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Protocol Examination of the bactericidal effect on surfaces

Job number: A2021001170

Details of the examination

Investigated agent

ANSILVER®-T concentrate (delivery / distribution by LT BIOTECH DE)

Description

Testing of the bactericidal effect of cellulose surfaces coated with ANSILVER®-T (dilution 1: 2 with water)

- Artificial contamination with different bacteria (double determination each)

- Time of examination 1h, 2h, 4h, 8h and 24h after inoculation

Test surface

- 1. Cellulose surface without ANSILVER®-T coating (incubated in the dark at 25 ° C and 98% humidity) reference surface**
- 2. Cellulose surface with ANSILVER®-T coating (incubated in the dark at 25 ° C and 98% humidity)**
- 3. Cellulose surface with ANSILVER®-T coating (incubated under UVA radiation (365nm, 18 watt) at 25 ° C and 98% humidity)**



4. Cellulose surface with ANSILVER®-T coating (daylight incubated at 25 ° C and 98% humidity)

Bacteria used	Escherichia coli; Staphylococcus aureus ;Pseudomonas aeruginosa; Salmonella enterica; Chlostridium perfringens
Growth medium	Trypton-T Dilution Medium Plate Count Agar

Description:

Bacterial suspensions of known concentration were inoculated onto the 100 cm² test surface (size 10 cm by 10 cm) and incubated under different conditions. The contamination is approx. 10⁶ CFU per 100 cm², which corresponds to a high level of microbial exposure. After each incubation, the concentration of the bacteria on the surface was determined. The reduction rate was determined from the initial concentration and periods of time.

Results of testing the bactericidal effect on surfaces:

Cellulose surface without ANSILVER®-T coating (incubated in the dark at 25 ° C and 98% humidity) reference surface

Bacteria	Initial concentration	Concentration after				
		1 h	2 h	4 h	8 h	24 h
(CFU / 100 cm ²)						
Escherichia coli	1,5 · 10 ⁶	1,0 · 10 ⁶	1,0 · 10 ⁶	9,5 · 10 ⁵	2,8 · 10 ⁵	1,4 · 10 ⁴
Staphylococcus aureus	8,0 · 10 ⁵	7,5 · 10 ⁵	7,4 · 10 ⁵	6,9 · 10 ⁵	4,8 · 10 ⁵	1,9 · 10 ⁵
Pseudomonas aeruginosa	1,6 · 10 ⁶	1,1 · 10 ⁶	1,0 · 10 ⁶	8,7 · 10 ⁵	1,8 · 10 ⁵	1,3 · 10 ⁴
Salmonella enterica	1,3 · 10 ⁶	1,0 · 10 ⁶	9,0 · 10 ⁵	8,4 · 10 ⁵	3,4 · 10 ⁵	2,1 · 10 ⁴
Chlostridium perfringens	1,1 · 10 ⁶	5,0 · 10 ⁴	2,0 · 10 ³	1,0 · 10 ²	<1,0 · 10 ²	<1,0 · 10 ²

CFU Colony-forming units

Bacteria	Reduction in % after				
	1 h	2 h	4 h	8 h	24 h
Escherichia coli	33,3	33,3	36,7	81,3	99,1
Staphylococcus aureus	6,3	7,5	13,8	40,0	76,3
Pseudomonas aeruginosa	31,3	37,5	45,6	88,8	99,2
Salmonella enterica	23,1	30,8	35,4	73,8	98,4
Chlostridium perfringens	95,5	99,8	100,0	100,0	100,0

Result of Cellulose surface with ANSILVER®-T coating (incubated in the dark at 25 ° C and 98% humidity)

