DISCLAIMER:

This document is strictly confidential communication to and solely for the use of the recipient and may not be reproduced or recirculated without Speco Singapore Pte Ltd's prior written consent. If you are not the intended recipient, you may not disclose or use the information in this documentation in any way.

The information is accurate as at 8th July 2021.

PRODUCT CERTIFICATION FOR SPECO AIR

This document has been prepared by Speco Singapore Pte Ltd[1] (f.k.a Spic & Span Pte Ltd) to provide the intended recipient with information on our product certifications for the purpose of its export and local sales.

Contents

[1] With immediate effect, our company will be renamed from Spic & Span Pte Ltd to Speco Singapore Pte Ltd to consolidate our position as a cleantech company. Our international arm, Speco International Pte Ltd, will continue to manage business matters outside of Singapore.

Speco Singapore Pte Ltd (UEN: 201700949H)
f.k.a. Spic & Span Pte Ltd
317 Outram Road #01-40, Concorde Shopping Centre, Singapore 169075
Phone: 67378918 | Email: Hello@speco.sg

Certificate of Analysis

CERTIFICATE OF ANALYSIS

Product: **SPECO+ Air**
Lot No. # 1001122022
Manufactured date: 16 December 2022

Property	Specification	Results
Appearance	Hazy White Liquid	Hazy white
Water Solubility	Yes	Yes
pH	5+	6
Non-Volatile Content (%)	Around 2.0%	2.0

Authorized Signatory

Samuel Chiang
Head, Research & Development
Speco Singapore Pte Ltd
UEN: 201700949H
GST Registration: 201700949H

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Speco Air Efficacy Test Result conducted by Axiom Laboratory dated 10th June 2021

AXIOM LABORATORY PTE LTD
ENVIRONMENTAL TESTING, ASSESSMENT & CONSULTANCY
59, Ubi Avenue 1, #03-12, Bizlink Centre, Singapore 408938
Tel: 6741 8700; Fax: 6748 0460; Email: axiomlab168@gmail.com
Company Registration No. & GST: 201923163E

TEST REPORT NO: AL-21-306M

Company Name	: Speco Singapore Pte Ltd
Address	: 317, Outram Road, #01-40, Singapore 169075
Date Tested	: 10 June 2021
Date Reported	: 16 June 2021
Sample Description	: Speco CLEAN AIR Efficacy Test

One (1) sample was submitted by Speco Singapore Pte Ltd in plastic bottle marked as:

Speco Clean Air

On microbiological analysis, the following results were obtained:

Tested Microorganism	Initial Bacterial Load, CFU/ml	Log_{10}
Staphylococcus aureus ATCC 6538	1.6×10^7	7.20

Tested Microorganism	Initial Fungus Load, CFU/ml	Log_{10}
Candida Albican ATCC 10231	1.0×10^6	6.00

Tested Microorganism	Contact Time (Minutes)	Count of Surviving Test Microorganism, CFU/ml	Log_{10}	Log Reduction	Percentage Kill of Tested Microorganism, %
Staphylococcus aureus ATCC 6538	1	< 1	-	7.20	99.9999
	5	< 1	-	7.20	99.9999

Tested Microorganism	Contact Time (Minutes)	Count of Surviving Test Microorganism, CFU/ml	Log_{10}	Log Reduction	Percentage Kill of Tested Microorganism, %
Candida Albican ATCC 10231	1	< 1	-	6.00	99.9999
	5	< 1	-	6.00	99.9999

Axiom Laboratory Pte Ltd Co. Reg. No: 201923163E

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Environmental Testing, Assessment & Consultancy

TEST REPORT NO: AL-21-306M

Remarks :

a) The above results were tested as per sample submitted.

b) In-House Test Method with reference to United States Pharmacopeia (USP) 41. 1ml of initial bacterial and fungus load were added in 100ml of sample and tested for 1 min and 5 mins contact time. After contact time, 1ml of samples from both contact time were immediately transferred into Tryptone Soya Agar (TSA) for total bacteria count and Malt Extract Agar (MEA) for total fungal count were used as sample medium and were incubated at 35°C for 48 hours & at 25°C for 120 hours respectively prior to microbial counts. The number of colony forming units were recorded.

