



## **Inactivation of quaternary disinfectants by cleaning cloths containing laundry detergent residues is cause for concern.**

Process Cleaning Solutions has initiated the following study to provide evidence of the efficacy of two commonly used health care disinfectants after exposure to cotton and micro fiber cleaning cloths that have been laundered. We could not find any currently published studies of disinfectant efficacy after exposure to cleaning cloths containing laundering detergent residues.

There are reports in reviewed literature that detergent residues must be effectively rinsed before application of disinfectants to prevent chemical inactivation of disinfectant. It is common knowledge that not all laundering detergents are removed in the rinse cycle. What effect the residual detergent residues left in cleaning cloths after laundering have on the efficacy of disinfectants is unknown?

To provide evidence on the efficacy of commonly used disinfectants when used with laundered cleaning cloths the following study was initiated.

New cotton cloths 16 inches x 16 inches size were purchased from local retailer – 90 cloths.

New PCS micro fiber cloths containing 80% polyester and 20% polyamide 14 inch x 14 inch size and 30 gram weight - 90 cloths.

The cotton and micro fiber cloths were washed separately with hot water wash cycle, normal rinse cycle, dried on cotton cycle and allowed to cool. A total of five washing and drying cycles for all cloths. Each wash cycle had 45 cloths and 2.25 ounces of Liquid Tide added to a top loading washing machine.

All cloths were washed with Tide Liquid laundry detergent with biodegradable anionic and non anionic surfactants and enzymes listed as ingredients on the label.

The cloths were then folded and placed into Nacecare 6 liter buckets with lids - 10 cotton cloths and 15 micro fiber cloths per bucket.

The buckets and cotton and micro fiber cloths and sealed unopened containers of PCS 2% Stabilized Bleach and a Quaternary disinfectant with claims for 30 different microbes at a 1 to 250 dilution as a one step cleaner disinfectant were delivered to Aquatox for completion of the study.

[www.processcleaningsolutions.com](http://www.processcleaningsolutions.com)



Aquatox portion of the study included.

Aquatox is accredited by CALA and a recognized GLP ecotoxicity testing laboratory.

PCS Stabilized Bleach was diluted to 1000 parts per million. Next, 1.8 liters of diluted solution was added to each bucket containing 10 cotton cloths and 15 micro fiber cloths. To saturate the cloths, the lids on the containers were closed and allowed to sit for 4 hours at which point the cloths were wrung out with Nacecare wringer/bucket. The bleach solution from cotton and micro fiber cloths were tested separately.

AOAC Official Method 955.15. Testing Disinfectants against *Staphylococcus aureus*. Use – dilution method. First action 1955. Final action 1959. Revised 2006. Contact times of 5 and 10 minutes were used for *Staphylococcus aureus*.

AOAC Official Method 955.15. testing Disinfectants against *Pseudomonas aeruginosa*. Use – dilution method. First action 1955. Final action 1959. Revised 2006. Contact time of 10 minutes.

The Quaternary disinfectant was diluted to recommended disinfection dilution and 1.8 liters of diluted disinfectant solution was poured over cotton and micro fiber cloths. Lids on buckets were closed and allowed to sit for 4 hours, at which point the cloths were wrung out using a separate Nacecare wringer/bucket and disinfectant solution was used as test solution from both cotton and micro fiber cloths .

AOAC Official Method 955.15. Testing Disinfectants against *Staphylococcus aureus*. Use – dilution method. First action 1955. Final action 1959. Revised 2006. Contact time of 10 minutes were used for *Staphylococcus aureus*.

AOAC Official Method 955.15. testing Disinfectants against *Pseudomonas aeruginosa*. Use – dilution method. First action 1955. Final action 1959. Revised 2006. Contact time of 10 minutes

All products were diluted with hard water as per Quaternary disinfectant label claim and no organic challenge was used.



## Results and discussion.

PCS 2% Stabilized Sodium Hypochlorite diluted to 1000 parts per million. 1.8 liters of diluted solution was used to saturate 10 cotton and 15 micro fiber cloths laundered with Tide Liquid Laundry, five cycles. Saturated cloths were allowed to sit in closed 6 liter bucket for 4 hours before extracting test solution.

