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# TARA PAA®

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**PERACETIC ACID**  
INFORMATION BROCHURE

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## **PERACETIC ACID**

Peracetic acid (PAA) is a liquid chemical germicide used for sterilizing or disinfecting. Scientists have been working with this germicide since the turn of the century. Freer and Novy reported on the germicidal action of PAA in 1902, but PAA solution was generally unavailable due to the cost of manufacturing.

Now PAA is available to end users at a competitive price and a wide variety of uses were introduced. In medical applications PAA has been used to sterilize rooms, equipments, hemodialyzers, and medical, surgical and dental instruments. PAA destroy cell membranes by disrupting sulfur and sulthydryl bonds. PAA inactivates a catalase that breaks down Hydrogen Peroxide and oxidizes enzymes that support biochemical transportation across cell membranes thus causing the cell wall to rupture. PAA is known to be a protein denaturant and destroys pyrogens.

PAA is most active against bacterial spores. In one test of 23 agents, the anti microbial activity of PAA was efficacious against Bacillus thermoacidurant spores, including chlorine containing compounds. PAA is most efficacious against a wide range of bacteria, mycobacteria, viruses, yeast and fungi. PAA is more efficacious than Hydrogen Peroxide, Formaldehyde and Gluteraldehyde. Additional advantages are its rapid action, ability to remain effective at low temperatures and efficacy in presence of organic material. The decomposition products of PAA are Acetic Acid (Vinegar), Water and Oxygen

## **Uses & Basic Chemistry**

### **TARA PAA (Peroxyacetic Acid Solutions)**

TARA PAA are stabilized equilibrium solution concentrates that are approved for numerous uses, including circulation and industrial sanitizing of equipment such as tanks, pipelines, evaporators, fillers, pasteurizers, aseptic equipment, and for sanitizing previously cleaned food contact surface of equipment.

The equilibrium TARA PAA is a mixture of Acetic Acid and Hydrogen Peroxide. Although the PAA is the true active ingredient, the Hydrogen Peroxide fraction aids in stabilizing the PAA.

**Applications of TARA PAA®**  
**Peracetic Acid**

**A. Food Products**

1. Fresh fruits and Vegetables
2. Processed Food
3. Organic Food
4. Dairy Industry
5. Meat Industry
6. Egg and Poultry
7. Starch (Medical)
8. Hotels
9. Flight Kitchen
10. Fish Farming
11. Wineries
12. Beverage
13. Breweries

**B. Biocide**

1. Agriculture
2. Sanitizer
3. Fogging
4. Medical Use

**C. Other Uses**

1. Cooling water
2. Wastewater
3. Sewage water
4. Textile Bleaching
5. Cleaning of ultra Filtration & RO. System
6. Plant & Equipment cleaning
7. Drip Irrigation tube cleaning

## Oxidation Capacity of Various Oxidizers

Oxidizer	eV*
Ozone	2.07
Peracetic Acid	1.81
Chlorine Dioxide	s 1.57
Sodium Hypochlorite	1.36
Hydrogen Peroxide	1.33(pH7)
*electron volts	

## Germicidal Action of Peracetic Acid

Temperature of Action	5°C		10°C		20°C		40°C	
Concentration of 100% PAA	0.01	0.025	0.01	0.025	0.01	0.025	0.01	0.025
<b>Gram-Positive Bacteria</b>								
Staph. Aureus	5	3	3	2	2	1	1	0.5
Strept. Faecalis	3	3	3	2	2	1	1	0.5
<b>Gram-Negative Bacteria</b>								
Enterobacter Aerogenes	1	1	1	1	1	1	1	0.5
Ps. Aeruginosa	3	1	2	1	1	0.5	1	0.5
Samonella Types	3	2	3	2	2	2	1	1
<b>Yeasts</b>								
Sacch. Cerevisiae	20	10	10	5	3	1	1	0.5
Cand. Mycoderma	120	40	90	40	40	10	3	1
<b>Molds</b>								
Penicillum Camerunense	>120	90	>120	90	20	10	3	1
Asp. Niger	>240	>240	>240	>240	90	60	10	5
Mucor Spec.	>240	>240	>240	>240	20	5	3	1
<b>Sporulators</b>								
Bac. Cereus	>60	>60	>60	>60	>60	60	40	10
Bac. Subtilis	>60	40	>60	>60	>60	60	40	10
Bac. Mesentericus	>60	40	>60	40	10	5	10	1
Thermophile Sporulators	>60	40	40	40	20	5	5	2
Clostridium Perfringens	>60	10	>60	10	20	5	2	1

Kill times in minutes (suspension Method) with colony counts of  $10^7 - 10^8$  per ml of inoculum.

