Smart Inovation®
Nanoscale empowerment

VIRUCIDAL ACTIVITY

PRODUCT ID: Si Bac-Pure 101-TF
MANUFACTURER: Smart Inovation, Lda.

Bac-Pure®
Antimicrobial
by Smart Inovation®

According to the European Centre for Disease Prevention and Control (ECDC https://www.ecdc.europa.eu/en), the active substance used in Si Bac-Pure formulations - Benzalkonium Chloride (BAC) - is known to be **effective against coronaviruses**.

Si Bac-Pure 101-TF uses a premium quality fast-acting biocide solution made from the quaternary ammonium compound benzalkonium chloride, that demonstrates antiviral activity. With our patented Si technology, we are able to fix those properties on textiles, providing long-lasting protection and high washing resistance.

The table below shows the antimicrobial agents recommended by the ECDC for health-care and non-healthcare use:

Antimicrobial agent	Concentration	Coronavirus tested
Ethanol	70%	HCoV-229E, MHV-2, MHV-N, CCV, TGEV
Sodium hypochlorite	0.1-0.5%	HCoV-229E
	0.05-0.1%	SARS-Cov
Povidone-iodine	10% (1% iodine)	HCoV-229E
Glutaraldehyde	2%	HCoV-229E
Isopropanol	50%	MHV-2, MHV-N, CCV
Benzalkonium chloride	**0.05%**	**MHV-2, MHV-N, CCV**
Sodium chlorite	0.23%	MHV-2, MHV-N, CCV
Formaldehyde	0.7%	MHV-2, MHV-N, CCV

Table 1: Antimicrobial agents effective against different coronaviruses: human coronavirus 229E (HCoV-229E), mouse hepatitis virus (MHV-2 and MHV-N), canine coronavirus (CCV), transmissible gastroenteritis virus (TGEV), and severe acute respiratory syndrome coronavirus (SARS-CoV) [1].
Ref:https://www.ecdc.europa.eu/sites/default/files/documents/coronavirus-SARS-CoV-2-guidance-environmental-cleaning-non-healthcare-facilities.pdf

ecdc
EUROPEAN CENTRE FOR DISEASE PREVENTION AND CONTROL

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筑波大学
University of Tsukuba

Studies performed at the University of Tsukuba, Japan, show that Canine Coronaviruses (MHV and CCV) were inactivated using only 0.05% benzalkonium chloride.

Ref: https://www.jstage.jst.go.jp/article/expanim1978/37/3/37_3_341/_pdf

Table 2. Virucidal efficacy of disinfectants against parvoviruses and coronaviruses

Disinfectant	Parvovirus		Coronavirus		
	CPV[a]	KRV[b]	MHV-2[b]	MHV-N[b]	CCV[a]
Ethanol	1.33[c]	1.05[c]	>4.20[d]	>3.91[d]	>3.28[d]
Isopropanol	1.00	0.88	>3.70	>4.10	>3.74
Benzalkonium chloride	0.67	1.46	>3.70	>4.10	>3.74
Iodophor (5 ppm)	0.50	0.96	0.66	0.54	0.44
〃 (50 ppm)	>2.83	3.25	>3.70	>4.10	>3.28
Sodium hypochlorite (10 ppm)	0.83	0.68	0.57	0.26	0.90
〃 (100 ppm)	>2.83	2.38	2.82	2.26	1.05
Sodium chlorite	NT	>3.55	>3.70	>3.91	>4.00
Cresol soap	0.40	0.46	>3.18	>3.23	>2.74
Formaldehyde	>2.83	2.18	>3.68	>3.45	>3.74
Chlorhexidine digluconate	0.40	0.39	0.80	0.66	0.28

FDA

According to the Food and Drugs Administration (FDA) in the United States, benzalkonium chloride is designated as “GRAS” (generally regarded as safe) for topical antiseptic applications. It is effective against gram-negative and gram-positive bacteria associated with nosocomial infections (hospital infections) and many virus associated with upper respiratory infections including human coronavirus.

Ref:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3145214/#bibr31-1740774511403513

Health Canada

Health Canada has developed a list of hard-surface disifectants that are likely to be effective and may be used against SARS-CoV-2, the coronavirus that causes COVID-19. For these products, evidence was submitted demonstrating that they are effective against harder-to-kill viruses or other viruses very similar to SARS-CoV-2.

Ref:https://www.canada.ca/en/health-canada/services/drugs-health-products/disinfectants/covid-19/list.html#tbl1

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OTHER VIRUSES

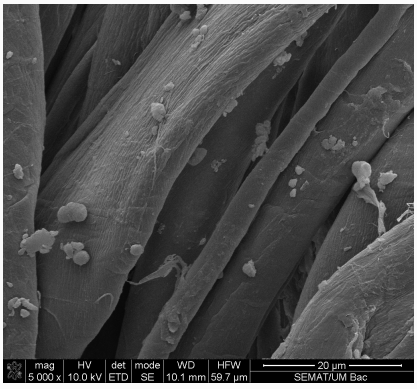
In 1963, a study performed in the Sterling-Winthrop Research Institute, New York, concluded that benzalkonium chloride inactivates several other virus such as influenza, measles, canine distemper, rabies, fowl laryngotracheitis, vaccinia, Semliki Forest, feline pneumonitis, meningo pneumonitis and herpes simplex viruses.

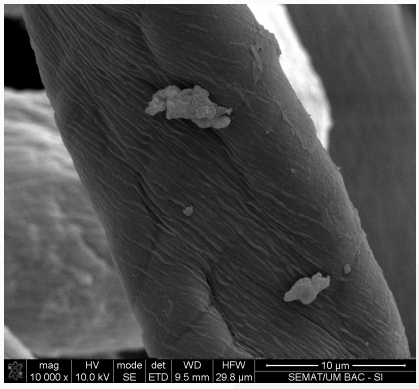
Ref:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1058082/?page=1

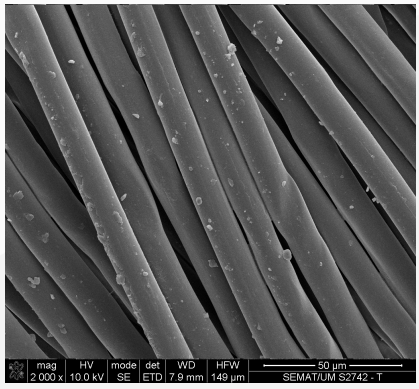
TEXTILES TREATED WITH Si BAC-PURE 101-TF

When treating textile materials with Si Bac-Pure 101-TF using the traditional finishing processes such as padding/foulard, exhaustion or spraying/tumbler, significant amounts of benzalkonium chloride will be fixed on the substrate.

The microscopic images below taken by us show the Si particles fixed on a textile substrate. These particles are transporting benzalkonium chloride on their surface, activating the treated material with the antimicrobial function.







The Si Bac-Pure functional finish will provide bactericidal, fungicidal and virucidal activity for over 100 washes, protecting both the textiles and the user.

Applicable on all types of fibres, fabrics, non-wovens, yarns, masks, home-textiles, socks, sports wear, every-day garments and many other.

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