Axiom Laboratory Pte Ltd Co. Reg. No: 201923163E

Chang Hee Kuan
Principal Consultant
Environmental Services

Axiom Laboratory Pte Ltd Co. Reg. No: 201923163E

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Air Quality Sampling & Analysis for Speco Clean Air Solution conducted by Axiom Laboratory dated 21st January 2021

AXIOM LABORATORY PTE LTD
ENVIRONMENTAL TESTING, ASSESSMENT & CONSULTANCY

72, Eunos Avenue 7, #04-07B, Singapore Handicrafts Building, Singapore409570Tel: 6741 8700; Fax: 6748 0460; Email: axiomlab168@gmail.com
Company Registration No. & GST: 201923163E

TEST REPORT NO: AL-REP-20-M049

Company Name	: Speco Singapore Pte Ltd (f.k.a Spic & Span Pte Ltd)
Address	: 317 Outram Road #01-40 Singapore 169075
Date Tested	: 19 November 2020 - 15 January 2021
Date Reported	: 21 January 2021
Sample Description	: Air Quality Sampling & Analysis for SPECO Clean Air solution

Location	**: CSFE Store Office**
Product	**: SPECO Clean Air**
NameDate	**: 19 November 2020 -15 January 2021**

Airborne Microbiological test and Total Volatile Organic Compounds (TVOCs) test was conducted by our technical personnel using a portable Buck Bioculture Microbiological air sampler to test the effectiveness of Aerosol Dispenser System with SPECO Clean Air solution and the following results were obtained.

I. Test Procedures:

a) Airborne Microbiological Test

Prior to testing, approximately $1.0x10^3$ *Escherichia coli* and approximate ly $1.0x10^3$ *Aspergillus niger* were introduced using ultra-low volume sprayer into the room. The initial count was sampled using a portable Buck Bioculture microbiological air sampler to collect microbial particulates at a flow rate of 100L/min for 1-minute sampling period. Then, an Aerosol Dispenser System was switched on for testing. A portable Buck Bioculture microbiological air sampler was used to collect microbial particulates throughout the sampling interval for post treatment testing. Towards the end of the sampling period, the dispenser was switched off at week 4 and final test was conducted at week 8. Tryptone Soya Agar (TSA) for total bacteria count and Malt Extract Agar (MEA) for total fungal count were used as sample medium and wereincubated at 35°C for 48 hours and 25°C for 5 days respectively prior to microbial counts. The detected numbers of organisms per unit of air volume are calculated as follows:

$$CFU^*/m^3 = \frac{\text{Colonies on Agar Plate} \times 1000}{\text{Volume of air sampled (litre)}}$$

**where CFU = Colony Forming Unit*

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b) Total Volatile Organic Compounds (TVOCs)

Total Volatile Organic Compounds was measured using a portable Graywolf IQ-610 Indoor Air Quality Probe with PID for 5 minutes sampling period where one final representative average reading was recorded.

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II. Test Location:

The test for all the air contaminants throughout the entire course was carried out using an Aerosol Dispenser System at CSFE store office size of approximately 5.0m (length) x 3.0m (width)x 3.0m (height) = 45.0m^3.

