PERFORMANCE Chemicals, LLC

ISO 9001 QUALITY MANAGEMENT

Confidential Product Information

PC-838 (Patent Pending)

PRODUCT DESCRIPTION:

PC-838 is a liquid water-soluble coating additive under development and testing by Performance Chemical to determine its utility for killing the SARS-CoV-2 (COVID-19) virus upon contact with a PC-838 containing coating. This material may be incorporated into paper, textile, non-woven, paints, coatings, acrylics, and adhesives. As part of this testing, PC-838 has been independently tested for efficacy against SARS-CoV-2 applied to different materials treated with PC-838 coatings. This testing has been done at the Level 4 Pathogen laboratory of the Public Health Agency of Canada's National Microbiology Laboratory in Winnipeg, Canada. In order to receive further information that may allow determination of PC-838's utility for use in antiviral coating (i.e.: application and design requirements for implementation into substrates and coatings per any specific application) an executed NDA will be required. Performance Chemical notes that the utility of PC-838 for any specific application needs to be determined for the application. Therefore, Performance Chemical makes here no claim that PC-838 will have utility for any specific application, is not advertising PC-838 or offering it for sale. Performance Chemical is only here, as allowed per 7 U.S.C., 136j(b)(5), providing opportunity for testing and evaluation of PC838 only to determine its value for pesticide purposes in specific applications or to determine its toxicity or other properties and from which any third party does not expect to receive any benefit in pest control from its use ins such evaluation and testing.

TYPICAL PROPERTIES *

PROPERTY	VALUE	UNIT
APPEARANCE:	Blue clear liquid	-
ODOR:	Mild odor	-
MELTING POINT:	NA	-
BOILING POINT:	ND	-
VISCOSITY @ 25°C (77°F):	10	**CPS (Brookfield)**
pH:	6.0 ± 1.0	**-pH Meter**
SOLUBILITY IN H2O:	Soluble	-
SPECIFICE GRAVITY:	1.23 ± .01	**g/ml**
POUR POINT:	~ -10	**°C**
VOC (EPA#24A):	NA	-
FLASH POINT:	ND	-

* The above information is given only as a listing of typical properties and is not intended to be representative of product specifications. Please contact the Quality Assurance Department for current product specifications.

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Methodology: Laboratory testing completed by the Public Health Agency of Canada's National Microbiology Laboratory on 07/14/2020 using cell preparation method ATCC CRL-1586, and Virus Disenfection method ASTM E-2197

The survival of SARS-CoV-2 was assessed over a 24-hour time course on a panel of 12 surfaces, consisting of chemically treated and untreated samples of six different material types:

Material	Type
Non-woven sample 5xx0 Treated with PC-R900, 15% wt/wt addition	Non-woven materials
Non-woven Ultra Sonic Bonded Spunlace Treated with PC-R900 15% wt/wt addition	
30# Paper bag (D1612301) Treated with PC-838 7.5% wt/wt addition	Paper-based materials
9# Tissue Treated with PC-838 15% wt/wt addition	
DxG white paper Treated with PC-838 10% wt/wt addition	
BxxR exterior paint Treated with PC-838 3% wt/wt addition.	Paint

Small ~ 1cm^2 coupons of all provided materials were prepared under sterile conditions in a biosafety cabinet. Experimental inoculum was prepared using SARS-CoV-2 virus stocks with the addition of a tripartite soil load containing mucin, bovine serum albumin and tryptone as per ASTM standard, resulting in a suspension with a final virus concentration of ~4.5 x 10^6 $TCID_{50}$/mL.

Coupons were placed face-up on the surface of sterile petri dishes and spotted with a single ten-microliter droplet of the SARS-CoV-2 inoculum. Samples designated for immediate elution ("T0") were transferred to individual wells of a sterile 12-well plate and eluted with 1 mL of virus culture medium (DMEM supplemented with 2% Fetal Bovine serum and 1% penicillin-streptomycin solution). Serial dilutions of eluates were subsequently prepared in virus culture medium and used to inoculate Vero E6 for end-point titration.

