


PAA Disinfectant Cleaners- Patient and Employee Safety Considerations

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The mission of the **Michigan Health Care Safety Association (MHCSA)** is to promote and maintain safety as a primary function in the delivery of quality health care services. As a statewide organization of professionals, MHCSA will provide resources, leadership and educational opportunities to its membership and the health care industry.

2017 MHCSA Quarterly Meetings

- Thursday, March 16, 2017
- Friday, June 16, 2017 – at Trinity Health, Livonia
- Thursday, September 14, 2017
- Friday, November 10, 2017

\$25 Annual Membership
To apply, see website at www.mhcsa.org.

PAA Disinfectant Cleaners- Patient and Employee Safety Considerations

MHCSA Membership Meeting- Educational Session
September 14, 2017

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PAA Disinfectants in Healthcare- “The New Clean”

- Face of the “New Clean” [Tradenames: Oxycide, Peridox, Steriplex SD+: also contains ethanol-30%]
- All of these products have two active ingredients:
 - ❖ **PERACETIC ACID (PAA)** breaks down outer membrane of the spore, bacteria or virus
 - ❖ **HYDROGEN PEROXIDE** destroys the inner component (DNA, proteins)
- Note: They also contain acetic acid to help stabilize the product.
- Historically, PAA has been used as a sanitizer in the food industry and a disinfectant during water treatment.
- Chemical Properties: Strong oxidizer and corrosive.
- Benefits- good disinfectant and sanitizer; sporicidal, no-rinsing required and environmentally friendly.



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Healthcare-Associated Infections (HAIs)

Healthcare-Associated Infections (HAIs) are the most common complication in hospitalized patients in the U.S.

- **1 in every 25** hospital patients has an HAI.
- 75,000 die every year in the US from HAIs.
- *Clostridium difficile* is linked to **14,000** deaths per year in the US.
- The average *C. diff.* case costs an average of \$7,285 in extra hospital costs, not including readmissions.
- Compared to patients without *C. Diff.* those infected had an estimated:
 - ❖ 77% higher chance of readmission within 30 days
 - ❖ 55% longer hospital stay by nearly 5 days
 - ❖ 13% higher risk of mortality



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Microorganisms presence on Environmental Surfaces

Microorganism	Lifespan/Presence on surfaces
MRSA	9 months
Staphylococci	7 months
C. Diff	> 5 months
VRE	4 months
Norovirus	3 weeks
SARS, HIV, etc.	Days to week
H1N1	Few days



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Proper Hand Hygiene and disinfection of surfaces can help prevent the spread of C diff.





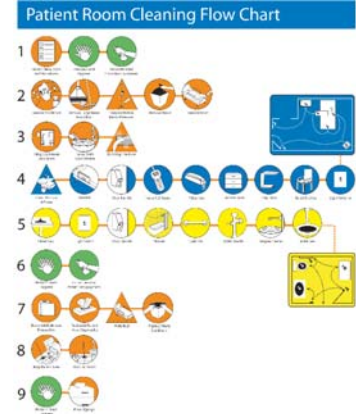

Benefits of PAA Disinfectants

- **Kills *C. difficile*** without harmful effects of bleach
- **Contact time is 5 min.**
- **Increases patient safety** & improves patient outcomes
- **Simplifies** the cleaning process
 - ❖ Less chemicals= less incompatibilities and less cost
- **Effective at a wide temperature range**
- **Decreases damage** to surfaces &



