ACUMEN SCIENTIFIC SDN. BHD. (514926-V)
Wisma Texchem, Lot 808 & 809, Jalan Subang, Taman Perindustrian Subang,
47610 Subang Jaya, Selangor Darul Ehsan, Malaysia.
TEL: +603-56345618 FAX: +603-56345619
EMAIL: inquiry@acumen.com.my WEBSITE: www.acumen.com.my

CERTIFICATE OF ANALYSIS

INFINITE TECHNOLOGY
No. 15, Jalan Industri PBP 9,
Taman Industri Pusat Bandar Puchong,
47100 Puchong, Selangor.
Tel: +603-58826250 Fax: +603-58827820
Attn: Mr Selvaraju

Certificate No	:	CCN19050271M01-0
Sample Received Date	:	29 – May – 2019
Complete Analysis Date	:	10 – June – 2019
Date Issue	:	17 – June – 2019

Study Title

Antibacterial Activity and Efficacy of NanoTouch Non-porous Test Substance

Test Method

Japanese Industrial Standard Z 2801
Antibacterial Products – Test for Antibacterial Activity and Efficacy

JIS Z 2801: General Information

The Japanese Industrial Standard Committee (JIS) is an international organization that develops and standardizes test methods for a variety of products and materials. The JIS method Z 2801 is a quantitative test designed to assess the performance of antimicrobial finishes on hard, non-porous surfaces. The method can be conducted using contact times ranging from ten minutes up to 24 hours. For a JIS Z 2801 test, non-antimicrobial control surfaces are used as the baseline for calculations of microbial reduction. The method is versatile and can be used to determine the antimicrobial activity of a diverse array of surfaces including plastics, metals, and ceramics.

Test Substance Information

The test substance was received on 29 MAY 2019 and the following picture was taken.

Figure 1: Test substance received – NanoSeptic Continuously Self-Cleaning Surface.

Test substance was cut down to ideal sizes for the study. The printed side (visible in the picture) was tested.

(<***Numeric number***) denotes detection limits

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Criteria for Scientific Defensibility of a JIS Z 2801 Study

In order to consider a JIS Z 2801 study to be scientifically defensible, the following criteria must be met:

1. The average number of viable bacteria recovered from the time zero samples must be approximately 1 x 10^4 cells or greater.
2. Ordinary consistency between replicates must be observed for the time zero samples.
3. The number of viable bacteria recovered from the control surface after the contact time must not be significantly (>2-Log_{10}) less than the original inoculums concentration.
4. Positive/Growth controls must demonstrate growth of appropriate test microorganism.
5. Negative/Purity controls must demonstrate no growth of test microorganism.

Passing Criteria

JIS specifies a performance criteria for antimicrobial efficacy of greater than or equal to a 2 Log_{10} or 99% reduction in the test microorganisms when comparing the treated surface to the control surface after the contact time.

Testing Parameters used in this Study

Test Substance Size	: 1 x 3 inch	Film Used (Size)	: Yes (20mm x 20mm)
Replicates	: Two		
Culture Growth Media	: Tryptic Soy Broth	Culture Growth Time	: 18 hours
Culture Dilution Media	:1:500 Nutrient Broth		
Inoculum Concentration	: ~ 3 x10^5 CFU/Carrier	Inoculum Volume	: 0.200 mL
Contact Time	: 24 hours	Contact Temperature	: 36 ^oC ± 1 ^oC
Neutralizer	: D/E Broth (10 mL)	Enumeration Plate Media	: Tryptic Soy Agar
Enumeration Plate Incubation Temperature	: 36 ^oC ± 1 ^oC	Enumeration Plate Incubation Time	: 24 – 48 hours

Study Modifications

During the contact time, samples were incubated under light (900-1000 lux).
Sterilized plastic carriers were used as controls.

Study Notes

No additional observations or notations were made for this study.

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Study Photographs

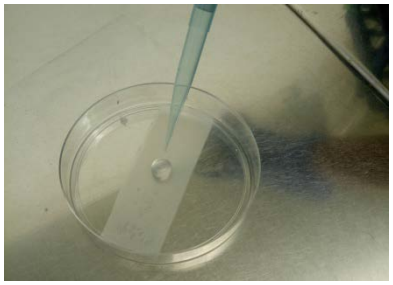

Figure2: Inoculation of plastic control carriers.

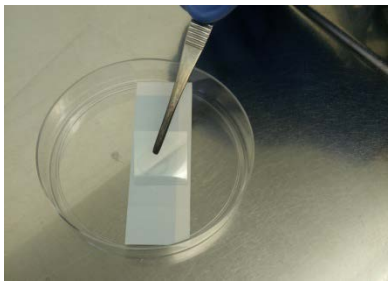

Figure 3: Placement of the cover film onto the test carriers.

Figure 4: Light intensity during the contact time.