AOAC Staphylococcus aureus 10 replicates, 5 minute contact time

Cotton	No Growth	Pass
Micro fiber	No Growth	Pass

AOAC Staphylococcus aureus 10 replicates, 10 minute contact time

Cotton	No Growth	Pass
Micro fiber	No Growth	Pass

AOAC Pseudomonas aeruginosa 10 replicates, 10 minute contact time

Cotton	No Growth	Pass
Micro fiber	No Growth	Pass

Quaternary disinfectant diluted as per label instruction for disinfecting environmental surfaces. 1 to 250 parts water. 1.8 liters of diluted solution was used to saturate 10 cotton and 15 micro fiber cloths laundered with Tide Liquid Laundry, five cycles. Saturated cloths were allowed to sit in closed 6 liter bucket for 4 hours before extracting test solution.

AOAC Staphylococcus aureus 10 replicates, 10 minute contact time

Cotton	Growth on all test cylinders	Failed
Micro fiber	Growth on all test cylinders	Failed

AOAC Pseudomonas aeruginosa 10 replicates, 10 minute contact time

Cotton	Growth on all test cylinders	Failed
Micro fiber	Growth on all test cylinders	Failed



Discussion.

Laundered cotton and micro fiber cloths containing residual detergents can inactivate quaternary disinfectants.

Tide Liquid laundry detergent list anionic and non ionic surfactants and enzymes as ingredients. Previous studies have demonstrated anionic surfactants incompatibility with cationic surfactants (Quaternary Disinfectants)

This study provides a link between the numerous studies in recent years that demonstrate low level exposure to quaternary disinfectants promotes bacterial resistance and cross resistance to antibiotics but not at disinfection concentrations.

Public Health Officials and Infection Control Practitioners need to review how disinfectants are applied to surfaces. This study clearly indicates applying quaternary disinfectants following manufactures label instructions for disinfection with laundered cleaning cloths may not be effectively decontaminating surfaces and may lead to the further expansion of resistant pathogens.

Quaternary disinfectants may not be effective even if indicator test strips indicate disinfectant is present as the chemical formulation of disinfectant is changed with the introduction of additional chemicals from cleaning cloths.

This study highlights the importance of converting to evidence based cleaning practices.

Inactivation of quaternary disinfectants by cleaning cloths containing laundry detergent residues is cause for concern.

This study confirms the efficacy of PCS Stabilized Bleach diluted to 1000 ppm when stored in closed container with laundered micro fiber or cotton cloths for four hours and no organic soils are present.



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 Tel: (519) 763-4412 Fax: (519) 763-4416

Work Order : 218308  
 Sample Number : 29360

**SAMPLE IDENTIFICATION**

Company :	Process Cleaning Solutions Ltd.	Sample Type :	Chemical
Location :	Peterborough ON	Submitted By :	M. Rochon
Substance :	2% Stabilized Bleach	Date Received :	2010-12-16
Chemical Lot Number:	080083	Date Tested :	2010-12-22

Reference(s) : AOAC Official Method 955.15. Testing Disinfectants against *Staphylococcus aureus*. Use Dilution Method. Journal of AOAC Internations. Vol 89, No 5, 2006.

**TEST RESULTS**

Date Recorded : 2010-12-24  
 Analyst(s) : SSH

**Primary Subculture / Secondary Subculture**

<b>1</b>		<b>2</b>		<b>3</b>		<b>4</b>		<b>5</b>	
-	-	-	-	-	-	-	-	-	-
<b>6</b>		<b>7</b>		<b>8</b>		<b>9</b>		<b>10</b>	
-	-	-	-	-	-	-	-	-	-

Results Summary	
Number of carrier sets with growth :	0
Number of carrier sets without growth :	10

