MicrobialControl

Lonza

VANTOCIL™ TG Antimicrobial

The Evaluation of VANTOCIL TG as a Sanitizing Laundry Additive

VANTOCIL™ TG Antimicrobial is a broad spectrum, fast acting bactericide that can be formulated into laundry additive products for institutional, industrial, hospital and domestic use. VANTOCIL™ TG Antimicrobial is designed for use in the treatment of laundry to provide sanitizing activity for fabrics and/or laundry water. VANTOCIL™ TG Antimicrobial is a 20% aqueous solution of poly(hexamethylene biguanide) hydrochloride, also known as PHMB. In the US, this is technically equivalent to VANTOCIL™ P Antimicrobial.

PHMB provides the following properties of direct relevance in sanitizing laundry additive applications:

- Extensive toxicity studies suggest acceptable use risk to humans
- Fast acting bactericide, effective at low concentrations against Gram positive and Gram negative vegetative bacteria
- Non-specific mode of action with no known evidence of development of organism resistance
- Effective and stable over a pH range of 1-11
- Active against both enveloped and naked viruses
- Retains activity in the presence of organic matter
- Low corrosivity, and compatible with common materials of construction at typical use levels
- At typical use levels has no smell, no taste and is non-staining

VANTOCIL™ TG Antimicrobial was tested according to the EPA guidance documents DIS/TSS-13, April 4, 1980, Efficacy Data and Labelling Requirements, Laundry Additives - Disinfection and Sanitization. VANTOCIL™ TG Antimicrobial showed excellent sanitizing action of both the cotton fabric and the wash water.

Experimental

Method	Petrocci, A.M & Clarke, P. 1969. Proposed Test Method for Antimicrobial Laundry Additives. J. AOAC. 52: 836-42 (equivalent to ASTM E2274-03) - see appendix 1.
Organisms	S.aureus ATCC 6538, Ps.aeruginosa ATCC 15442, K.pneumoniae ATCC 4352
Contact Time	5 minutes
Conditions	200ppm and 400ppm $CaCO_3$ (hard water)
Active Concentration	200ppm (10:1 and 5:1 liquor:fabric ratio)
Pass Criteria	99.9% reduction in bacteria over the control count for both laundry water and fabric must be demonstrated against each test micro-organism
Fabric	Bleached, desized, plain weave cotton print cloth
Temperature	23°C
pH of Test Solution	5.5

Table 1. The Efficacy of VANTOCIL™ TG Antimicrobial on Fabric (10:1 liquor:fabric ratio, 200ppm hard water)

Product (200 ppm Total Active)	% Reduction		
	S.aureus	Ps.aeruginosa	K.pneumoniae
VANTOCIL™ TG Antimicrobial	99.95	100.00	99.91
Product A	99.64	89.16	42.93
Product B	100.00	99.71	99.97
Na hypochlorite	99.99	99.99	99.99

Product A = Blend of dimethyl benzyl ammonium chlorides and alkyl dimethyl ethylbenzyl ammonium chlorides

Product B = Blend of twin chain quaternary ammonium compounds and alkyl dimethyl benzyl ammonium chloride

Table 2. The Efficacy of VANTOCIL™ TG Antimicrobial in Laundry Wash Water (10:1 liquor:fabric ratio, 200ppm hard water)

Product (200 ppm Total Active)	% Reduction		
	S.aureus	Ps.aeruginosa	K.pneumoniae
VANTOCIL™ TG Antimicrobial	99.91	99.99	99.93
Product A	99.95	99.99	99.93
Product B	99.95	98.15	99.99
Na hypochlorite	99.17	99.99	99.91

Table 3. The Efficacy of VANTOCIL™ TG Antimicrobial as a Laundry Additive (5:1 liquor:fabric ratio, 400ppm hard water) vs Ps.aeruginosa

Product (200 ppm Total Active)	% Reduction	
	Laundry Wash Water	Fabric
VANTOCIL™ TG Antimicrobial	99.98	99.93
Product B	95.78	49.31

The data shows that only VANTOCIL™ TG Antimicrobial meets the pass criteria of the test for the sanitizing efficacy of both fabric and laundry water in both an industrial and domestic setting (5:1 and 10:1 liquor to fabric ratio resp.).

Na hypochlorite = 200ppm as total available chlorine

Application

- Designed to be used for regular sanitizing of contaminated linen, garments & fabrics as part of the laundering process
- Can be used in home-type or commercial laundering machines
- Ideal for use in health care laundry applications
- VANTOCIL™ TG Antimicrobial is not compatible with high levels of chlorine. Articles treated with VANTOCIL™ TG Antimicrobial should not be subsequently bleached with chlorine
- VANTOCIL™ TG Antimicrobial is not compatible with common soap and anionic detergents

Appendix 1

Laundry Additives Test Method References

1. Proposed Test Method for Antimicrobial Laundry Additives. A. N. Petrocci and P. Clarke. Journal of the AOAC (Vol. 52, No. 4, 836-842, 1969).

2. ASTM E2274-03 Standard Test Method for Evaluation of Laundry Sanitizers and Disinfectants.

3. DIS/TSS 13 Laundry Additives - Disinfection and Sanitization, US EPA, Office of Pesticide Programs, April 1980.

Scope

This test is designed to evaluate sanitizing and disinfecting laundry detergents and additives for use in top loading automatic clothes washing operations (not front loading, low water volume automatic clothes washing operations).

Summary

Under simulated laundry conditions, sets of inoculated fabric swatches are placed into diluted product solution and agitated. After a specific contact time, the wash water and the test fabric are individually cultured either quantitatively (sanitizer efficacy) or qualitatively (disinfectant efficacy). The procedure is used to evaluate the activity of a test reagent in the reduction or complete kill of the bacterial population in fabric and wash water following a single wash.

Procedure

1. Test fabric (80 x 80 threads/ in., bleached, desized, plain weave cotton print cloth without bluing or optical brighteners) is scoured, washed, rinsed and dried.

2. Fabric strips (15g, 2 in. wide) are then wound around a stainless steel spindle and sterilized.

3. Fabric carriers of approx. 1 x 1.5 in. are cut and sterilized.

4. Challenge micro-organisms are grown on nutrient agar and harvested using glass beads into dilution fluid to yield approx. 10E8 colony forming units (cfu) per ml of Staphylococcus aureus ATCC 6538 and 10E9 cfu/ml of Pseudomonas aeruginosa ATCC 15442 and Klebsiella pneumoniae ATCC 4352.

5. Test sample is diluted using AOAC hard water.

6. Three fabric carriers are inoculated using the challenge micro-organisms and dried.

7. The inoculated fabric carriers are then placed between the folds of a wrapped spindle.

8. The spindle is then placed in an exposure chamber and the test sample added. Liquor to fabric ratios are dictated by use patterns e.g. 10:1 is relevant for home or coin-operated laundering and 5:1 for industrial laundering.

9. The exposure chamber is rotated for the specified contact time (through 360° vertical orbit of 4-8" in diameter at 45-60rpm).

10. The fabric carriers and aliquots of the wash water are then removed to neutralizing broth.

11. Surviving bacteria are then enumerated by serial dilution onto nutrient agar.

12. Validation steps include a numbers control (the inoculated fabric carriers are exposed to AOAC hard water) and a carrier count control (the bacteria are counted from an inoculated carrier).

Results

Percentage reduction is then calculated as follows:

% reduction = (a - b) / a x 100

a = average number of organisms surviving in the fabric carriers or wash water of the numbers control.

b = average number of organisms surviving in the fabric carriers or wash water of the test sample.

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