The remaining samples were left to dry for one hour under the biosafety cabinet, and subsequently transferred to individual wells of 12-well culture plates. Samples designated for elution at the 1 hour time point (T1) were processed as described above, while plates containing the T4 and T24 samples were removed from the BSC and placed in a covered container in the dark at ambient temperature for the appropriate amount of time until sampling.

As a toxicity control, non-inoculated coupons of all material types were similarly eluted in 1 mL of culture medium to assess for residual toxicity from the materials themselves; determining the limits of detection (termed limit of toxicity) for each material type in cell culture.

Results:

None of the eluates from untreated materials led to toxicity in cell culture. The paper-based materials which were treated with the PC-838 with an addition of 15% wt/wt, eluates of the chemically treated samples caused a cytotoxic effect in cell culture at neat and 10-1 dilutions, leading to a higher limit of detection for those particular materials as virus-induced cytopathic effect would not be discernable in the background of such cytotoxicity. In these cases, limits of toxicity ("LOT") are indicated on results graphs, as compared with the assay limit of detection ("LOD") indicated for other materials without associated cytotoxicity.

Stability of SARS-CoV-2

The detrimental effects of chemical treatment on SARS-CoV-2 surface stability were most pronounced with the 9# Tissue, where the virus appeared immediately inactivated following inoculation on the chemically treated substrate (T=0) compared to the untreated control material.

A similar result was observed with the treated Paint sample, which showed a notable decrease in residual viable virus compared to the untreated control starting at 1-hour post-inoculation. This trend remained for the duration of the experiment up to the final 24-hour sampling point.

In the case of the two non-woven materials treated with a highly water and grease resistant material the PC-R900, the 5xx0 and Non-Woven Ultra Sonic Bonded Spunlace, chemical treatment enhanced viral persistence on these surfaces compared to the untreated controls. With both materials, a significant change in surface properties was observed compared to the controls, where the applied inoculum remained in a spherical droplet on the deposited surface rather than being absorbed into the material. As a result, the drying time of the inoculum was significantly prolonged on the treated surfaces, likely contributing to the enhanced persistence of viable virus.

Of note, a source of variation in the data may be attributed to loss of input inoculum onto the petri dish prior to transferring the coupons to 12-well plates. This was especially noted in the case of paper-based products, where the inoculum quickly soaked through the material and contacted the plastic plate below. The decision to carry out the assay in this way, rather than inoculate the coupons directly in a 12-well plate format, was to ensure that any recovered virus was directly attributed to the eluted material itself rather than being artificially deposited onto the plastic well surface in the process. However, as all materials were treated in the identical manner, this potential for variation and input sample loss was consistent for both control and treated materials.

A graphical summary of results can be found in the attached figure, while raw experimental data is included in the attached table.