Simplified Room Cleaning

- Multilingual
- Clear instructions
- Decreases errors



Chemical Safety Data Sheet-Oxycide



SAFETY DATA SHEET		ECOLAB	
OXICYDE DAILY DISINFECTANT CLEANER			
Section 1. Chemical product and company identification			
Product name	OXICYDE DAILY DISINFECTANT CLEANER		
Manufacturer name and address	Ecolab, Inc., 10000 E. Harvard Ave., Denver, CO 80231		
Product dilution information	Use in 3 steps or 22 mL/L in water		
Supplier's information	Ecolab, Inc., 10000 E. Harvard Ave., Denver, CO 80231		
Code	Ecolab, Inc.		
UN number	2814		
DOT hazard class	6.1		
DOT hazard label	Corrosive		
DOT hazard division	6.1		
Signal word	Corrosive		
Precedence	Corrosive		
Section 2. Hazards identification			
GHS Classification	Product as sold: CORROSIVE - Skin [Category 2] CORROSIVE - Eye [Category 2] CORROSIVE - Aquatic Toxicity [Category 3] CORROSIVE - Aquatic Toxicity [Category 3] CORROSIVE - Aquatic Toxicity [Category 3]	Product as used Solution: ACUTE TOXICITY - Oral [Category 4]	
Signal words	Corrosive	Warning	
Hazard statements	H314 Causes severe skin burns and eye damage. H335 May irritate the respiratory system.	P273 Avoid release to the environment.	
Precautionary statements	P280 Wear protective gloves/protective clothing/eye protection/face protection. P303+P361+P353 IF GASED OR FUMES, VAPORS OR MIST ARE RELEASED, evacuate the area. P305+P351+P338 IF IN EYES, Rinse cautiously with water for several minutes. Remove contact lenses, if available and convenient. Do not breathe the vapors. P308+P313 IF SWALLOWED, Call a poison center or doctor immediately for treatment advice. P312 Call a poison center or doctor if you feel unwell. P501 Dispose of contents and container in accordance with local, state, and federal regulations.	Prevent further release.	

- Information on Oxycide **USE SOLUTION** is in the gray shaded area, usually on the right side of the document.
- **Eyes and Skin Contact:** No known effect after eye or skin contact. Rinse with water for a few minutes. Equivalent to pH of grapefruit juice
- **Inhale (Breathe in):** No specific measures required. Treat symptomatically. Remove to fresh air is best practice.
- **If Swallowed:** Rinse mouth out with water. Get medical attention if you feel unwell.
- **Is an irritant** (like many cleaning products)
 - ❖ May temporarily affect the eyes, nose, respiratory tract and cause headache.

Review of Chemical and Physical Properties

- Oxycide [Concentrate]
 - ❖ Oxidizing Liquid [Category 2]
 - ❖ Organic peroxide [Type F]
 - ❖ Corrosive- Skin [Category 1A] and Eye [pH 1, Category 1]
 - ❖ Incompatibilities: Bleach or other chlorinated products [produces chlorine gas]
 - ❖ Water soluble
 - ❖ Vinegar-like Odor [good warning properties]
- Oxycide [Use Dilution]
 - ❖ The Oxycide SDS reports that the dilution renders the product relatively non-toxic to humans unless swallowed/ingested.
 - ❖ pH after dilution- 3.06



Occupational Safety and Health Concerns

- PAA is reported to be a moderate to strong upper respiratory irritant and a potential asthmagen.
- Health complaints reported have primarily been upper respiratory irritation responses such as a runny nose, burning and watery eyes, sore throat and congestion; respiratory symptoms [asthma exacerbation]; head aches and chest pain.
- It has been suggested that PAA or the mixture of both hydrogen peroxide and PAA may cause asthma-like effects that current OELs do not consider.
- The Centers for Disease Control and Prevention (CDC) and the National Institute for Occupational Safety and Health (NIOSH) issued a request for information earlier in the year with the intention to evaluate the scientific and technical data on occupational exposures to PAA.



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Occupational Safety and Health

- The **National Institute for Occupational Safety and Health (NIOSH)**, a part of the Centers for Disease Control and Prevention (**CDC**), is the United States federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness.
- The term **immediately dangerous to life or health (IDLH)** is **defined** by NIOSH as exposure to airborne contaminants that are "likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment."



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Occupational Safety and Health

- The **American Conference of Governmental Industrial Hygienists (ACGIH®)** is a private not-for-profit, nongovernmental corporation whose members are industrial hygienists or other occupational health and safety professionals dedicated to promoting health and safety within the workplace.
- The **Threshold Limit Values (TLVs®)** and Biological Exposure Indices (BEIs®) are developed as guidelines to assist in the control of health hazards. These recommendations or guidelines are intended for use in the practice of industrial hygiene, to be interpreted and applied only by a person trained in this discipline.