Control Results		
Tube :	1	2
Viability Controls :	+	+
Negative Controls :	-	-

"-" = no growth observed  
 "+" = growth observed

Data Reviewed By : SSH  
 Date : 2011-01-06

**TEST CONDITIONS**

Test Organism :	<i>Staphylococcus aureus</i>	Use Dilution :	20:1
Carrier Titre :	$3.0 \times 10^{-6}$	Dilution Water :	Hard (400 ppm)
Carrier Drop Time Interval :	1 min $\pm$ 5 sec	Exposure Temp. :	20 $\pm$ 1 °C
Primary Medium :	Lethen Broth + 0.1% Sodium thiosulfate	Exposure Period :	5 min
Secondary Medium :	Fluid Thioglycollate Medium	Neutralization :	Confirmed

**COMMENTS**

Tested a use dilution of 20:1 made up at 1.8 L in 400 ppm hard water and held for 4 hours on laundered cotton cloths at 20°C.

- This product passed the screening test.
- Control results are acceptable.

Date : 2011-01-06  
 yyyy-mm-dd

Approved By: [Signature]  
 Project Manager



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Work Order : 218308  
 Sample Number : 29360

**SAMPLE IDENTIFICATION**

Company :	Process Cleaning Solutions Ltd.	Sample Type :	Chemical
Location :	Peterborough ON	Submitted By :	M. Rochon
Substance :	2% Stabilized Bleach	Date Received :	2010-12-16
Chemical Lot Number:	080083	Date Tested :	2010-12-22

Reference(s) : AOAC Official Method 955.15. Testing Disinfectants against *Staphylococcus aureus*. Use Dilution Method. Journal of AOAC Internations. Vol 89, No 5, 2006.

**TEST RESULTS**

Date Recorded :  
 Analyst(s) :

**Primary Subculture / Secondary Subculture**

<b>1</b>		<b>2</b>		<b>3</b>		<b>4</b>		<b>5</b>	
-	-	-	-	-	-	-	-	-	-
<b>6</b>		<b>7</b>		<b>8</b>		<b>9</b>		<b>10</b>	
-	-	-	-	-	-	-	-	-	-

<b>Results Summary</b>	
Number of carrier sets with growth :	0
Number of carrier sets without growth :	10

<b>Control Results</b>		
<b>Tube :</b>	<b>1</b>	<b>2</b>
Viability Controls :	+	+
Negative Controls :	-	-

"-" = no growth observed  
 "+" = growth observed

Data Reviewed By : BRH  
 Date : 2011-01-06

**TEST CONDITIONS**

Test Organism :	<i>Staphylococcus aureus</i>	Use Dilution :	20:1
Carrier Titre :	3.0 x 10 <sup>-6</sup>	Dilution Water :	Hard (400 ppm)
Carrier Drop Time Interval :	1 min ± 5 sec	Exposure Temp. :	20 ± 1 °C
Primary Medium :	Lethen Broth + 0.1% Sodium thiosulfate	Exposure Period :	10 min
Secondary Medium :	Fluid Thioglycollate Medium	Neutralization :	Confirmed

**COMMENTS**

Tested a use dilution of 20:1 made up at 1.8 L in 400 ppm hard water and held for 4 hours on laundered cotton cloths at 20°C.

- This product passed the screening test.
- Control results are acceptable.

Date : 2011-01-06  
 yyyy-mm-dd

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 Project Manager



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Work Order : 218308  
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**SAMPLE IDENTIFICATION**

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Location :	Peterborough ON	Submitted By :	M. Rochon
Substance :	2% Stabilized Bleach	Date Received :	2010-12-16
Chemical Lot Number:	080083	Date Tested :	2010-12-23

Reference(s) : AOAC Official Method 955.15. Testing Disinfectants against *Staphylococcus aureus*. Use Dilution Method. Journal of AOAC Internations. Vol 89, No 5, 2006.