Table 1: Total Bacteria Count, Total Fungal Count and Total Volatile Organic Compounds forBefore and After Using Aerosol Dispenser System With SPECO Clean Air solution

Date/Time	Test Day/Week	Total Bacteria Count@ 35°C for 48 hours (CFU/m^3)	Total Fungal Count @ 35°C for 120 hours (CFU/m^3)	Total Volatile Organic Compounds, TVOC (ppb)
19/11/2020 @ 1330-1340	System Off **(Day 0: Background level)**	410	250	550
19/11/2020 @ 1345-1355	System Off **(Day 0: Introduced bacterial, fungus, TVOC)**	1000	800	5460
19/11/2020 @ 1400-1500	System On **(Day 0: 1 hour later)**	300	270	676
20/11/2020 @ 0930-0945	System On **(Day 1)**	270	220	633
27/11/2020 @ 1000-1015	System On **(Week 1)**	110	130	618
04/12/2020 @ 0900-0915	System On **(Week 2)**	70	60	527
11/12/2020 @ 1000-1015	System On **(Week 3)**	40	50	516
18/12/2020 @ 1100-1115	System On **(Week 4)**	10	20	320
15/01/2021 @1000-1015	System Off **(From week 4 to 8)**	380	220	490
S5554:2016 COP for IAQ		**1000**	**500 (5S554:2009)**	**1000**

Remarks:

Air sampling was carried out before the installation of Aerosol Dispenser with SPECO Clean Air at Day 0. It was then started to operate from Day 1 to Week 8 and a final air sampling was completed 4 Weeks after the termination of using the system.

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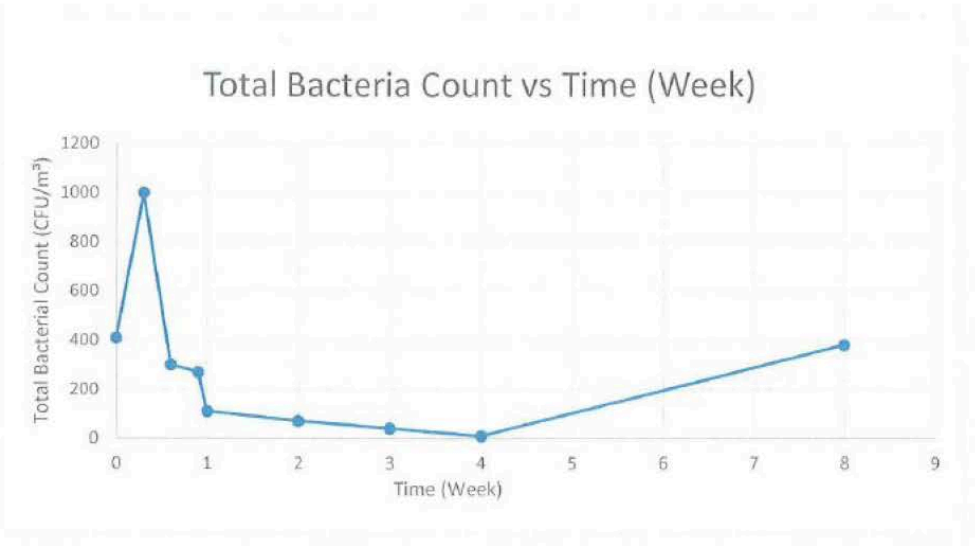