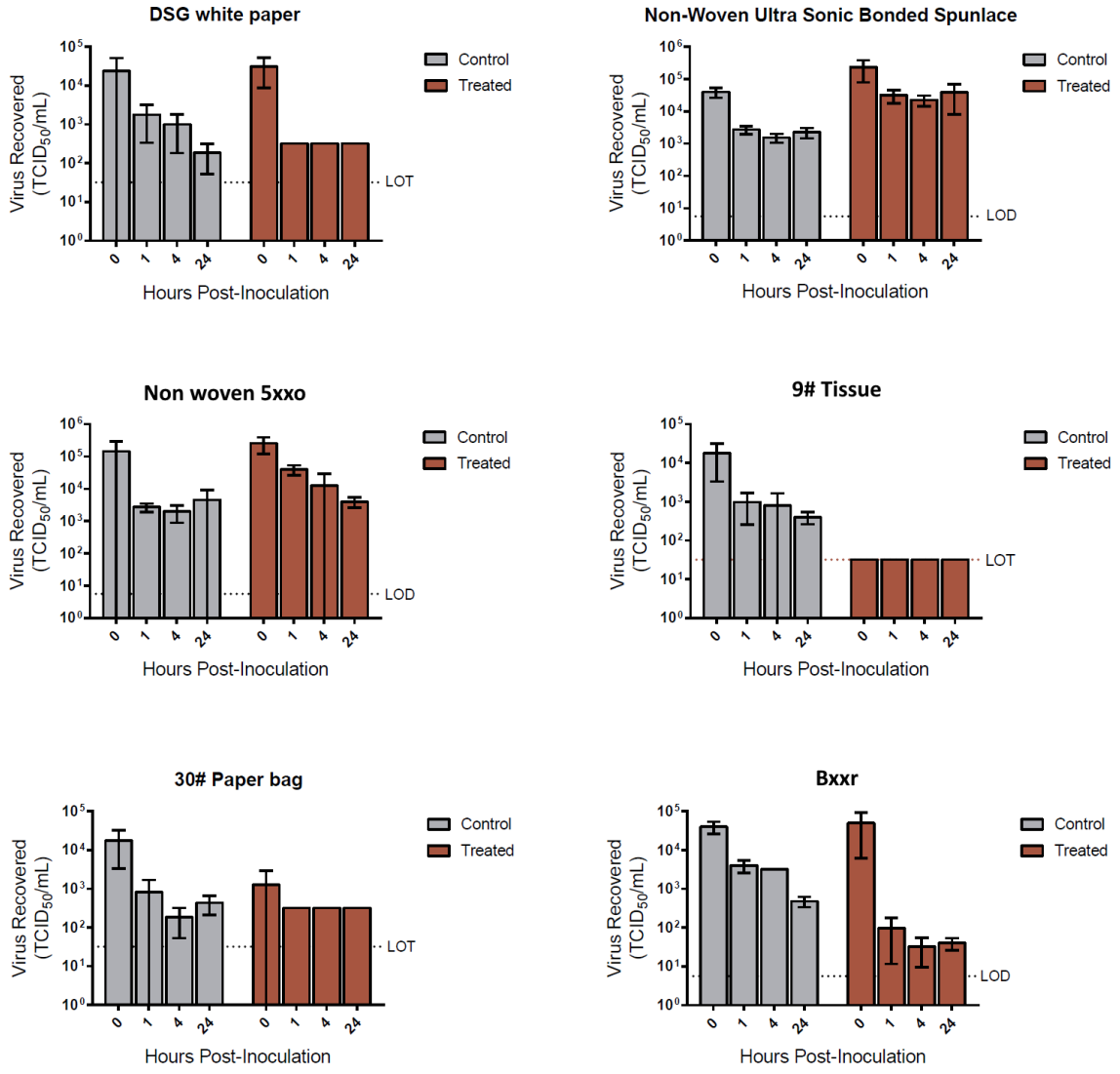

Figure 1

Figure 1. Recovery of SARS-CoV-2 following inoculation of treated and untreated materials. Coupons of test materials were inoculated with 10ul of SARS-CoV-2 suspended in a tripartite soil load and assessed for viral recovery immediately following inoculation (T=0 hrs) and after 1, 4 and 24 hours. Results indicate means +/- standard deviations of three technical replicates of each material from a single experiment. Virus recovery was determined through the 50% tissue culture infectious dose assay (TCID50) in Vero E6 cells following elution of inoculated materials in cell culture medium and subsequent 10-fold serial dilutions. Uninoculated coupons of treated and control materials were utilized to determine assay limits of detection based on toxicity. LOD = limit of detection of the TCID50 assay; LOT = limit of detection for a given material based on toxicity in cell culture.

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Persistence of SARS-CoV-2 on Six Materials. Results provided in Median Tissue Culture Infectious Dose units (TCID50) per mL.

