RESPICIDE* GP DISINFECTING SOLUTION

EFFECTIVENESS OF A NEW DISINFECTING SOLUTION FOR TREATMENT OF NON-METAL MEDICAL EQUIPMENT

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ABSTRACT

The effectiveness of a new non-aldehyde solution, RespiCide GP Disinfecting Solution, is discussed.

RespiCide GP Disinfecting Solution is a disinfecting solution that is packaged as a concentrate and formulated for the single use treatment of non-metal, heat-sensitive, reusable, non-critical medical equipment. The solution is 100% effective against bacteria, fungi, viruses and *Mycobacterium bovis* (BCG) in 5 minutes at 20°C with less than 10 parts per million active ingredient.

INTRODUCTION

Patient-ready rubber and plastic anesthesia and respiratory equipment such as breathing masks, tubing, connecting adapters and canisters are devices that require cleaning and disinfection prior to reuse. These devices are considered non-critical medical devices because they normally only come in contact with intact skin. The process of disinfection for non-critical devices requires equipment to be cleaned using a validated cleaning procedure prior to disinfection. Liquid chemical germicides should be fast acting, work place friendly, not alter the appearance of function of equipment, and easily rinsed with water.

RespiCide GP Disinfecting Solution is an EPA registered single use disinfectant, formulated to disinfect non-metal, heat-sensitive, reusable, non-critical medical equipment. The product was developed by Bio-Cide International, Inc., and is specially formulated to address the unpleasant odor, staining, slow disinfection time, required elevated temperature and reuse issues associated with most aldehyde-based products. RespiCide GP Disinfecting Solution is packaged as two components; a fluid concentrate component consisting of 2% chlorine dioxide precursor and an activator component. Four ounces of RespiCide GP Solution produces one gallon of product. RespiCide GP Disinfecting Solution is effective in 5 minutes at 20°C. Following disinfection, equipment is removed from the disinfecting solution, rinsed with water and allowed to air dry before being reused. The disinfecting solution is discarded and fresh solution is prepared for the next disinfection procedure.

The purpose of this paper is to describe the effectiveness properties of RespiCide GP Disinfecting Solution.

ANTIMICROBIAL PROPERTIES

Efficacy test results for RespiCide GP Disinfecting Solution are shown in Table 1. Tests were performed by AOAC Methods required by the Environmental Protection Agency (EPA) for registration and simulated use testing. Test results support the 5-minute effectiveness label claim for RespiCide GP Disinfecting Solution against the test organisms shown in Table 1.

SIMULATED USE ANTIMICROBIAL PROPERTIES

The bactericidal activity of RespiCide GP Disinfecting Solution was examined in a simulated use protocol. Cultures of *P. aeruginosa* ATCC 15442 and *S. aureus* ATCC 6538 were brushed evenly onto each of two breathing mask pieces (a clear plastic mount and a silicone seat). Cells were dried onto the breathing mask pieces at 37°C *in vacuo.* The two components of each breathing mask were subjected to one of the following three treatments: untreated control (sterile water) with 30 minutes contact time at 20°C; RespiCide GP Disinfecting Solution with 5 minutes contact time at 20°C; a disinfectant germicide (positive control) with 10 minutes contact time at 20°C. After treatment, masks were placed in 400 ml of inactivating buffer and agitated for 15 minutes with a sterile rod. Aliquots were spread plated on tryptic soy agar for enumeration of viable cells. A 5-point most probable number assay was also used to enumerate low number of viable cells (detection limit: one cell per 5 ml original sample) (Banwart, G.J. 1981. Basic Food Microbiology. AVI Publishing Co., Westport). Plates and incubation tubes were incubated at 30°C, after which viable cell counts were determined.

Assays were conducted in triplicate. RespiCide GP Disinfecting Solution reduced cell counts on breathing masks from over 10,000,000 cfu to undetectable levels after five minutes of treatment at 20°C. Table 2 summarizes assay results.

DISCUSSION

A new non-aldehyde disinfecting solution has been developed. The product, RespiCide GP Disinfecting Solution, which is packaged as a concentrate, has many unique features that make this formulation ideally suited for the disinfection of non-metal, heat-sensitive, reusable, non-critical medical equipment such as: facemasks, tubing, canisters and connectors. The product doesn't possess irritating odors, or stain skin, is single use, is effective in 5 minutes at 20°C, and can be disposed of without any special precautions. Table 3 summarizes the features and benefits derived for this product.

CONCLUSION

RespiCide GP Disinfecting Solution is a highly effective disinfecting solution for treatment of non-metal, heat-sensitive, reusable, non-critical medical equipment. RespiCide GP Disinfecting Solution is 100% effective against bacteria, fungi, viruses and *Mycobacterium bovis* (BCG) in 5 minutes at 20°C.

Table 1

Microbiological Efficacy of RespiCide GP Disinfecting Solution

Test Method	Test Organism (s)	Kill Time at 20°C*
Quantitative Tuberculocidal Test	Mycobacterium bovis (BCG)	5 minutes
EPA Virucidal Testing (DIS/TSS-7, November 1981)	Poliovirus Type 2	5 minutes
	Herpes simplex 1	5 minutes
	Coxsackie virus	5 minutes
	Rhino virus	5 minutes
	Cytomegalovirus	5 minutes
	Respiratory syncytial virus	5 minutes
AOAC Use Dilution Test	Pseudomonas aeruginosa	5 minutes
	Staphylococcus aureus	5 minutes
	Salmonella choleraesuis	5 minutes
AOAC Fungicidal Test	Trichophyton mentagrophytes	5 minutes

*Efficacy testing was conducted on RespiCide GP Disinfecting Solution. Test solution was prepared by diluting 1 part RespiCide GP Solution with 31 parts water followed by the addition of 1 level teaspoon of activator per liter of solution. Test organisms were exposed to the test solution 15 minutes post-activation.

Table 2

Activity of RespiCide GP Disinfecting Solution Against *Pseudomonas aeruginosa* and *Staphylococcus aureus* on Breathing Masks*

Treatment	cfu/mask P. aeruginosa (% reduction)	S. aureus (% reduction)
Control (sterile water)	1.7×10^7	1.3×10^7
RespiCide GP Disinfecting Solution	$<7 \times 10^1$ (>99.999)	$<7 \times 10^1$ (>99.999)
Germicide (positive control)	$<7 \times 10^1$ (>99.999)	$<7 \times 10^1$ (>99.999)

*Assays were conducted in the laboratory of Dr. Ralph S. Tanner, University of Oklahoma.

Table 3

Features and Benefits of RespiCide GP Disinfecting Solution

Feature	Benefit
EFFECTIVENESS	Disinfection in 5 minutes at 20°C. Bactericidal, Fungicidal, Virucidal, and Tuberculocidal.
SAFETY	No aldehydes. Low level of active ingredient. Class III Toxicity Rating, requires only a precautionary statement of "CAUTION".
USER-FRIENDLY	Low odor. Non-staining. Sold as a concentrate. Diluted with tap water. Easily handled. Requires minimal storage space.
LIABILITY	Single use, no effectiveness monitoring records required – fresh solution per treatment.
MATERIALS COMPATIBILITY	Does not damage or stain rubber/plastic medical equipment. Does not contain surfactants. Easily rinsed with water, no retention of product. Does not fix protein to equipment.
DISPOSABILITY	Can be discarded without special precautions. No organic residues.
COST EFFICIENT	Doesn't require heaters, fume hoods or effectiveness monitoring tests.