National Forensic Sciences University

Knowledge | Wisdom | Fulfilment

An Institution of National Importance
(Ministry of Home Affairs, Government of India)

COVID -19 Testing Facility (ICMR APPROVED)

ANALYSIS REPORT

EFFICACY TESTING OF ANTIVIRAL AIR PRO 3DD MASK FABRIC AGAINST SARS-COV-2 VIRUS AS PER ISO 18184:2019 (MODIFIED) TEST METHOD

Name of Company

Pradaan Innovation Labs

Report No.

NFSU/IFS/AntiViral Testing/17/2021

Date: 15th November 2021

National Forensic Sciences University ★ School of Forensic Science ★ G'Nagar ★

15/11/2021

Objective

To evaluate the antiviral efficacy of mask as demonstrated by the ISO 21702:2019 (Modified) test method.

Test Sample Details

Name of the Product	Air Pro 3DD
Type of the product	N99 Mask
State of Product	Fabric
Name of Company	Pradaan Innovation Labs
Address	Shop No. 11, Emerald Shopping Complex, Silver Springs, Phase-2, AB Bypass Road, Indore-452020

Brief Note on Test Organism and Target Genes

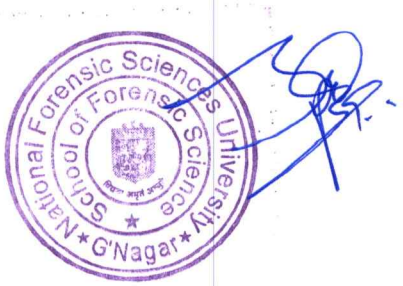
- SARS-CoV-2 is a positive-sense, single-stranded RNA (ssRNA), group IV virus. CoV genomes code for a ORF1a / ORF1ab polyprotein and four structural proteins and the non-structural genes include the RNA dependent RNA polymerase (RdRP) which are widely studied as major drug and detection targets.

Test Procedure Summary

- The test organism was adjusted and diluted to obtain the starting inoculum concentration of Ct value of 27.
- The control was tested in triplicate at Time = 05 min. The test samples were tested in triplicate at Time = 05 min.
- Each sample piece was placed in a sterile centrifuge tube and the medium having virus particles was inoculated in the tube.
- Then the samples were incubated at 25°C and a relative humidity of at least 90%. At the appropriate time the entire inoculum was withdrawn and collected in a fresh microcentrifuge tube.
- Then the inoculum was processed for RNA extraction using MagMAX™ RNA Extraction Kit (Thermo Fisher Scientific) method.
- After RNA extraction, the C_T value of each sample was recorded using the TaqPath one step RTPCR kit (Thermo Fisher Scientific) for COVID-19 detection. The results are sown in the "Test Results" section below. These results pertain only to the samples tested. All the samples were run in triplicate.

Test Variables

No.	Variable	Details
1	Sample Submission Date	07-11-2021
2	Sample Testing Date	14-11-2021
3	Report Date	15-11-2021
4	Sample to be tested	Fabric of Air Pro 3DD N99 Mask
5	Test Organism	SARS CoV-2 Virus
6	Size of the sample	50 X 50 mm
7	Method of Sterilization	NA
8	Control Sample	Untreated (non-antivial) Fabric (50 X 50mm)
9	Dilution Medium Used	Viral Transport Medium
10	Starting Inoculum	C_T value 27 for N, ORF1ab, and RNAseP gene
11	Amount of Inoculum	70 µL
12	Contact Time	05 min
13	Deviations from Standard Test Method	Yes. The method (ISO 18184:2019) was modified for the test organism SARS-CoV-2 Virus.



Test Results

No.	Product Name	Surface	Contact Time (Min)	Air Pro 3DD Mask Fabric									Untreated Fabric (Control)		
				**N Gene C_T (Average)	Delta C_T for N Gene (14-6)	% Reduction in viral Load	**ORF Gene C_T (Mean of Triplicate)	Delta C_T for ORF Gene (15-8)	% Reduction in viral Load	**S Gene C_T (Mean of Triplicate)	Delta C_T for S Gene (16-11)	% Reduction in viral Load	**N Gene C_T (Average)	**ORF Gene C_T (Average)	**S Gene C_T (Average)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Air Pro 3DD Mask Fabric	Fabric	05	33	03	99.9	32	02	99.0	34	04	99.99	30	30	30
2	Positive Control	N	NA	27	-	-	27	-	-	27	-	-	-	-	-
3	Negative Control	N	NA	ND	-	-	ND	-	-	-	-	-	ND	ND	ND

** = Mean of Triplicates, ND=Not Detected

Conclusion (These results pertain only to the samples tested)

Based on the test results, it is concluded that the tested fabric of the mask (tested samples) is effective to reduce viral load of SARS CoV-2 up to 99.9% within 05 min of contact time.

Test Results Interpretation

The value of the antiviral activity was calculated according to the formula listed below and recorded as log reduction.

$$R = (U_t - U_0) - (A_t - U_0) = U_t - A_t$$

Where,

R : antiviral activity

U_0 : average of logarithm numbers of viable viral particles from untreated control at Time = 0 h

U_t : average of logarithm numbers of viable viral particles from untreated control at Time = t Min

A_t : average of logarithm numbers of viable viral particles from test sample at Time = t Min

According to the standard, an antiviral product is determined to have antiviral effectiveness when the antiviral activity (R) is 2.0 or more.

Percent reductions are determined by comparing the sample after the contact time to the untreated laminate control after the contact. Reporting of percent reduction is not indicated by the test method but is provided by NFSU as additional information.

Percent reduction is translated into log reduction by the following:

90% reduction = 1 log reduction; i.e. Ct 10 increased to Ct 11 is a 1 log reduction

99% reduction = 2 log reduction; i.e. Ct 10 increased to Ct 12 is a 2 log reduction

99.9% reduction = 3 log reduction; i.e. Ct 10 increased to Ct 13 is a 3 log reduction

99.99% reduction = 4 log reduction; i.e. Ct 10 increased to Ct 14 is a 4 log reduction

99.999% reduction = 5 log reduction; i.e. Ct 10 increased to Ct 15 is a 5 log reduction

Analysis Reviewed and Approved by

Dr. Bhargav C. Patel
Assistant Professor & In-Charge
COVID-19 Testing Facility
National Forensic Sciences University
(NFSU) Gandhinagar, Gujarat, India
Phone: +91 079 23977186, +91 9978425121
Email: bhargav.patel@nfsu.ac.in
www.nfsu.ac.in