Figure 1: Graph of Total Bacterial Count versus Cumulative Time

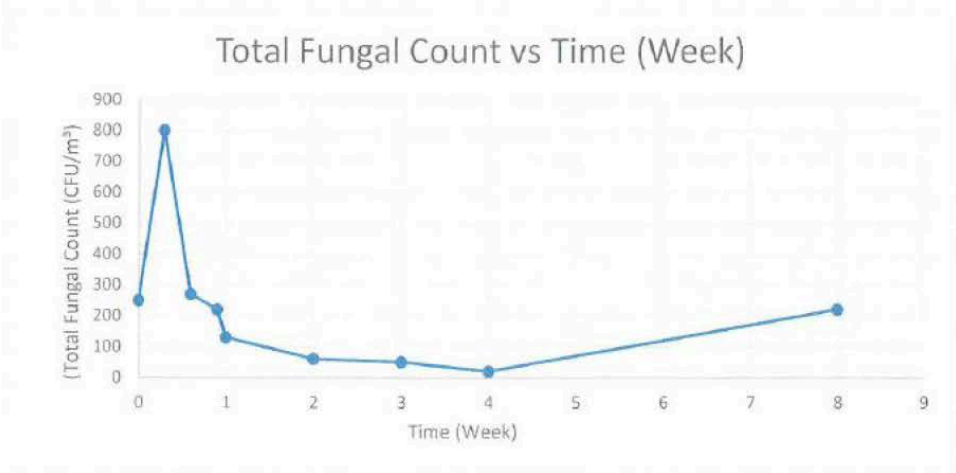

Figure 2: Graph of Total Fungal Count versus Cumulative Time

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Figure 3: Graph of TVOC Concentration versus Cumulative Time

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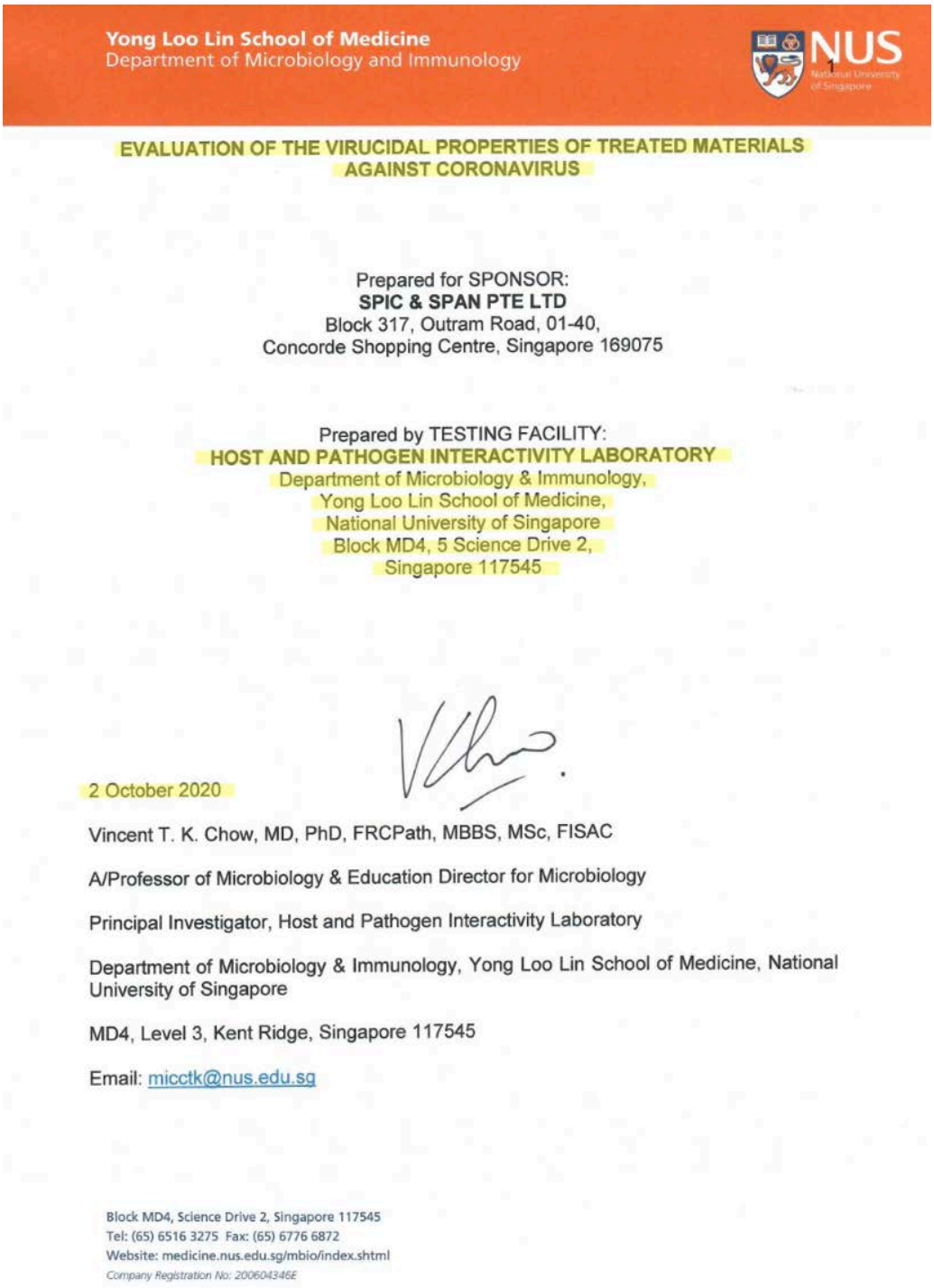
Speco® Active Ingredient Durability Evaluation Report dated 2nd October 2020