## Comparison Chart for various Sanitizer/Disinfectant/Biocide

	Optimum pH Range for Sanitization	Use Dilution Concentration in ppm	Effect of Hard Water on Sanitization	Effect of Organics in Water	Germicidal Activity	Activity against Gram Positive Bacteria	Activity against Gram Negative Bacterial	Activity against Spores
<b>HYPOCHLORITE</b>	5 - 7	200	Moderate tolerance	Inactivated	High	●●●●	●●●●	●●●○
<b>IODOPHORS</b>	1 - 5	25	Activity reduced More sanitizer required	Reduced activity; more stable than hypochlorites	Moderate, less effective than hypochlorites	●●●●	●●●●	○○○○
<b>QUATS</b>	8 - 11	200	Activity reduced	Moderately Stable	Varied	●●●●	●●●●	○○○○
<b>ACID SANITIZERS</b>	1 - 3	200	Activity reduced more sanitizer required	Low reactivity	Very Good	●●●●	●●●●	○○○○
<b>ALDEHYDES</b>	6 - 8	2% for Sterilization	No effect	Activity reduced	High	●●●●	●●●●	●●●●
<b>ALCOHOLS</b>	5 - 8	70%	No effect	Loss of activity	Moderate	●●●○	●●●●	○○○○
<b>PHENOLICS</b>	10.5 - 11.5	200 - 400	Moderate tolerance	Moderately stable	Very good	●●●●	●●●●	●●●○
<b>PAA</b>	2 - 8.5	150 - 200	limited effect	Reacts and loses activity	High, better than hypochlorite	●●●○	●●●●	●●●●
<b>CHLORINE DIOXIDE</b>	2 - 5	5 - 15	No effect	Little influence	High, better than hypochlorite	●●●●	●●●●	●●●○

●●●● Highly Effective, ●●●○ Moderately Effective, ●●○○ Slightly effective, ○○○○ Ineffective

## **COOLING WATER;**

PAA solutions find particular advantageous use in cooling water systems because it is a very powerful oxidizer (second only to ozone). PAA is lipid soluble making it an effective on-line and off-line cleaner.

Higher doses can be used to remove slime mass accumulation. It does not create halogenated by-products or THM's, does NOT react with ammonia and many other nitrogen-based chemistries, and does not contribute to the conductivity or TDS of the blow-down or bleed off stream. PAA consumes alkalinity, allowing higher cycles of concentration compared to hypochlorite.

For most surface discharges, quenching is not required. PAA is compatible with organic scale and corrosion inhibitors.

The threshold level for most algae and slime forming organisms is 1-2 ppm active PAA. Effective pH ranges are as high as 9.5, but the optimum pH is below 8.6. Typical micro results for various organisms exposed to PAA solution are following.

## **SANITATION:**

When used as the primary sanitizer in processing facilities, the PAA formula does not contribute to wastewater TDS or total salt levels, and does not interfere with most wastewater chemical treatment programs or systems. There are no known microbial mutation or resistance response to PAA. It can be used at concentrations up to 200 ppm active PAA without requiring a water rinse. Normal use rates are 80 ppm with contact times of 1 minute to achieve a 99.999% microbial kill. TARA PAA used as a continuous conveyor sanitizer (with direct food contact) for meat, poultry, seafood, and fruit and vegetable plants in accordance with 21 CFR 173.315 and 21 CFR 173370

## **AGRICULTURE:**

PAA solution are finding specialty use as a fungicide for daffodil and flower bulbs, a biodispersant and slime inhibitor for flume systems, and as a drip irrigation line cleaner and algaecide. When used as a drip line cleaner, the PAA breaks down in soil within minutes, releases (adds) active oxygen, and does not contribute a salt or conductivity (EC) loading in the root zone. At levels above 10 ppm, the products will dissolve calcium and add mild acidity to the soil. When compared to Chlorine, PAA will NOT depress crop yields

## **WASTEWATER:**

PAA has, nonetheless, been used successfully as an additive for sludge debulking, algae control, chemical enhancement for sulfide removal and prevention, as a supplement to UV disinfection, and odor eliminator. PAA use costs are lower than Chlorine for treating raw and physio-chemically treated effluents. For biologically treated effluents, use cost are higher (but with similar efficacy results), yet PAA does not create THM precursors or most of the DBP's (disinfection by-products) associated with the use of Chlorine. When neutralization is required, Sulfite reduction may be used (the same as for Chlorine).