Bacteria	Initial concentration	Concentration after				
		1 h	2 h	4 h	8 h	24 h
(CFU / 100 cm ²)						
Escherichia coli	1,5 · 10 ⁶	9,3 · 10 ⁵	9,1 · 10 ⁵	8,1 · 10 ⁵	4,1 · 10 ⁴	1,5 · 10 ³
Staphylococcus aureus	8,0 · 10 ⁵	6,9 · 10 ⁵	6,8 · 10 ⁵	6,1 · 10 ⁵	1,1 · 10 ⁵	4,3 · 10 ⁴
Pseudomonas aeruginosa	1,6 · 10 ⁶	8,8 · 10 ⁵	8,7 · 10 ⁵	5,4 · 10 ⁵	3,5 · 10 ⁵	1,0 · 10 ⁴
Salmonella enterica	1,3 · 10 ⁶	6,9 · 10 ⁵	5,5 · 10 ⁵	5,1 · 10 ⁵	2,7 · 10 ⁴	1,4 · 10 ⁴
Chlostridium perfringens	1,1 · 10 ⁶	4,5 · 10 ⁴	9,0 · 10 ²	1,0 · 10 ²	<1,0 · 10 ²	<1,0 · 10 ²

CFU Colony-forming units

Bacteria	Reduction in % after				
	1 h	2 h	4 h	8 h	24 h
Escherichia coli	38,0	39,3	46,0	97,3	99,9
Staphylococcus aureus	13,8	15,0	23,8	86,3	94,6
Pseudomonas aeruginosa	45,0	45,6	66,3	78,1	99,4
Salmonella enterica	46,9	57,7	60,8	97,9	98,9
Chlostridium perfringens	95,9	99,9	100,0	100,0	100,0

Cellulose surface with ANSILVER®-T coating (incubated under UVA radiation (365nm) at 25 ° C and 98% humidity)

Bacteria	Initial concentration	Concentration after				
		1 h	2 h	4 h	8 h	24 h
	(CFU / 100 cm ²)					
Escherichia coli	1,5 · 10 ⁶	9,2 · 10 ⁵	1,2 · 10 ⁵	9,6 · 10 ⁴	6,7 · 10 ³	1,2 · 10 ³
Staphylococcus aureus	8,0 · 10 ⁵	6,5 · 10 ⁵	1,9 · 10 ⁵	1,0 · 10 ⁵	1,0 · 10 ⁴	9,8 · 10 ³
Pseudomonas aeruginosa	1,6 · 10 ⁶	8,1 · 10 ⁵	1,7 · 10 ⁵	1,2 · 10 ⁴	9,1 · 10 ³	2,8 · 10 ³
Salmonella enterica	1,3 · 10 ⁶	6,7 · 10 ⁵	2,0 · 10 ⁵	9,1 · 10 ⁴	2,1 · 10 ⁴	8,0 · 10 ³
Chlostridium perfringens	1,1 · 10 ⁶	1,1 · 10 ⁴	2,0 · 10 ²	<1,0 · 10 ²	<1,0 · 10 ²	<1,0 · 10 ²

CFU Colony-forming units

Bacteria	Reduction in % after				
	1 h	2 h	4 h	8 h	24 h
Escherichia coli	38,7	92,0	93,6	99,6	99,9
Staphylococcus aureus	18,8	76,3	87,5	98,8	98,8
Pseudomonas aeruginosa	49,4	89,4	99,3	99,4	99,8
Salmonella enterica	48,5	84,6	93,0	98,4	99,4
Chlostridium perfringens	99,0	100,0	100,0	100,0	100,0

Cellulose surface with ANSILVER®-T coating (daylight incubated at 25 ° C and 98% humidity)

