR 178.1010



PAA Approvals

- National Organic Program
 - Approved Nov 17, 2000
- NSF approved for fruit and vegetable washing without a final rinse
 - Registration No. 122280
- Kosher approved including Passover
 - Pareve, Kashruth Certification



PAA Toxicity

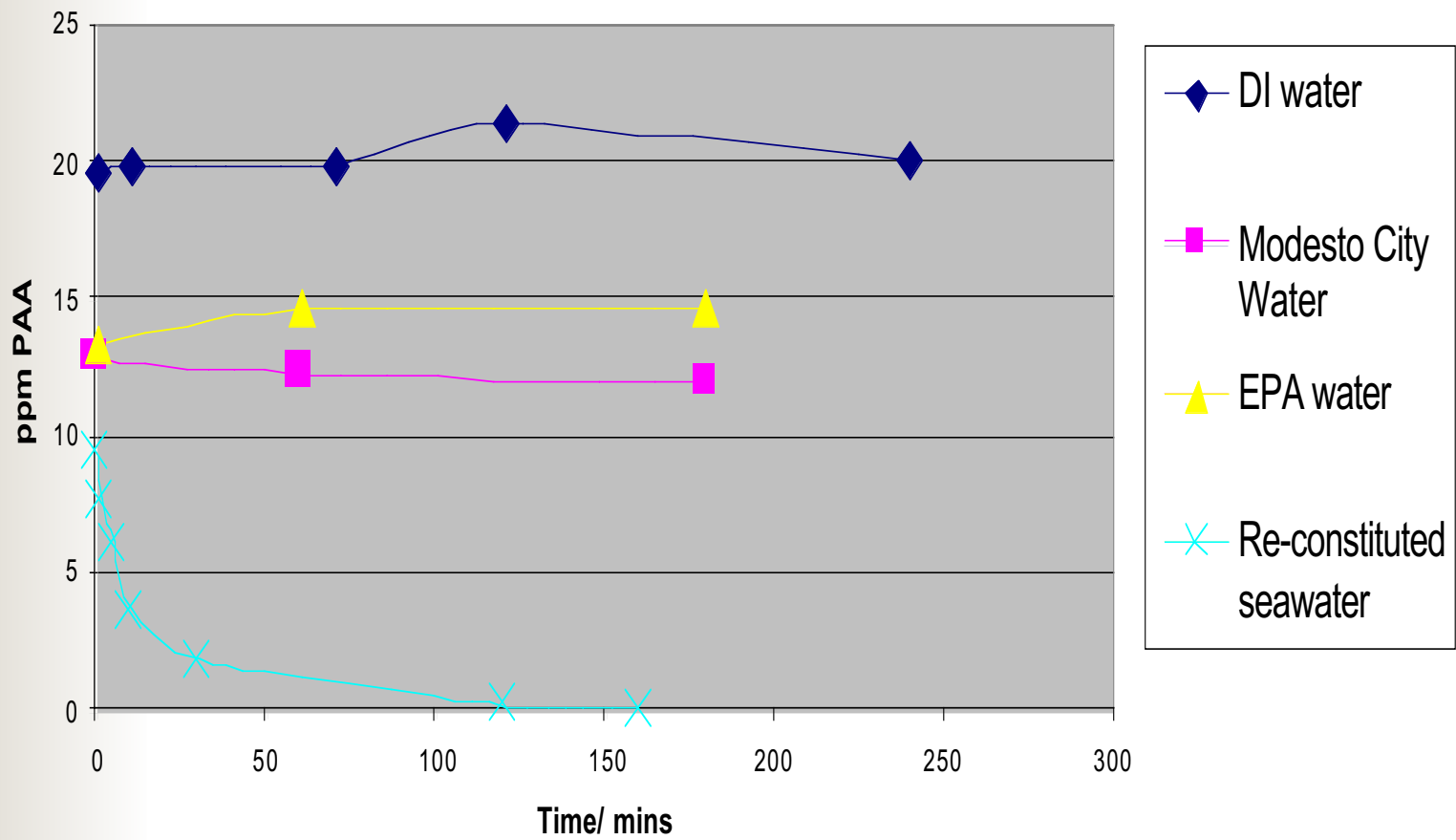
Species	NOEC mg/l
Bluegill	0.47
Rainbow	0.82
Daphnia magna	0.56
Selanastrum	0.12