<b>TARA PAA® Solution for Various Uses</b>						
<b>S.no.</b>	<b>Application</b>	<b>Concentration in ppm</b>	<b>Required TARA PAA® for 100 Ltrs solution</b>	<b>Temperature</b>	<b>Exposure Time</b>	<b>Note</b>
1	Foot Dip	500	895 ml	Normal		Clean the Boots with Soft Bruch
2	Washing Fruits & Veg.	25	45 ml	Normal	60 Second	Dry the vegetable & Fruit before use. No washing with fresh water required.
3	Washing Meat	80-200	143 ml to 357 ml	Normal	60 Second	Allow it to drip 230 ppm –FMC
4	Hatching Egg + Shell Egg for food	80 - 200	143 ml to 357 ml	43°C	60 second	Allow it to Dry. Active against as per gillus fumigates 280 ppm
5	Fogging	150 - 750	268 ml to 1340 ml	Normal		Allow it for 2 hrs. 3 Ltr solu for every 100 cu.mtr.
6	Utensils & Tableware used in eating Drinking & Food Preparation	75	135 ml	Normal	60 second	Apply Physical cleaning & washing prior to use.
7	Non Food Contact- Hard Surface – Disinfectant	135 – 1775	240 ml to 3000 ml			
8	Disinfectant for Animal & Poultry Premises, Trucks & Crates.	80 - 320	143 – 570 ml		10 minutes	
9	Antimicrobial rinse of Pre-cleaned Container (Returnable & Non Returnable)	1120 - 1700	2000 to 3000 ml	40 - 60°C	15 second	
10	Algae control and Bio Film removal in Cooling Tower	3-6	6-10 ml	Normal		

## **Frequently Asked Technical/Application Questions**

TARA PAA-15 is an equilibrium mixture of 15% peracetic acid (PAA) and 22% hydrogen peroxide. TARA PAA - 5 is an equilibrium mixture of 5.6% peracetic acid (PAA) and 26.5% hydrogen peroxide.

### **GENERAL PRODUCT INFORMATION:**

#### **What are the uses of TARA PAA products?**

TARA PAA products are registered for the following uses:

- Institutional / Industrial Sanitizer and Disinfectant for previously cleaned Hard, Non-Porous Food Contact in Dairies, Wineries, Food and Beverage Plants, Poultry Egg Facilities, and Animal Housing.
- Hard, Non-Porous Surface Disinfecting in Hospital, Schools, Industrial Facilities, Office Buildings, Veterinary Clinics.
- Bacteria, Fungi and Slime Control in Cooling Water and Evaporative Cooling System, Reverse Osmosis and Ultra Filtration Systems.

#### **Why is TARA PAA-5 available in two different concentrations?**

The products have almost identical label uses and can be used interchangeably. TARA PAA-5 is preferred from a worker exposure issue whereas TARA PAA-15 is more concentrated and more economic to ship in large volumes.

#### **Do TARA PAA-15 products have an odor?**

TARA PAA has a pungent odor of vinegar. The odor is much less intense for TARA PAA-15.

#### **DO TARA PAA products produce halogenated or toxic by-products?**

Absolutely not. In the environment, TARA PAA products degrade to Carbon-dioxide, Oxygen contribute no additional conductivity to the system.

#### **Why are the storage containers vented?**

TARA PAA products have a shelf life of over one year when stored in their original container. The gradual loss of activity is accompanied by the generation of Oxygen gas that would build up in the headspace and pressurize the container if it was not vented to the atmosphere.

**Are TARA PAA products degraded by ultra violet light?**

Unlike Sodium Hypochlorite bleach and other halogenated products, TARA PAA does not lose activity on exposure to UV light. However, containers should be shielded from direct sunlight to avoid build-up of heat. A cool, dry, well ventilated environment is recommended for storage of TARA PAA products.

**What materials are incompatible with TARA PAA products?**

Avoid contacting TARA PAA products with strong alkalis, oxidizable organics, heavy metals, leather, paper and wood.

**What containers should be used to store TARA PAA products?**

Storage in the original high density polyethylene container is recommended. When transfers are necessary, the transfer containers should be made of the same material or high quality stainless steel. Do not contact with any other metal (e.g. brass, copper, galvanized, aluminum, mild steel) as these are readily corroded and the metal ions released can cause accelerated decomposition of TARA PAA products.

**What kind of personal protective equipment do I need to wear when handling TARA PAA products?**

Chemically resistance gloves such as neoprene or vinyl. Goggles, safety glasses or face shield will protect from accidental splashing. Most common accidents or problems are eye protection issues. Always protect your eyes!