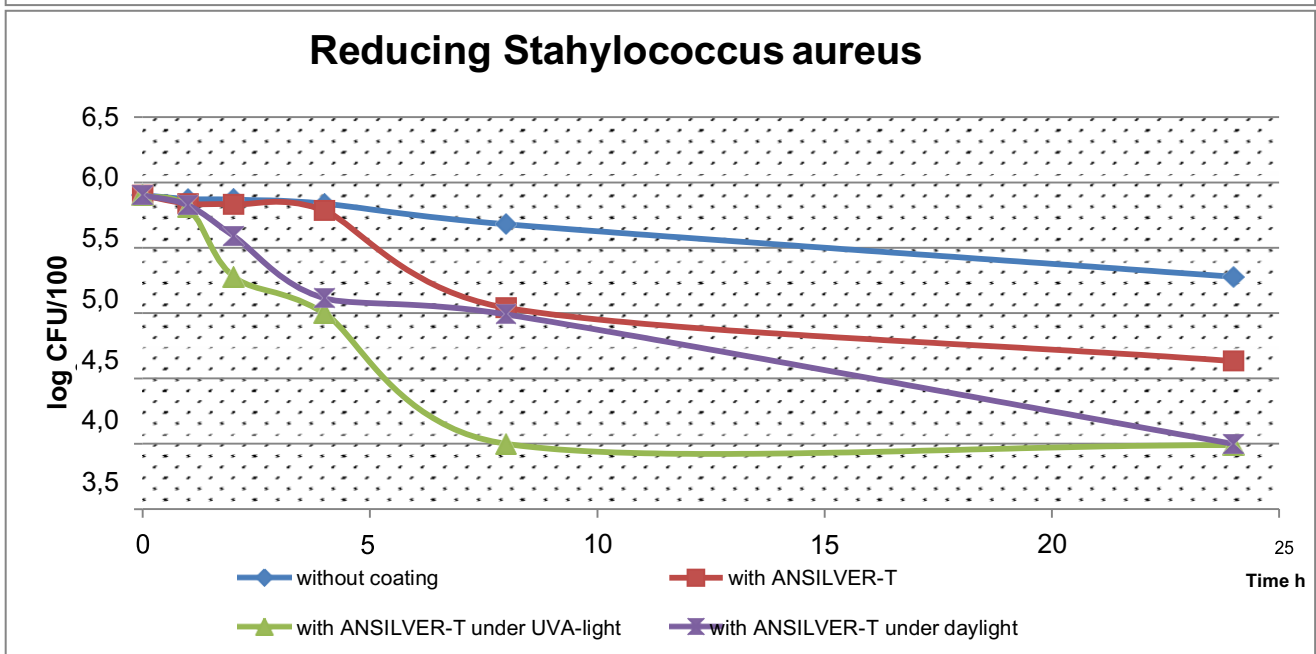
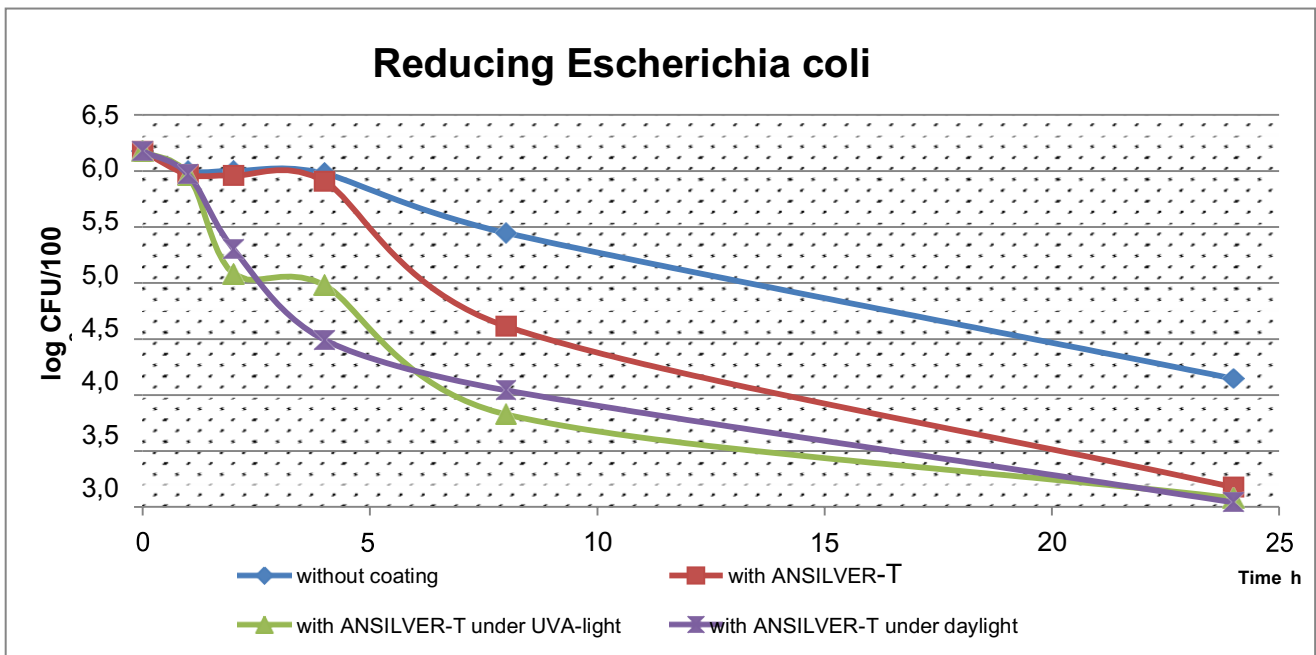
Bacteria	Initial concentration	Concentration after				
		1 h	2 h	4 h	8 h	24 h
(CFU / 100 cm ²)						
Escherichia coli	1,5 · 10 ⁶	9,3 · 10 ⁵	2,0 · 10 ⁵	3,1 · 10 ⁴	1,1 · 10 ⁴	1,1 · 10 ³
Staphylococcus aureus	8,0 · 10 ⁵	6,7 · 10 ⁵	3,9 · 10 ⁵	1,3 · 10 ⁵	9,8 · 10 ⁴	1,0 · 10 ⁴
Pseudomonas aeruginosa	1,6 · 10 ⁶	8,4 · 10 ⁵	2,8 · 10 ⁵	1,0 · 10 ⁴	4,0 · 10 ³	2,4 · 10 ³
Salmonella enterica	1,3 · 10 ⁶	6,9 · 10 ⁵	3,1 · 10 ⁵	8,0 · 10 ⁴	2,0 · 10 ⁴	7,6 · 10 ³
Chlostridium perfringens	1,1 · 10 ⁶	1,0 · 10 ³	1,0 · 10 ²	<1,0 · 10 ²	<1,0 · 10 ²	<1,0 · 10 ²