Speco Air is formulated with Speco®'s Proprietary Active Ingredients that has been proven to be effective against viruses, bacteria and mould.



Yong Loo Lin School of Medicine
Department of Microbiology and Immunology

NUS National University of Singapore

EVALUATION OF THE VIRUCIDAL PROPERTIES OF TREATED MATERIALS AGAINST CORONAVIRUS

Prepared for SPONSOR:
SPIC & SPAN PTE LTD
Block 317, Outram Road, 01-40,
Concorde Shopping Centre, Singapore 169075

Prepared by TESTING FACILITY:
HOST AND PATHOGEN INTERACTIVITY LABORATORY
Department of Microbiology & Immunology,
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Block MD4, 5 Science Drive 2,
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2 October 2020

Vincent T. K. Chow, MD, PhD, FRCPath, MBBS, MSc, FISAC

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Tel: (65) 6516 3275 Fax: (65) 6776 6872
Website: medicine.nus.edu.sg/mbio/index.shtml
Company Registration No: 200604346E

PURPOSE OF STUDY:

The purpose of this study was to evaluate the virucidal activity of antimicrobial disinfectant-coated glass surfaces when challenged with Coronavirus.

SCOPE:

This study was adapted from ISO 22196:2007 (Plastics – Measurement of antibacterial activity on plastics surfaces). It was designed to evaluate the virucidal property of the antimicrobial disinfectant-coated glass (test) surfaces. The virucidal efficacies of the test surfaces were compared with those of the uncoated glass (control) surfaces. Murine hepatitis virus, strain A59 (MHV-A59) was inoculated onto the test and control surfaces, and incubated at 25 ºC. Following the timed exposure, the samples were retrieved from the surfaces, and inoculated onto susceptible cells for analysis by virus plaque reduction assay. Triplicates of test and control samples were evaluated.

JUSTIFICATION FOR THE SELECTION OF THE TEST SYSTEM:

The Sponsor has requested an antimicrobial surface label claim for Coronavirus. MHV-A59, a mouse beta-coronavirus, was used for testing.

TEST MATERIALS:

The evaluated test and control materials were provided to the Testing Facility by the Study Sponsor, complete with appropriate documentation. Certificates of Analysis were not provided to the Testing Facility. Responsibility for the determination of the identity, strength, purity, composition, and stability of the test and control materials, as well as the retention of the test and control materials, rests with the Sponsor.

Test materials: Glass treated with in-house disinfectant coating.
Receipt Date: July 2020.
Expiration Date: Not Provided.

Control Materials: Untreated Glass.
Receipt Date: July 2020.
Expiration Date: Not Provided.

Test and Control glass samples were provided by the Sponsor.

TEST CONDITIONS:

Exposure Time: 20 minutes, 60 minutes and 180 minutes
Exposure Temperature: 25 ºC

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CHALLENGE VIRAL STRAIN:

Murine Hepatitis Virus (Beta-coronavirus), strain A59 (MHV-A59)

HOST CELL:

H2.35 (ATCC #CRL-1995; mouse liver, epithelial).
ATCC: American Type Culture Collection.