**TEST RESULTS**

Date Recorded : 2010-12-25  
 Analyst(s) : SSH

**Primary Subculture / Secondary Subculture**

<b>1</b>		<b>2</b>		<b>3</b>		<b>4</b>		<b>5</b>	
-	-	-	-	-	-	-	-	-	-
<b>6</b>		<b>7</b>		<b>8</b>		<b>9</b>		<b>10</b>	
-	-	-	-	-	-	-	-	-	-

Results Summary	
Number of carrier sets with growth :	0
Number of carrier sets without growth :	10

Control Results		
Tube :	1	2
Viability Controls :	+	+
Negative Controls :	-	-

"-" = no growth observed  
 "+" = growth observed

Data Reviewed By : SSH  
 Date : 2011-01-06

**TEST CONDITIONS**

Test Organism :	<i>Staphylococcus aureus</i>	Use Dilution :	20:1
Carrier Titre :	4.2 x 10 <sup>-5</sup>	Dilution Water :	Hard (400 ppm)
Carrier Drop Time Interval :	1 min ± 5 sec	Exposure Temp. :	20 ± 1 °C
Primary Medium :	Lethen Broth + 0.1% Sodium thiosulfate	Exposure Period :	5 min
Secondary Medium :	Fluid Thiglycollate Medium	Neutralization :	Confirmed

**COMMENTS**

Tested a use dilution of 20:1 made up at 1.8 L in 400 ppm hard water and held for 4 hours on laundered microfibre cloths at 20°C.

- This product passed the screening test.
- Control results are acceptable.

Date : 2011-01-06  
 yyyy-mm-dd

Approved By: [Signature]  
 Project Manager



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Work Order : 218308  
 Sample Number : 29360

**SAMPLE IDENTIFICATION**

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Location :	Peterborough ON	Submitted By :	M. Rochon
Substance :	2% Stabilized Bleach	Date Received :	2010-12-16
Chemical Lot Number:	080083	Date Tested :	2010-12-23

Reference(s) : AOAC Official Method 955.15. Testing Disinfectants against *Staphylococcus aureus*. Use Dilution Method. Journal of AOAC Internations. Vol 89, No 5, 2006.

**TEST RESULTS**

Date Recorded : 2010-12-25  
 Analyst(s) : SSH

**Primary Subculture / Secondary Subculture**

<b>1</b>		<b>2</b>		<b>3</b>		<b>4</b>		<b>5</b>	
-	-	-	-	-	-	-	-	-	-

<b>6</b>		<b>7</b>		<b>8</b>		<b>9</b>		<b>10</b>	
-	-	-	-	-	-	-	-	-	-

Results Summary	
Number of carrier sets with growth :	0
Number of carrier sets without growth :	10

Control Results		
<b>Tube :</b>	<b>1</b>	<b>2</b>
Viability Controls :	+	+
Negative Controls :	-	-

"-" = no growth observed  
 "+" = growth observed

Data Reviewed By : SSH  
 Date : 2011.01.06.

**TEST CONDITIONS**

Test Organism :	<i>Staphylococcus aureus</i>	Use Dilution :	20:1
Carrier Titre :	4.2 x 10 <sup>-5</sup>	Dilution Water :	Hard (400 ppm)
Carrier Drop Time Interval :	1 min ± 5 sec	Exposure Temp. :	20 ± 1 °C
Primary Medium :	Lethen Broth + 0.1% Sodium thiosulfate	Exposure Period :	10 min
Secondary Medium :	Fluid Thioglycollate Medium	Neutralization :	Confirmed

**COMMENTS**

Tested a use dilution of 20:1 made up at 1.8 L in 400 ppm hard water and held for 4 hours on laundered microfibre cloths at 20°C.

- This product passed the screening test.
- Control results are acceptable.

Date : 2011.01.06.  
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Work Order : 218308  
 Sample Number : 29360

**SAMPLE IDENTIFICATION**

Company :	Process Cleaning Solutions Ltd.	Sample Type :	Chemical
Location :	Peterborough ON	Submitted By :	M. Rochon
Substance :	2% Stabilized Bleach	Date Received :	2010-12-16
Chemical Lot Number:	080083	Date Tested :	2010-12-29

Reference(s) : AOAC Official Method 964.02. Testing Disinfectants against *Pseudomonas aeruginosa*. Use Dilution Method. Journal of AOAC Internations. Vol 89, No 5, 2006.