CFU Colony-forming units

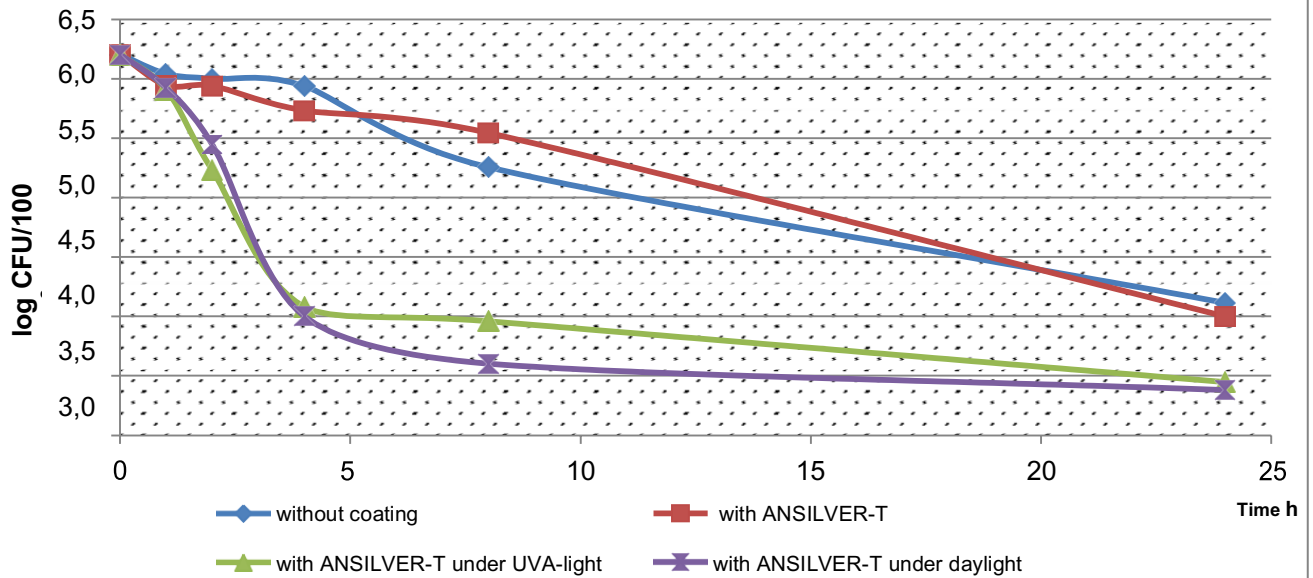
Bacteria	Reduction in % after				
	1 h	2 h	4 h	8 h	24 h
Escherichia coli	38,0	86,7	97,9	99,3	99,9
Staphylococcus aureus	16,3	51,3	83,8	87,8	98,8
Pseudomonas aeruginosa	47,5	82,5	99,4	99,8	99,9
Salmonella enterica	46,9	76,2	93,8	99,8	99,4
Chlostridium perfringens	99,9	100,0	100,0	100,0	100,0

Summary:

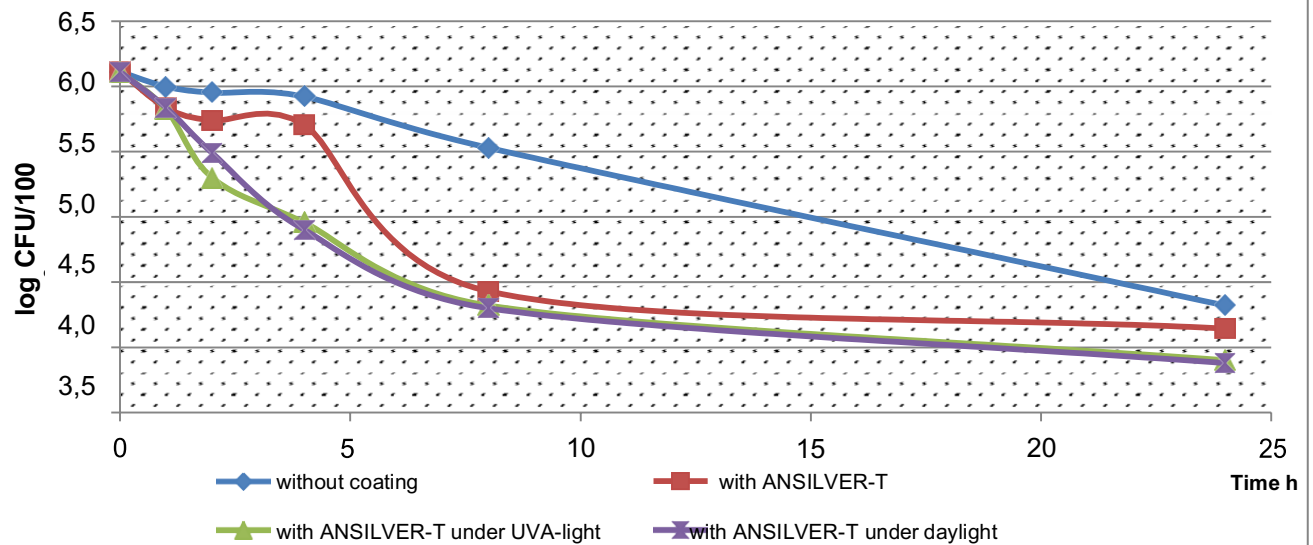
By coating the tested surfaces with ANSILVER®-T, the bacteria are reduced more quickly, which can be seen from the comparison with the reference surface. The bactericidal effect is intensified by light, whereby artificial irradiation with UVA radiation (365 nm) has a stronger effect. The following diagrams show the reduction processes over the examined bacterial species by comparing the tested surfaces.

