PCTS Specialty Chemicals Pte Ltd

16 Joo Koon Crescent Singapore 629018 Tel: (65) 6862 2298 Fax: (65) 6862 2243

Dry Film Antibacterial Efficacy Studies on Nippon VirusGuard Sample

Author: Tan Chin Peng / Tan Kee Boon
Approved by: Peter Chan, Ph.D.

Project Number: BT2011130
Report Number: 2013ER285AB
Report issued on: 27 January 2014

TABLE OF CONTENTS

SUMMARY

Nippon Paint Singapore is developing a hygienic coating with antimicrobial efficacy. This project was conducted to demonstrate dry film antibacterial efficacy of Nippon VirusGuard from Nippon Paint Singapore (NPS).

An emulsion paint sample labelled as Nippon VirusGuard was obtained from NPS. The sample weighed about 250 g was received at PCTS in good condition with no leakage observed. With this sample, dry film antibacterial efficacy test was conducted to evaluate the efficacy of Nippon VirusGuard against 3 types of bacteria (*Escherichia coli*, *Staphylococcus aureus* and *Methacillin Resistance Staphylococcus aureu*).

In the dry film antibacterial efficacy test, we found that at the end of the incubation period, no bacterial growth from ALL the test species (*Escherichia coli*; *Staphylococcus aureus* and *Methacillin Resistance Staphylococcus aureu*) was observed on the film of Nippon VirusGuard. In contrary, heavy growth of all 3 types of bacteria was seen on PCTS' concurrent control and the blank paint sample, as indicated by the massive number of bacteria recovered from the paint film by washing (as illustrated by colonies on the petri dish).

The results from the dry film antibacterial test indicated that Nippon VirusGuard has sufficient dry film antibacterial efficacy against all the 3 types of tested bacteria species.

PROJECT OBJECTIVE

To evaluate the dry film antibacterial efficacy of Nippon VirusGuard from Nippon Paint Singapore.

PROJECT BACKGROUND

Nippon Paint Singapore is developing a hygienic coating with antimicrobial efficacy. This project was conducted to demonstrate dry film antibacterial efficacy of Nippon VirusGuard from Nippon Paint Singapore (NPS).

MATERIALS AND SAMPLES

An emulsion paint sample labelled as Nippon VirusGuard was obtained from NPS. The sample weighed about 250 g was received at PCTS in good condition with no leakage observed. With this sample, dry film antibacterial efficacy test was conducted to evaluate the efficacy of Nippon VirusGuard against 3 types of bacteria (*Escherichia coli*, *Staphylococcus aureus* and *Methacillin Resistance Staphylococcus aureu*).

TEST PROCEDURES

Antibacterial Efficacy Test (Washing Test; adopted from Japanese Industrial Standard Test Method (JIS Z 2801:2000)

For the antibacterial efficacy test, the paint sample was coated on a waxy paper using an applicator of 200 μm thickness. After drying for seven days, a 5 cm x 5 cm square-shape paint film was cut out from the big paint film using a cutter. Each square-shape paint film sample was sterilized under the UV light before conducting the test. The sterilized paint films were placed in the center of a sterilized petri dish, and the paint film surface was inoculated with 0.2 ml of *Escherichia coli* (ATCC No. 4157) inoculums. The concentration of *E. coli* inoculums contained $5.0 \times 10^5 - 2.0 \times 10^6$ CFU/ml. After inoculation, the test paint film were covered with a 4 cm x 4 cm square-shape polyethylene (PE) film to ensure a thin layer of inoculums contact with the test paint film sample. After incubation at 37 ^{o}C for 24 hours, the test paint film was washed with 20 ml of sterile water; and 0.5 ml of the washing water was inoculated onto the Nutrient Agar (NA) petri dish under aseptic conditions. The number of *Echerichia coli* colonies recovered from the paint film sample was counted after the petri dish had been incubated at 37 ^{o}C for 7 days. The above procedures were repeated using two other bacteria, *Staphylococcus aureus* (ATCC No. 6538) and *Methacillin Resistance Staphylococcus aureus* (ATCC No. BAA-41).

RESULTS AND OBSERVATIONS

Antibacterial Efficacy Test

The dry film antibacterial efficacy test results are listed in Table 1, and illustrated in Photo 1 to 6. In the dry film antibacterial efficacy test, we found that at the end of the incubation period, no bacterial growth from ALL the test species (*Escherichia coli*; *Staphylococcus aureus* and *Methacillin Resistance Staphylococcus aureu*) was observed on the film of Nippon VirusGuard. In contrary, heavy growth of all 3 types of bacteria was seen on PCTS' concurrent control and the blank paint sample, as indicated by the massive number of bacteria recovered from the paint film by washing (as illustrated by colonies on the petri dish).

CONCLUSIONS

The results from the dry film antibacterial test indicated that Nippon VirusGuard has sufficient dry film antibacterial efficacy against all the 3 types of tested bacteria species.

TABLE

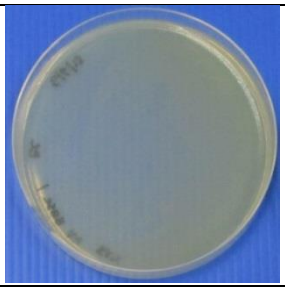
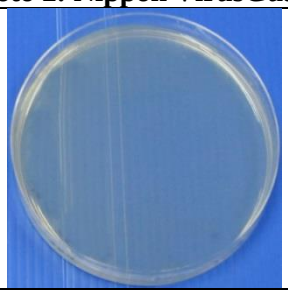
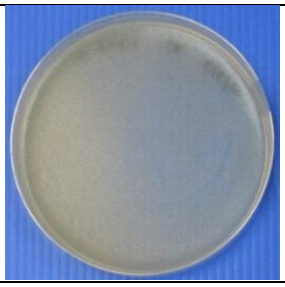
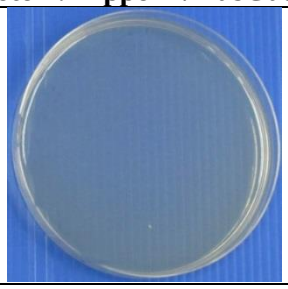
Table 1: Dry Film antibacterial efficacy test results on Nippon VirusGuard paint sample

Paint Samples Type	Estimated Number of bacterial colonies recovered from paint film surface		
	Escherichia coli	***Staphylococcus aureus***	***MRSA***
Nippon VirusGuard	0	0	0
PCTS' Control Blank	TMTC	TMTC	TMTC
PE Film Blank	TMTC	TMTC	TMTC

*TMTC: Number bacteria is Too Many To Count; MRSA: *Methacillin Resistance Staphylococcus aureus*

PHOTOS

Photo 1-6: Dry film antibacterial efficacy test on Nippon VirusGuard paint sample

Bacteria species	Recovery of bacteria from paint film surface	
Escherichia coli	**Photo 1: Control Blank**	**Photo 2: Nippon VirusGuard**
		
Staphylococcus aureus	**Photo 3: Control Blank**	**Photo 4: Nippon VirusGuard**
		
Methacillin Resistance Staphylococcus aureus (MRSA)	**Photo 5: Control Blank**	**Photo 6: Nippon VirusGuard**