**What is the impact of TARA PAA products on the environment?**

TARA PAA products are environmentally responsible. The short half-life means that PAA is not persistent and rarely needs to be neutralized prior to discharge. No additional conductivity is introduced to the receiving waters. The results of a large aquatic toxic toxicity study demonstrate TARA PAA is far less toxic to marine and fresh water organisms than alternative disinfection chemistries. If spilled or applied to soil, PAA decays in a few minutes with no lasting impact on the soil quality. The ultimate end result is Carbon, Oxygen, and Water.

## **APPLICATION INFORMATION:**

### **How are TARA PAA products fed?**

Diaphragm-pumps with Teflon diaphragms and polypropylene, Teflon or Kynar materials and degassing heads are recommended for feeding TARA PAA products. Only use gaskets and 'O' rings made of gore-tex, Teflon or EPDM. Piping materials for the concentrated product should be Teflon or Teflon-lined. Always pump the products from the top of the container using a dip tube or foot valve. If using totes, never draw products from the drain valve as this could lead to unwanted siphoning or excessive products loss if leakage occurs. TARA PAA products can also be conveniently metered using injectors or eductors made of compatible material of construction. Peristaltic pumps are not recommended because of frequent squeeze tube failure with most elastomers. We receive many questions about using polyethylene tubing and its potential use. We do not recommend PE tubing, as it will crack, split or fail within a few month of use.

### **Where should TARA PAA products be introduced to the system?**

TARA PAA products may be fed to either the system water or the make-up water at an area of good mixing to promote rapid dispersion. The products may be introduced continuously or intermittently depending upon the needs of the end user.

### **How does the compatibility of TARA PAA products with scale and corrosion inhibitors compare with that of halogenated products?**

TARA PAA products are far less reactive to common Phosphonate and polymeric scale and corrosion inhibitors than halogen chemicals. TARA PAA products have no impact on toytriazole and are actually stabilized to chemical degradation by a variety of arclate and maleate polymer scale and corrosion inhibitors.

### **How effective are TARA PAA products?**

A vast amount of efficacy data, has proven PAA to be a broad spectrum microbiocide.

### **Are TARA PAA products suitable for slime control and biofilm removal?**

Most certainly. The organic nature of the Peracetic acid molecule allows it to penetrate the polysaccharide slime layers harboring bacteria to destroy them. Additionally, the effervescing action of oxygen bubbles released from Hydrogen Peroxide (scrubbing bubbles) helps to dislodge troublesome slimes from surfaces.

**Can I use an approved non-oxidizing biocide in conjunction with TARA PAA products?**

This is not recommended for economical reasons. TARA PAA products were developed to be stand-alone bio-control agents. Some other companies advocate using non-oxidizing biocides in conjunction with TARA PAA type products, but the economic benefits are questionable.

**Do TARA PAA products remain effective in the presence of ammonia, organic nitrogen and sulfides?**

Unlike chlorinated chemicals, PAA does not react with ammonia and is not compromised by organic nitrogen. The high amounts of Hydrogen Peroxide in TARA PAA products rapidly oxidize sulfides to sulfur or sulfate depending upon system pH.

**What is the half life of PAA in water?**

This is highly dependent on the water quality of the system. In ordinary tap water of moderate hardness and low chemical demand, the half-life of PAA has been measured to be between 8-30 hours. For re-circulating cooling water with elevated cycles of concentrations and higher pH values, half-lives of between 5-10 hours have been measured. PAA is highly unstable in seawater and has a half-life of 12-30 minutes.

## TARA PAA TECHNICAL DATA SHEET

### Peroxyacetic acid

- Peracetic acid
- Ethaneperoxoic acid
- Acetyl hydroperoxide

### Formula

**CH<sup>3</sup>COOOH**

### Description

Colorless liquid with a strong, pungent, acrid odor.

### Uses

Bactericide & fungicide, especially in Food processing, reagent in making caprolactam, synthetic glycerol.

### Registry Numbers and Inventories.

CAS

79-21-0

EC (EINECS/ELINCS)

201-186-8

EC Index Number

607-094-00-8

EC Class

Flammable; Oxidising; Harmful;  
Corrosive; Dangerous for the  
Environment

RTECS

SD8750000

RTECS class

Agricultural Chemical and Pesticide;  
Tumorigen; Primary Irritant

UN (DOT)

2131

Merck

127293

Beilstein/gmelin

1098464

Beilstein Reference	4-02-00-00390
EGA OPP	63201
Swiss Giftlistef	G-2709
Canada DSL/NDSL	DSL
US TSCA	Listed
Australia AICS	Listed
Japan ENCS (MITI)	Listed