Testing for PAA

- Paper strips
 - 0 to 50 ppm
 - 0 to 500 ppm
- For lower level use DPD (chlorine) test kit
 - Use total chlorine only
- Titration
 - 5 step drop test. Much more accurate than Le Motte test procedure

PAA High Concentration Decay Profile





PAA for CIP

- Effective and stable at pH <1 to 9
- Non-foaming, very low surface tension
 - Will not cavitate pumps
- Does not contribute to taste and odor
- No rinse required
- Complete solubility in water
- Will not corrode stainless steel, aluminum



PAA on Food

- Approved for direct fruit and vegetable contact without a final rinse.
 - Limit is 80 ppm as PAA
- Patented for use in transport flumes
 - Patent # 5,674,538 ; 5,409,713
- Other uses include dip (wash) tanks, sprays, continuous belt spray, etc.



Other uses of PAA

- Bottling line sanitation
 - High dose sanitizes bottles in 12 seconds
- Sanitizes processing eggs
- RO sanitizer and cleaner
 - Compatible with RO membranes
 - No need to “dechlor”
- Dish and tableware sanitizer
- Fogging in packaging rooms/areas



PAA Material Compatibility

TUBING:

The only synthetic tubing recommended by Enviro Tech is Teflon based. FEP or PFA Teflon tubing has good pressure and wear resistance, and is UV and weather resistant. Low density polyethylene tubing is not recommended for peracetic acid solutions (PAA). High density polyethylene has relatively good resistance to PAA but will become brittle with time. Never use any synthetic tubing for PAA other than those discussed above.



PAA Material Compatibility

PUMPS:

All pumps considered for use with PAA should have Teflon diaphragms and Teflon/polypropylene/kynar liquid contacting parts. Do not use elastomer composite material for seats or gaskets other than Teflon.

Peristaltic pumps are not recommended. The squeeze tubes cannot handle the concentrated PAA solutions or pressures (over time) using any squeeze tube elastomer.



PAA Material Compatibility

LMI pumps have proven to be unreliable. They only have 1 ball-seated check valve, are extremely difficult to prime, and lose prime easily with peroxygen products.

Pulsafeeder-type pumps with double seated check valves and a degassing head has shown good performance in the field.



PAA Material Compatibility

Plastic fittings:

“Jaco” brand high pressure polypropylene tubing fittings give very good service life. If they are used in the direct sunlight they should be wrapped with electrical tape or similar material to prevent UV degradation. Do not use nylon or acetal-type fittings. Parker brand (black) fittings are not recommended. Kynar (PVDF) fittings are acceptable, but take care to tighten the fitting nuts with tools, as they are difficult to torque down on tubing.



PAA Material Compatibility

- **Piping:**

- 316L stainless tubing is the product of choice for transporting concentrated PAA over distances. Compression fittings should be stainless/Teflon only. If piping is used, 304 stainless fittings are acceptable. However, PAA should never be confined between two points, such as between valves. In such cases a pressure relief device should be installed set at slightly higher pressure than the operating parameters.



PAA Material Compatibility

- Never use brass, copper, iron, or galvanized metal of any kind that will contact even the most dilute solution of PAA.



PAA Safety and Handling

- **Storage:**
- PAA solutions should be kept in cool environments when possible.
- **Never** store a PAA drum outdoors in a **bright sunlight** without protecting the tops from direct sun. Sunlight will increase the temperature in the headspace of a drum, and the gas may expand faster than the venting membrane devices will allow.



PAA Safety and Handling

- **Miscellaneous safety:**
- NEVER place or pour *concentrated* PAA solutions into any type of other holding device, such as ‘shot’ feeders, day tanks, or any other type of container, unless it is dedicated for PAA and is made of compatible materials.
- As a rule, add PAA solutions to water only.



PAA Safety and Handling

- NEVER return PAA solutions back to the original container once it is removed. The slightest contamination may degrade the product remaining in the drum, or may set off a decomposition reaction, which evolves oxygen and heat.
- ALWAYS wear gloves, goggles or faceshield, and other appropriate chemical resistant gear when handling peroxyacetic acid products.