

PHA Agent:

BLESSTAR® EVER ECOLAR®

Antibacterial Performance (ASTM E2315-16 + ASTM E2783-22)

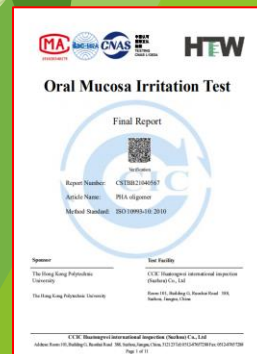
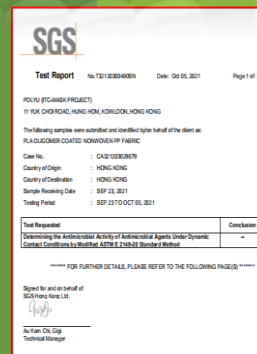
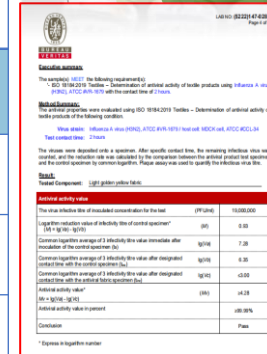
Concentration	S. Aureus (1min)	K. Pneumoniae (1min)	C. Albicans (1min)	Methicillin-resistant S. Aureus (1min)
20 mg/mL	> 99.99%	> 99.99%	> 99.99%	> 99.99%

Antiviral Performance of (20 mg/mL (2002 Ministry of Health, China, ISO 18184-2019)

Index/Virus	COVID-19 (20min)	H1N1 (1min)	H1N1 (1min)	H3N2 (1min)
Inactivation rate	> 99.99%	> 99.9%	> 99.99%	> 99.9%
Inactivation index	> 4	> 3	> 4	> 3.38

Skin irritation of (ISO 10993-10: 2010, 100mg/mL)

Index/Position	Oral mucosa of hamster	Vagina of white rabbit
Irritation index	0.7	0.7
Irritation reaction	negligible	negligible



Competitive analysis of BLESSTAR®

Items	Inorganic	Organic	Natural	BLESSTAR®
Typical products	Ag, CU, Mg and Zn compounds or nanoparticles	quaternary ammonium, Polybiguanides,	chitosan	PHA or its water solution
Antiviral/antimicrobial	excellent	excellent	good	excellent
Toxicity and allergy	high	medium	no	no
Lethal Dose50 (mg/kg)	2000	25.6	1500	4300
Degradation product	residuals of Ag, Cu, Zn	residuals of S, Cl, and N	H ₂ O, CO ₂ , N or others	Only H₂O, CO₂
Emission of CO ₂ (kg CO ₂ eq/kg)	2.91 (ZnO)	1.08 (Cl ₂)	2.11(NH ₃)	0.5
Price as disinfectant	> \$1000/L Nano-silver solution	\$200/kg	> \$480/kg	\$40~200/Kg
Price as finishing agent	> \$1000/L Nano-silver solution	\$180/kg	> \$300/kg	\$40~200/Kg

Traits:

- ❑ Fully biodegradable, low carbon emission.
- ❑ Broad-spectrum antiviral/antimicrobial property.
- ❑ Non-toxic and non-allergenic.
- ❑ Simple preparation and cost-effectiveness.
- ❑ Stable and durable.

Hodge and Sterner scale for the evaluation of toxicity

Toxicity Rating	Commonly Used Term	Oral LD50
		(single dose to rats) mg/kg
1	Extremely Toxic	1 or less
2	Highly Toxic	1-50
3	Moderately Toxic	50-500
4	Slightly Toxic	500-5000
5	Practically Non-toxic	5000-15,000
6	Relatively Harmless	15,000 or more

Notes: Lethal Dose50 (median lethal dose, LD50), higher LD50 means the much safer of the product.