**TEST RESULTS**

Date Recorded : 2010-12-31  
 Analyst(s) : SSH

**Primary Subculture / Secondary Subculture**

1		2		3		4		5	
-	-	-	-	-	-	-	-	-	-

6		7		8		9		10	
-	-	-	-	-	-	-	-	-	-

Results Summary	
Number of carrier sets with growth :	0
Number of carrier sets without growth :	10

Control Results		
Tube :	1	2
Viability Controls :	+	+
Negative Controls :	-	-

"-" = no growth observed  
 "+" = growth observed

Data Reviewed By : SSH  
 Date : 2011-01-06

**TEST CONDITIONS**

Test Organism :	<i>Pseudomonas aeruginosa</i>	Use Dilution :	20:1
Carrier Titre :	$7.0 \times 10^{-5}$	Dilution Water :	Hard (400 ppm)
Carrier Drop Time Interval :	1 min $\pm$ 5 sec	Exposure Temp. :	20 $\pm$ 1 °C
Primary Medium :	Lethen Broth + 0.1% Sodium thiosulfate	Exposure Period :	10 min
Secondary Medium :	Fluid Thioglycollate Medium	Neutralization :	Confirmed

**COMMENTS**

Tested a use dilution of 20:1 made up at 1.8 L in 400 ppm hard water and held for 4 hours on laundered cotton cloths at 20°C.

- This product passed the screening test.
- Control results are acceptable.

Date : 2011-01-06  
 yyyy-mm-dd

Approved By: J. Sch. Hess  
 Project Manager



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Work Order : 218308  
 Sample Number : 29360

**SAMPLE IDENTIFICATION**

Company :	Process Cleaning Solutions Ltd.	Sample Type :	Chemical
Location :	Peterborough ON	Submitted By :	M. Rochon
Substance :	2% Stabilized Bleach	Date Received :	2010-12-16
Chemical Lot Number:	080083	Date Tested :	2010-12-29

Reference(s) : AOAC Official Method 964.02. Testing Disinfectants against *Pseudomonas aeruginosa*. Use Dilution Method. Journal of AOAC Internations. Vol 89, No 5, 2006.

**TEST RESULTS**

Date Recorded : 2010-12-31  
 Analyst(s) : SSH

**Primary Subculture / Secondary Subculture**

1		2		3		4		5	
-	-	-	-	-	-	-	-	-	-
6		7		8		9		10	
-	-	-	-	-	-	-	-	-	-

Results Summary	
Number of carrier sets with growth :	0
Number of carrier sets without growth :	10

Control Results		
Tube :	1	2
Viability Controls :	+	+
Negative Controls :	-	-

"-" = no growth observed  
 "+" = growth observed

Data Reviewed By : SSH  
 Date : 2011-01-06

**TEST CONDITIONS**

Test Organism :	<i>Pseudomonas aeruginosa</i>	Use Dilution :	20:1
Carrier Titre :	7.0 x 10 <sup>-5</sup>	Dilution Water :	Hard (400 ppm)
Carrier Drop Time Interval :	1 min ± 5 sec	Exposure Temp. :	20 ± 1 °C
Primary Medium :	Lethen Broth + 0.1% Sodium thiosulfate	Exposure Period :	10 min
Secondary Medium :	Fluid Thioglycollate Medium	Neutralization :	Confirmed

**COMMENTS**

Tested a use dilution of 20:1 made up at 1.8 L in 400 ppm hard water and held for 4 hours on laundered microfibre cloths at 20°C.

- This product passed the screening test.
- Control results are acceptable.

Date : 2011-01-06  
 yyyy-mm-dd

Approved By: [Signature]  
 Project Manager



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Work Order : 218308  
 Sample Number : 29362

**SAMPLE IDENTIFICATION**

Company : Process Cleaning Solutions Ltd. Sample Type : Chemical  
 Location : Peterborough ON Submitted By : M. Rochon  
 Substance : Neutral Disinfectant Concentrate (15.36% Didecyl Dimethyl Ammonium Chloride) Date Received : 2010-12-16  
 Date Tested : 2010-12-21  
 Chemical Lot Number: 100099  
 Reference(s) : AOAC Official Method 955.15. Testing Disinfectants against *Staphylococcus aureus*. Use Dilution Method. Journal of AOAC Internations. Vol 89, No 5, 2006.

