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## Technical Report

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**Subject:** Purafil SP Media anti-microbial efficacy

### Scope

To evaluate Purafil SP Media removal efficiency against airborne bacteria and virus.

The tests were conducted at Guangdong Detection Center of Microbiology, China. The tests were run with commonly encountered airborne bacteria (*Staphylococcus albus*) and virus (Influenza A (H1N1)). Tests with Influenza A can provide an indication of the disinfection power of Purafil SP Media on CoVid-19.

### Background

Purafil SP Media consists of generally spherical, porous pellets formed from a combination of activated alumina and other binders, suitably impregnated with 12%wt sodium permanganate ( $\text{NaMnO}_4$ ). It has been specially engineered to provide the highest oxidation potential available thus assuring the highest overall performance. Purafil SP Media demonstrates a high working capacity for broad-spectrum control in applications where multiple contaminant gases are present.

The active ingredient,  $\text{NaMnO}_4$  has been used as disinfectant to inactivate or destroy microorganisms. It is effective in fighting viruses. It also kills bacteria, fungi and algae. Sodium permanganate is one of the most widely used inorganic chemicals for the treatment of municipal drinking and wastewater. Breakdown components of  $\text{NaMnO}_4$  (sodium, manganese, and water) are common in nature.

### Experimental Method

(Reference: The Technical Standard for Disinfection (2002 Ministry of Health P.R.China)-2.1.3)

Purafil SP sample (500g) is placed flat on the bottom of an air chamber ( $1 \text{ m}^3$ ). Then the challenge organism is aerosolized and introduced into the chamber. The bacteria/virus aerosol is circulated by a fan inside the chamber. The air circulation will continue for total two hours. Then the air inside the chamber is collected by a liquid aerosol sampler and assayed. The bacterial/virus units will be compared to a no-media control to determine the bacteria/virus removal efficiency with three replicates.

### Results and Discussion

The lab data show that, within 2hr, Purafil SP Media produced average 93.78% kill of the test bacteria (Table 1) and resulted in 99.49% virus kill in average (Table 2). Purafil SP Media has significant disinfecting power.

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**Table 1** Purafil SP Media Airborne Bacteria (Staphylococcus albus) Disinfection Effect

(Note: The natural decay of the bacteria in the air has been eliminated.)

Bacteria	Replicate	Initial number in the air (cfu/m <sup>3</sup> )	2hr number in the air (cfu/m <sup>3</sup> )	Killing rate (%)
Staphylococcus albus 8032	1	3.8x10 <sup>6</sup>	1.2x10 <sup>5</sup>	94.51
	2	3.4x10 <sup>6</sup>	1.3x10 <sup>5</sup>	93.12
	3	3.6x10 <sup>6</sup>	1.2x10 <sup>5</sup>	93.70

**Table 2** Purafil SP Media Airborne Virus (Influenza A (H1N1)) Elimination Effect

(Note: The natural decay of the virus in the air has been eliminated.)

Virus	Replicate	Initial air content (TCID <sub>50</sub> /m <sup>3</sup> )	2hr air content (TCID <sub>50</sub> /m <sup>3</sup> )	Killing rate (%)
Influenza A (H1N1)	1	1.79x10 <sup>6</sup>	3.12x10 <sup>3</sup>	99.53
	2	1.43x10 <sup>6</sup>	2.48x10 <sup>3</sup>	99.55
	3	1.79x10 <sup>6</sup>	5.30x10 <sup>3</sup>	99.40

The active ingredient NaMnO<sub>4</sub> has been one of the most versatile and most convenient forms of oxygen available. It liberates oxygen, oxidizes bacterial protoplasm, and destroys the lipid membrane through oxidation, which leads to irreversible damage of oxidizing-restoring reaction of bacteria and virus.

Purafil has conducted multiple tests to evaluate the correlation between media oxidation potential and NaMnO<sub>4</sub> content. In general, the oxidation potential is positively correlated to the NaMnO<sub>4</sub> content. One study indicates that, when NaMnO<sub>4</sub> content increased from 8 to 12%wt, the chemical oxidation capacity could increase by 60%.

Purafil SP Media has been specially engineered to provide the highest oxidation potential available on the market. The NaMnO<sub>4</sub> content has been optimized to assure the highest overall performance on bacterial/virus kill.

## Implications

Influenza A, SARS, and CoVid-19 are all enveloped viruses. The virion outer layer is a lipid membrane in which the virus multiplies. Enveloped viruses rely on the protective lipid coating—are the easiest type to deactivate.

Not many scientific studies have asked which are the most effective disinfecting agents to use against CoVid-19 because it was discovered so recently. Based on the data presented in this report, we believe that Purafil SP Media, which works perfectly against lipid-coating virus can work successfully against CoVid-19.