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Review of Occupational Exposure Levels

- Peroxyacetic acid (PAA) [79-21-0]
 - ❖ ACGIH TLV-STEL: 0.4 ppm [with IFV end note]
 - ❖ NIOSH IDLH [Draft]: 0.64 ppm
 - ❖ No OSHA PEL [Legal Limit]
- Hydrogen peroxide [7722-84-1]
 - ❖ OSHA PEL-TWA: 1 ppm
 - ❖ ACGIH TLV-TWA: 1 ppm
 - ❖ NIOSH REL-TWA: 1 ppm
- Acetic acid [64-19-7]
 - ❖ OSHA PEL-TWA: 10 ppm
 - ❖ ACGIH TLV-TWA: 10 ppm [TLV-STEL: 15 ppm]
 - ❖ NIOSH REL-TWA: 10 ppm [REL-STEL: 15 ppm]
 - ❖ NIOSH IDLH: 50 ppm



Things to consider:

What should be monitored? When do you monitor? What OELs do you use & do you include additive effects? What is the goal?



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Testing For PAA, Hydrogen Peroxide & Acetic Acid

- Traditional IH Air Sampling Methods for these chemical agents:

- For **HP** air is bubbled through titanium oxysulfate in a midget impinger, or samples are collected by drawing air through two 25-mm quartz filters, coated with titanium oxysulfate **for 8 hours**.
- For **Acetic Acid** air is pulled through a solid sorbent charcoal tube for **minimum of 15 minutes**.
- For **PAA** air is collected by drawing air through two 25-mm quartz filters, coated with titanium oxysulfate. Followed by a Silica Gel tube treated with methyl p-tolylsulfoxide (MTSO) for **15 minutes**.



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Testing For PAA, Hydrogen Peroxide & Acetic Acid

- Newer Direct Reading Air Sampling Methods for these chemical agents:

- For HP air passively migrates through an electrochemical cell.
- For Acetic Acid air is pulled through a detector tube.
- For PAA air passively migrates through an electrochemical cell.



FTIR can do all three at once with real time!



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Testing For PAA, Hydrogen Peroxide & Acetic Acid

- When assess employee exposures one must consider the toxicological effect of exposure.
- All three chemical will, at elevated airborne concentrations, will irritate the eyes, mucus membranes, skin and lungs. Based on these factors, these chemicals have additive exposure effects on the work.
- ACGIH states when two or more hazardous substances have a similar toxicological effect on the same target organ or system, their combined effect, rather than that of either individually, should be given primary consideration.

$$\frac{C1}{T1} + \frac{C2}{T2} + \frac{C3}{T3} \dots + \frac{Cn}{Tn} =$$



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Testing Exposure Results For PAA, HP & A A

- Results from Oxycide for General Patient Room Cleaning.
 - PAA concentrations **exceeded** ACGIH STEL twice in less than 60 minutes, but elevated airborne concentrations were less than 15 minute durations.
 - HP concentrations **exceeded** OSHA PEL concentration for less than 4 minutes.
- Results from Oxycide for C-Diff Patient Room Cleaning.
 - PAA concentrations **exceeded** ACGIH STEL five times in less than 60 minutes, but elevated airborne concentrations were less than 15 minute durations. PAA concentrations **exceeded** NIOSH IDLH.
 - HP concentrations **exceeded** OSHA PEL concentration nine times in less than one hour, but remained in compliance.
- Exceeded NIOSH IDLH (0.78 ppm) and the ACGIH Additive Effects Guidelines**



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Testing Exposure Results For PAA, HP & A A

- Results from Peridox RTU for Pharmacy Anti Room and Clean Room Cleaning.
 - PAA concentrations **exceeded** ACGIH STEL.
 - HP concentrations **exceeded** OSHA PEL concentration 41 times, reached levels more than 2.5 times higher than the PEL, but remained in compliance with the TWVA.
 - **Exceeded NIOSH IDLH (0.91 ppm) and the ACGIH Additive Effects Guidelines**



What is the occupational cost of the “New Clean”?

- Are the benefits of these products worth the occupational effects?
- What is the proper balance between Patient Safety and Employee Safety?
- What level of staff training and communication should be provided?
- What personal protective equipment should be required?
- Should respiratory protection be considered?
- Should emergency eyewash units be installed?
- Should medical surveillance be considered?
- Should initial and/or routine air sampling be considered?



Questions and Comments