HOST CELL PREPARATION:

Cells were maintained as monolayers in disposable cell culture labware. Prior to testing, host cell cultures were seeded into multi-well cell culture plates. Cell monolayers were ~80% confluent, and less than 24-hours old before inoculation with the virus. The culture medium (CM) consisted of DMEM supplemented with fetal bovine serum.

TEST VIRUS PREPARATION:

Coronavirus was propagated, stored, and used for this study. On the day of use, aliquots of a stock virus suspension were removed from a -80 °C freezer and thawed in a water bath. The stock virus was diluted to obtain the titer of 2×10^5 PFU per 20 µl. (Reference: Chiow KH, Phoon MC, Putti T, Tan BK, Chow VT. Evaluation of antiviral activities of Houttuynia cordata Thunb. extract, quercetin, quercetrin and cinanserin on murine coronavirus and dengue virus infection. Asian Pacific Journal of Tropical Medicine 2016; 9:1-7).

TEST VIRUS IDENTIFICATION:

Virus-specific plaque reduction assay (for viable virus quantification) in H2.35 cells susceptible to virus infection.

PREPARATION OF TEST MATERIALS:

The test materials and control materials were sterilized by ultra-violet radiation for 5 minutes prior to the test.

SIMULATED CONTAMINATION OF TEST AND CONTROL MATERIALS:

The virus from the laboratory's high-titer virus collection was used in this study to simulate viral contamination. A virus concentration of 2×10^5 PFU per 20 µl was used.

A 20 µl aliquot of virus inoculum was transferred onto each surface of the test and control samples. A clean glass cover slip was then placed on top of the inoculum to spread the virus over the test and control surfaces. The exposure time of 20, 60 or 180 minutes commenced following application of the glass cover slip.

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TEST PROCEDURE:

Test and control samples were inoculated with 20 µl of the virus inoculum, covered with a clean glass cover slip, and subjected to either 20, 60 or 180 minutes exposure time at 25 ºC. The inoculums were each individually retrieved by the addition of 1 ml of DMEM, and thoroughly mixed before inoculating 100 µl into the seeded H2.35 cells for virus plaque reduction assay.

Initial Virus Population. The test virus inoculum was serially diluted (10-fold) up to 5 times, and inoculated into the seeded H2.35 cells.

Cell Culture Control. Uninfected H2.35 cells served as the control of cell culture viability.

The plates were incubated for 3 days at 37 ºC in an incubator with 5% CO_2.

Evaluation of Virus Recovery. The cells were stained with crystal violet to facilitate visualization of any plaques. Clear plaques (PFU) were counted based on the dilution well with <10 plaques. The viral titers were then back calculated to account for the dilution factor.

CALCULATIONS:

Viral titers were expressed as PFU per 100 µl for infectivity. Clear plaques (PFU) were counted based on the dilution well with <10 PFU. For example, if 8 plaques were counted at a dilution factor of 10^4, then the actual virus titer would be 8×10^4 PFU per 100 µl. Viral log reduction is measured by dividing the virus titer of the control surface over the virus titer of the tested surface, and then converted to Log_{10} scale.

TEST ACCEPTANCE CRITERIA:

The test was considered to be valid based on the following factors: (a) 1×10^4 PFU per 100 µl of virus was recovered from Initial population; (b) Cells in control wells showed no virus plaque formation, and were attached to the bottom of the well; (c) Control and tested surface samples inoculated with only media showed no virus recovery; (d) the culture medium was free of "non-viral" contamination in all wells of the plate.

LIABILITY AND INDEMNIFICATION:

The Testing Facility's liability to the Study Sponsor under this Protocol shall be limited to the price of the evaluation. The Study Sponsor shall be responsible to Study Participants (when applicable) and to other third parties for the fitness and use of the product.

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FINAL RESULTS:

Below is the overall summary of the testing results.

The testing was considered to be valid, based on fulfilment of the test acceptance criteria outlined above.