**TEST RESULTS**

Date Recorded : 2010-12-23  
 Analyst(s) : SSH

**Primary Subculture / Secondary Subculture**

1		2		3		4		5	
+	+	+	+	+	+	+	+	+	+
6		7		8		9		10	
+	+	+	+	+	+	+	+	+	+

Results Summary	
Number of carrier sets with growth :	10
Number of carrier sets without growth :	0

Control Results		
Tube :	1	2
Viability Controls :	+	+
Negative Controls :	-	-

"-" = no growth observed  
 "+" = growth observed

Data Reviewed By : SSH  
 Date : 2010-12-23

**TEST CONDITIONS**

Test Organism : *Staphylococcus aureus* Use Dilution : 5 mL/L  
 Carrier Titre :  $6.5 \times 10^6$  Dilution Water : Hard (400 ppm)  
 Carrier Drop Time Interval : 1 min  $\pm$  5 sec Exposure Temp. : 20  $\pm$  1 °C  
 Primary Medium : Lethen Broth + 5 g/L Sodium thiosulfate Exposure Period : 10 min  
 Secondary Medium : Lethen Broth + 5 g/L Sodium thiosulfate Neutralization : Confirmed

**COMMENTS**

Tested a use dilution of 5 mL/L made up at 1.8 L in 400 ppm hard water and held for 4 hours on laundered microfibre cloths at 20°C.

- This product did not pass the screening test.
- Control results are acceptable.

Date : 2010-12-23  
 yyyy-mm-dd

Approved By: SSH  
 Project Manager



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Work Order : 218308  
 Sample Number : 29362

**SAMPLE IDENTIFICATION**

Company : Process Cleaning Solutions Ltd. Sample Type : Chemical  
 Location : Peterborough ON Submitted By : M. Rochon  
 Substance : Neutral Disinfectant Concentrate (15.36% Didecyl Dimethyl Ammonium Chloride) Date Received : 2010-12-16  
 Date Tested : 2010-12-23  
 Chemical Lot Number: 100099  
 Reference(s) : AOAC Official Method 955.15. Testing Disinfectants against *Staphylococcus aureus*. Use Dilution Method. Journal of AOAC Internations. Vol 89, No 5, 2006.

**TEST RESULTS**

Date Recorded : 2011-12-25  
 Analyst(s) : SSH

**Primary Subculture / Secondary Subculture**

1		2		3		4		5	
+	+	+	+	+	+	+	+	+	+

  

6		7		8		9		10	
+	+	+	+	+	+	+	+	+	+

Results Summary	
Number of carrier sets with growth :	10
Number of carrier sets without growth :	0

Control Results		
Tube :	1	2
Viability Controls :	+	+
Negative Controls :	-	-

"-" = no growth observed  
 "+" = growth observed

Data Reviewed By : SSH  
 Date : 2011-01-06

**TEST CONDITIONS**

Test Organism : *Staphylococcus aureus* Use Dilution : 5 mL/L  
 Carrier Titre :  $4.2 \times 10^{-5}$  Dilution Water : Hard (400 ppm)  
 Carrier Drop Time Interval : 1 min  $\pm$  5 sec Exposure Temp. : 20  $\pm$  1 °C  
 Primary Medium : Lethen Broth Exposure Period : 10 min  
 Secondary Medium : Lethen Broth Neutralization : Confirmed

**COMMENTS**

Tested a use dilution of 5 mL/L made up at 1.8 L in 400 ppm hard water and held for 4 hours on laundered cotton cloths at 20°C.

- This product did not pass the screening test.
- Control results are acceptable.

Date : 2011-01-06  
 yyyy-mm-dd

Approved By: [Signature]  
 Project Manager



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Work Order : 218308  
 Sample Number : 29362

**SAMPLE IDENTIFICATION**

Company : Process Cleaning Solutions Ltd. Sample Type : Chemical  
 Location : Peterborough ON Submitted By : M. Rochon  
 Substance : Neutral Disinfectant Concentrate (15.36% Didecyl Dimethyl Ammonium Chloride) Date Received : 2010-12-16  
 Date Tested : 2010-12-30  
 Chemical Lot Number: 100099  
 Reference(s) : AOAC Official Method 964.02. Testing Disinfectants against *Pseudomonas aeruginosa*. Use Dilution Method. Journal of AOAC Internations. Vol 89, No 5, 2006.