**Properties :**

Formula	C <sub>2</sub> H <sub>4</sub> O <sub>3</sub>
Formula mass	76.05
Melting point, °C	0.1
Boiling point, °C	105
Vapor pressure, mmHg	7.9(25°C)
Density	1.1037 g/cm <sup>3</sup> (20°C)
Solubility in water	Very soluble
Viscosity	3.280 cp @ 78°F
Refractive index	1.3994 (15°C)
pKa/pKb	8.20 (pKa)
Heat of vaporization	44,25kJ/mol

## **Hazards and Protection.**

**Storage** Store in a cool, dry, well-ventilated location. Separate from acids, alkalies, organic materials, heavy metals. Normally kept refrigerated outside or detached storage is preferred.

**Handling** All chemicals should be considered hazardous. Avoid direct Physical contact. Use appropriate, approved safety equipment. Untrained individuals should not handle this chemical or its Container. Handling should occur in a chemical fume hood.

**Protection** Full protective clothing (goggles, rubber gloves, etc)

**Respirators** Self-contained breathing apparatus.

**Caution** Peracetic acid is a strong oxidizer. Fire or other violent reaction may occurs upon contact with combustible organic material. Avoid breathing vapors. Do not touch the spilled material; shut off all ignition sources and stop the leak if this can be done without risk. The spilled material should be absorbed with a noncombustible absorbent such as vermiculite.

**Small spills** Sweep up and place in a metal container for immediate disposal. Do not use spark-generating metals or organic materials for sweeping up or handling spilled material. Dispose of the absorbed Peroxyacetic acid solution, in small quantities at a time, by placing it on the ground in a remote outdoor area and igniting with a long torch. Empty containers should be washed with a 10% Sodium Hydroxide solution.

**Stability** Thermally unstable. After 30 days the specific Peracetic acid in 20gl (with wetting agent), and Peracetic acid Spirit show a loss of Peracetic acid of 25,35,22% respectively with storage at 2-5 degrees.

**Decomposition** Decomposes violently @ 110° C peracetic acid diluted with 60% acetic acid when heated to decomposition it emits acrid smoke and irritating fumes.

## Fire

Flash Point, °C 40.5

Autoignition, °C 200

**Fire fighting:** If fire occurs in the vicinity of this compound, water should be used to keep containers cool. Cleanup salvage operations should not be attempted until all of the Peroxyacetic acid solution has cooled completely. Keep unnecessary people away; wear self-contained breathing apparatus and full protective clothing. Fight fires from an explosion-resistant location. In advanced or massive fires, area should be evacuated. For small fires: use Dry Chemical, Carbondioxide, Water Spray, or Foam. For large fires: flood area with water.

**Fire potential:** Flammable liquid. Dangerous fire hazard by chemical reaction with reducing agents or exposure to heat.

**Hazards** Decomposes violently at 230°F, When heated to decomposition, this compound emits acrid smoke and fumes, runoff to sewer may create a fire or explosion hazard. Powerful oxidizer. Isolate from other stored material, particularly accelerators, oxidizers, and organic or flammable materials. Avoid shock and heat.

**Combustion:** Fire may produce irritating, corrosive and / or toxic gases, Products

Health	3
Flammability	2
Reactivity	4
Special	0

## Health

Poison-Class	2
Exposure effects	An increase in blood pressure, respiratory rate and pulse has been noted in animal experiments. No data were available to assess the teratogenic potential of this agent. No data were available to assess the potential effects of exposure to this agent during pregnancy or Lactation.
Ingestion	Ingestion of Peracetic acid may cause gastrointestinal tract Irritation and possible oral and esophageal burns.
Inhalation	Mice exposed by inhalation developed signs of respiratory tract irritation.
Skin	Peracetic acid is highly irritating and possibly corrosive to the skin.
Eyes	Peracetic acid can cause severe eye irritation. A 10 percent solution of Peracetic acid applied to rabbit eyes caused corneal ulceration, perforation, and symblepharon formation.

Irritation of nasal and throat mucosa is common with exposure to vapors.

### First aid:

Ingestion	Seek medical assistance.
Inhalation	Move victim to fresh air. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult.
Skin	Remove contaminated clothing and wash exposed area thoroughly with soap and water. A physician should examine the area if irritation or pain persists.
Eyes	Irrigate exposed eyes with copious amounts of tepid water for at least 15 minutes. If Irritation, pain, swelling, lacrimation, or photophobia persist the patient should be seen in a health care facility.

**Transport.**

UN number 2131

Response guide 147

Hazard class 5.2

USCG CHRIS PAA

11.5

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