Control Results

Neutralization Method: N/A Media Sterility: Confirmed

Growth Confirmation: Morphology on TSA

Calculations

Percent Reduction = $\left(\frac{B-A}{B}\right)$ x 100

Where:

B = Amount of microorganism on the control carriers after the contact time

A = Amount of microorganism on the test carriers after the contact time

Log_{10} Reduction = Log $\left(\frac{B}{A}\right)$

Where:

B = Amount of microorganism on the control carriers after the contact time

A = Amount of microorganism on the test carriers after the contact time

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Results of the Study

Test Microorganism	Contact Time	Carrier	Replicate	CFU/Carrier	Average CFU/Carrier	Percent Reduction Compared to Control at Contact Time	Log_{10} Reduction Compared to Control at Contact Time
Escherichia coli ATCC 8739	Time Zero	Control	1	$2.4x10^5$	$2.5x10^5$	N/A	
			2	$2.6x10^5$			
Staphylococcus aureus ATCC 6538			1	$3.3x10^5$	$3.6x10^5$		
			2	$3.9x10^5$			
Pseudomonas aeruginosa ATCC 15442			1	$3.8x10^5$	$3.7x10^5$		
			2	$3.5x10^5$			
Escherichia coli ATCC 8739	24 hours	Control	1	$5.7x10^6$	$5.6x10^6$		
			2	$5.4x10^6$			
Staphylococcus aureus ATCC 6538			1	$3.3x10^6$	$3.7x10^6$		
			2	$4.1x10^6$			
Pseudomonas aeruginosa ATCC 15442			1	$6.9x10^6$	$7.9x10^6$		
			2	$8.8x10^6$			
Escherichia coli ATCC 8739	24 hours	Sample	1	$1.4x10^3$	$1.9x10^3$	99.97%	3.47
			2	$2.4x10^3$			
Staphylococcus aureus ATCC 6538			1	$5.2x10^3$	$5.5x10^3$	99.85%	2.83
			2	$5.7x10^3$			
Pseudomonas aeruginosa ATCC 15442			1	$7.8x10^3$	$7.2x10^3$	99.91%	3.04
			2	$6.6x10^3$			

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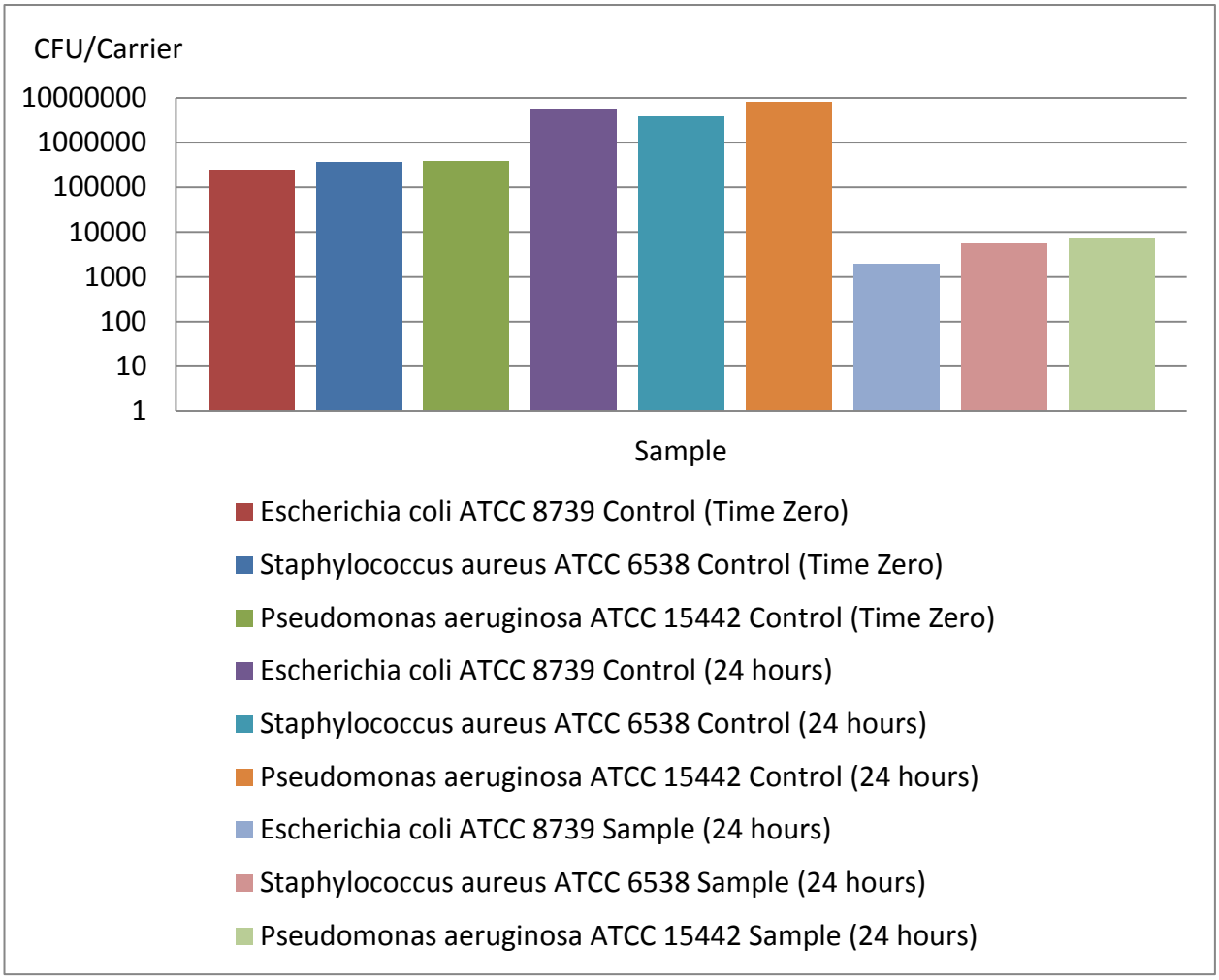

The results of this study apply to the tested substance(s) only. Extrapolation of findings to related materials is the responsibility of the Sponsor.

Ng Yee Teng
Assistant Manager
B.Sc.(Hons)
MJMM0390

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