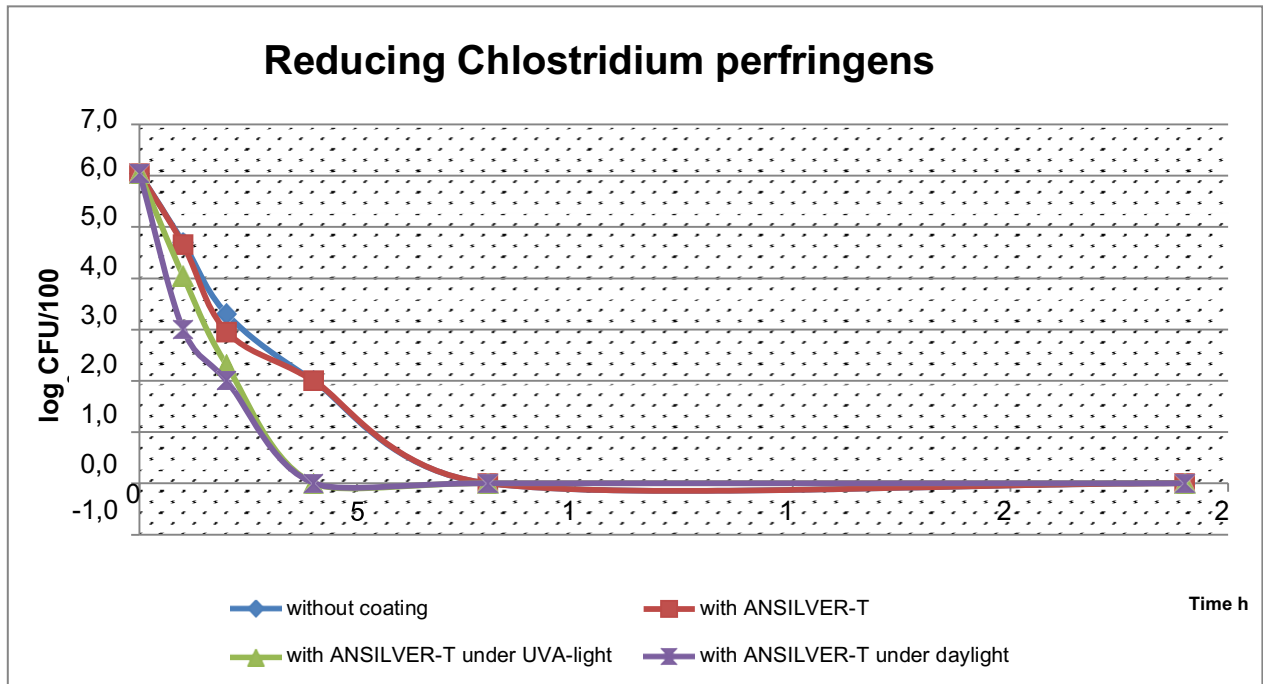


Reducing *Pseudomonas aeruginosa*



Reducing *Salmonella enterica*





It is seen that, in comparison to the reference surface, after a short time a significant reduction occurs with ANSILVER®-T coating and exposure to light. Regarding the results of this examination, a bactericidal effect of the ANSILVER®-T coating on surfaces, which intensifies under the influence of light, can be confirmed.

/signature/
Gregor Böhm

The test results relate exclusively to the tested sample.
Extracts of the test report may not be copied without the written approval of the testing facility.