

Milan, 10 January 2007

Spett.

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### Evaluation of antibacterial properties of textiles

#### EXPERIMENTAL CONDITIONS.

##### Test method:

**Dynamic shake flask test, evaluation of antibacterial activity. ASTM E2149-01.**

Two different tests have been conducted in the following experimental conditions:

**Test 1: Quantitative evaluation of antibacterial activity of textiles.** The antibacterial activity toward *Staphylococcus aureus* ATCC 6538 was evaluated. In sterilised flasks 2 g of textile cut in small pieces were added to 50 ml phosphate buffer inoculated with *S. aureus*,  $1 \times 10^5$  CFU/ml (CFU: colony forming units). The flasks were incubated under shaking for 8 hours at  $37 \pm 1^\circ\text{C}$ .

**Test 2: Evaluation of antimicrobial agent leaching from textiles in water solution.** Water extracts from each textile sample were obtained as follows: 3 g. of textile cut in small pieces were added to 75 ml phosphate buffer in sterilised flasks. The flasks were incubated under shaking for 24 h at  $37 \pm 1^\circ\text{C}$  to allow any possible leaching of antimicrobial agent in water solution.

After the incubation period 50 ml of buffer were sampled from each flask avoiding the collection of the textile and put into sterilised flasks and inoculation with *Staphylococcus aureus* (about  $1 \times 10^5$  CFU/ml) was performed. Immediately after the inoculation a sampling was performed from each flask to evaluate microbial count at zero contact time ( $T_0$ ). Afterward the inoculated flasks were incubated for 24 h at  $37 \pm 1^\circ\text{C}$  under shaking, and then microbial count was performed at 24h contact time ( $T_{24}$ ).

##### **Calculation of the antibacterial activity:**

The antibacterial activity of textile sample and their water extracts was calculated as follows:

$$(B - A) / B \times 100 = \% \text{ reduction}$$

A = CFU/ml (colony forming units/ml) of treated sample after specified contact time.

B = CFU/ml at zero contact time of the reference sample.

**RESULTS:**

**Antibacterial activity ASTM E2149-01. TEST 1: Quantitative evaluation of antibacterial activity of textiles.**

Sample	<i>Staphylococcus aureus</i> ATCC 6538		
	CFU/ml T <sub>0</sub> <b>B</b>	CFU/ml 8 h <b>A</b>	% reduction 8 h
Inoculated buffer	40 x 10 <sup>4</sup>	80 x 10 <sup>4</sup>	
DermaSilk (knitted silk)		31 x 10 <sup>2</sup> 14 x 10 <sup>3</sup>	<b>99.25</b> <b>96.66</b>
Triclosan (knitted polyamide)		3 28	<b>99.99</b> <b>99.99</b>
Envicon (knitted cotton with silver yarns)		0 0	<b>100,0</b> <b>100,0</b>
Lohman (100% knitted cotton)		96 x 10 <sup>4</sup> 92 x 10 <sup>4</sup>	<b>0,0</b> <b>0,0</b>

**Comment:** The samples named DermaSilk, Triclosan and Envicon after 8 hours contact time produced antibacterial activity of at least one order of magnitude. While the sample named Lohman did not show any antibacterial effect.

**Antibacterial activity ASTM E2149-01. TEST 2: Evaluation of antimicrobial agent leaching from textiles in water solution.**

Sample	<i>Staphylococcus aureus</i> ATCC 6538		
	CFU/ml T <sub>0</sub> <b>B</b>	CFU/ml 24 h <b>A</b>	% riduzione 24 h
Inoculated buffer	25 x 10 <sup>4</sup>	24 x 10 <sup>4</sup>	
DermaSilk water extract (knitted silk)	22 x 10 <sup>4</sup> 23 x 10 <sup>4</sup>	46 x 10 <sup>4</sup> 40 x 10 <sup>4</sup>	<b>0.0</b> <b>0.0</b>
Triclosan water extract (knitted polyamide)	22 x 10 <sup>4</sup> 23 x 10 <sup>4</sup>	15 x 10 <sup>2</sup> 17 x 10 <sup>2</sup>	<b>99.4</b> <b>99.3</b>
Envicon water extract (knitted cotton with silver yarns)	22 x 10 <sup>4</sup> 22 x 10 <sup>4</sup>	0 0	<b>100.0</b> <b>100.0</b>
Lohman water extract (100% knitted cotton)	21 x 10 <sup>4</sup> 23 x 10 <sup>4</sup>	27 x 10 <sup>4</sup> 29 x 10 <sup>4</sup>	<b>0.0</b> <b>0.0</b>

**Comment:** The water extracts obtained from the textile samples named Triclosan and Envicon produced antibacterial effect, therefore demonstrating significant contamination of the water extracts with antimicrobial agents leached from the textile samples. While water extracts obtained from the samples named DermaSilk and Lohman did not produce any antibacterial effect, therefore they did not show any antimicrobial agent leaching from the textiles.

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