Tested and control samples were each initially inoculated with a 20 µl volume containing 2×10^5 PFU of MHV-A59 (equivalent to 10^6 PFU per 100 µl).

Condition: 20 minutes contact time

Virus titers of **test (coated)** surfaces:

Replicate 1 = 1.00×10^4 PFU per 100 µl
Replicate 2 = 1.50×10^4 PFU per 100 µl
Replicate 3 = 1.20×10^4 PFU per 100 µl

Average = 1.23×10^4 PFU per 100 µl (**Absolute percentage reduction:** 98.77%)

Virus titers of **control (uncoated)** surfaces:

Replicate 1 = 2.00×10^4 PFU per 100 µl
Replicate 2 = 2.00×10^4 PFU per 100 µl
Replicate 3 = 2.00×10^4 PFU per 100 µl

Average = 2.00×10^4 PFU per 100 µl

Relative fold reduction: 1.62
Relative percentage reduction: 38.33%

Summary: With 20 minutes of contact time, there was a 1.62-fold reduction in viral titer with the application of disinfectant coating with respect to the uncoated control.

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Condition: 60 minutes contact time

Virus titers of **test (coated)** surfaces:

Replicate 1 = 1.00×10^4 PFU per 100 µl
Replicate 2 = 9.00×10^3 PFU per 100 µl
Replicate 3 = 4.00×10^3 PFU per 100 µl

Average = 7.67×10^3 PFU per 100 µl (**Absolute percentage reduction:** 99.23%)

Virus titers of **control (uncoated)** surfaces:

Replicate 1 = 3.00×10^4 PFU per 100 µl
Replicate 2 = 5.00×10^4 PFU per 100 µl
Replicate 3 = 2.00×10^4 PFU per 100 µl

Average = 3.33×10^4 PFU per 100 µl

Relative fold reduction: 4.35
Relative percentage fold reduction: 77.00%

Summary: With 60 minutes of contact time, there was a 4.35-fold reduction in viral titer with the application of disinfectant coating with respect to the uncoated control.

Condition: 180 minutes contact time

Virus titers of **test (coated)** surfaces:

Replicate 1 = 1.10×10^3 PFU per 100 µl
Replicate 2 = 9.00×10^2 PFU per 100 µl
Replicate 3 = 1.00×10^3 PFU per 100 µl

Average = 1.00×10^3 PFU per 100 µl **(Absolute percentage reduction:** 99.90%)

Virus titers of **control (uncoated)** surfaces:

Replicate 1 = 9.00×10^3 PFU per 100 µl
Replicate 2 = 7.00×10^3 PFU per 100 µl
Replicate 3 = 6.00×10^3 PFU per 100 µl

Average = 7.33×10^3 PFU per 100 µl

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Relative fold reduction: 7.33
Relative percentage fold reduction: 86.36%

Summary: With 180 minutes of contact time, there was a 7.33-fold reduction in viral titer with the application of disinfectant coating with respect to the uncoated control.

FINAL SUMMARY

This study evaluated the virucidal activity against coronavirus on glass surfaces coated with the Speco® antimicrobial disinfectant coating.

In summary, there was a reduction in viral titer with the application of the tested antimicrobial disinfectant coating on glass surfaces at 20, 60, and 180 minutes of contact time, respectively.

Based on the *absolute* reduction of the viral titer, the antimicrobial disinfectant coated surface inactivated 98.77% (20 minutes contact time), 99.23% (60 minutes contact time), and 99.90% (180 minutes contact time) of the coronavirus.

This corresponded to the *relative* coronavirus titer being reduced by 38.33%, 77.00%, and 86.36%, with respect to the uncoated surface.

NB: These results from this service can only be used for your own internal consumption, i.e. the National University of Singapore (NUS) will not endorse the product. As such the Sponsor will not be able to make use of the NUS name, logo, department, PI name, etc in any form of publicity such as in brochures or advertisements or newspaper articles.

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