**TEST RESULTS**

Date Recorded : 2010-12-31  
 Analyst(s) : SSH

**Primary Subculture / Secondary Subculture**

<b>1</b>		<b>2</b>		<b>3</b>		<b>4</b>		<b>5</b>	
+	+	+	+	+	+	+	+	+	+

<b>6</b>		<b>7</b>		<b>8</b>		<b>9</b>		<b>10</b>	
+	+	+	+	+	+	+	+	+	+

<b>Results Summary</b>	
Number of carrier sets with growth :	10
Number of carrier sets without growth :	0

<b>Control Results</b>		
<b>Tube :</b>	<b>1</b>	<b>2</b>
Viability Controls :	+	+
Negative Controls :	-	-

"-" = no growth observed  
 "+" = growth observed

Data Reviewed By : SSH  
 Date : 2011-01-06

**TEST CONDITIONS**

Test Organism : *Pseudomonas aeruginosa* Use Dilution : 5 mL/L  
 Carrier Titre :  $7.7 \times 10^{-5}$  Dilution Water : Hard (400 ppm)  
 Carrier Drop Time Interval : 1 min  $\pm$  5 sec Exposure Temp. : 20  $\pm$  1 °C  
 Primary Medium : Lethen Broth Exposure Period : 10 min  
 Secondary Medium : Lethen Broth Neutralization : Confirmed

**COMMENTS**

Tested a use dilution of 5 mL/L made up at 1.8 L in 400 ppm hard water and held for 4 hours on laundered microfibre cloths at 20°C.

- This product did not pass the screening test.
- Control results are acceptable.

Date : 2011-01-06  
 yyyy-mm-dd

Approved By: [Signature]  
 Project Manager



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Work Order : 218308  
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Company : Process Cleaning Solutions Ltd. Sample Type : Chemical  
 Location : Peterborough ON Submitted By : M. Rochon  
 Substance : Neutral Disinfectant Concentrate (15.36% Didecyl Dimethyl Ammonium Chloride) Date Received : 2010-12-16  
 Date Tested : 2010-12-30  
 Chemical Lot Number: 100099  
 Reference(s) : AOAC Official Method 964.02. Testing Disinfectants against *Pseudomonas aeruginosa*. Use Dilution Method. Journal of AOAC Internations. Vol 89, No 5, 2006.

**TEST RESULTS**

Date Recorded : 2010-12-31  
 Analyst(s) : SSH

**Primary Subculture / Secondary Subculture**

1		2		3		4		5	
+	+	+	+	+	+	+	+	+	+
6		7		8		9		10	
+	+	+	+	+	+	+	+	+	+

Results Summary	
Number of carrier sets with growth :	10
Number of carrier sets without growth :	0

Control Results		
<b>Tube :</b>	<b>1</b>	<b>2</b>
Viability Controls :	+	+
Negative Controls :	-	-

"-" = no growth observed  
 "+" = growth observed

Data Reviewed By : SSH  
 Date : 2011-01-06

**TEST CONDITIONS**

Test Organism : *Pseudomonas aeruginosa* Use Dilution : 5 mL/L  
 Carrier Titre :  $7.7 \times 10^{-5}$  Dilution Water : Hard (400 ppm)  
 Carrier Drop Time Interval : 1 min  $\pm$  5 sec Exposure Temp. : 20  $\pm$  1 °C  
 Primary Medium : Lethen Broth Exposure Period : 10 min  
 Secondary Medium : Lethen Broth Neutralization : Confirmed

**COMMENTS**

Tested a use dilution of 5 mL/L made up at 1.8 L in 400 ppm hard water and held for 4 hours on laundered cotton cloths at 20°C.

- This product did not pass the screening test.
- Control results are acceptable.

Date : 2011-01-06  
 yyyy-mm-dd

Approved By : [Signature]  
 Project Manager