	Non Woven 5xxo						Bxxr						9# Tissue					
Time	Control			Treated			Control			Treated			Control			Treated		
0	5.62E+04	3.16E+05	5.62E+04	1.78E+05	1.78E+05	4.22E+05	5.62E+04	3.16E+04	3.16E+04	1.00E+05	1.78E+04	3.16E+04	3.16E+03	1.78E+04	3.16E+04	3.16E+01	3.16E+01	3.16E+01
1	3.16E+03	3.16E+03	1.78E+03	3.16E+04	5.62E+04	3.16E+04	3.16E+03	5.62E+03	3.16E+03	1.78E+02	1.00E+01	1.00E+02	1.78E+03	5.62E+02	5.62E+02	3.16E+01	3.16E+01	3.16E+01
4	3.16E+03	1.00E+03	1.78E+03	3.16E+03	3.16E+03	3.16E+04	3.16E+03	3.16E+03	3.16E+03	1.00E+01	5.62E+01	3.16E+01	3.16E+02	3.16E+02	1.78E+03	3.16E+01	3.16E+01	3.16E+01
24	1.78E+03	1.78E+03	1.00E+04	3.16E+03	3.16E+03	5.62E+03	5.62E+02	3.16E+02	5.62E+02	5.62E+01	3.16E+01	3.16E+01	3.16E+02	3.16E+02	5.62E+02	3.16E+01	3.16E+01	3.16E+01

	DxG						Ultrasonic						30# Paper Bag					
Time	Control			Treated			Control			Treated			Control			Treated		
0	1.00E+04	5.62E+03	5.62E+04	1.78E+04	1.78E+04	5.62E+04	5.62E+04	3.16E+04	3.16E+04	5.62E+04	3.16E+05	3.16E+05	3.16E+03	1.78E+04	3.16E+04	3.16E+02	3.16E+02	3.16E+03
1	3.16E+03	1.78E+03	3.16E+02	3.16E+02	3.16E+02	3.16E+02	3.16E+03	3.16E+03	1.78E+03	4.64E+04	3.16E+04	1.78E+04	1.00E+02	5.62E+02	1.78E+03	3.16E+02	3.16E+02	3.16E+02
4	1.78E+02	1.78E+03	1.00E+03	3.16E+02	3.16E+02	3.16E+02	1.00E+03	1.78E+03	1.78E+03	1.78E+04	1.78E+04	3.16E+04	1.78E+02	5.62E+01	3.16E+02	3.16E+02	3.16E+02	3.16E+02
24	3.16E+02	1.78E+02	5.62E+01	3.16E+02	3.16E+02	3.16E+02	1.78E+03	1.78E+03	3.16E+03	3.16E+03	5.62E+04	5.62E+04	5.62E+02	5.62E+02	1.78E+02	3.16E+02	3.16E+02	3.16E+02

- The National Microbiology Laboratory (NML) is part of the Infectious Disease Prevention and Control Branch of the Public Health Agency of Canada (PHAC), the agency of the Government of Canada that is responsible for public health, health emergency preparedness and response, and infectious and chronic disease control and prevention.

- NML is in several sites across the country including the Canadian Science Centre for Human and Animal Health (CSCHAH) in Winnipeg, Manitoba. NML has a second site in Winnipeg, the Wilt Infectious Disease Research Centre on Logan Avenue which serves as a hub for HIV research and diagnostics in Canada. The three other primary sites include locations in Guelph, St. Hyacinthe and Lethbridge.

- The CSCHAH is a biosafety level 4 infectious disease laboratory facility, the only one of its kind in Canada.[2] With maximum containment, scientists are able to work with pathogens including Ebola, Marburg, Lassa fever, and SARS-CoV-2 / COVID-19.

- **This information is not to be taken as a warranty or representation for which we assume legal responsibility nor as permission or recommendation to practice any patented invention without a license. It is offered solely for your consideration, investigation, and verification. Refer to the Safety Data Sheet (SDS) for health, safety, and personal protection.**