

Antibacterial

Antibacterial (broad sense)

Refers to the process of killing bacteria, fungi and other microorganisms and/or hindering the reproduction and activity by physical and chemical methods.

Antibacterial process

Refers to the process of giving materials or products the function of killing or hindering the reproduction and activity of microorganisms such as bacteria and fungi.

Antibacterial activity value

Refers to the difference in the logarithmic number of viable bacteria or fungi between the control group and the test group in antibacterial testing.

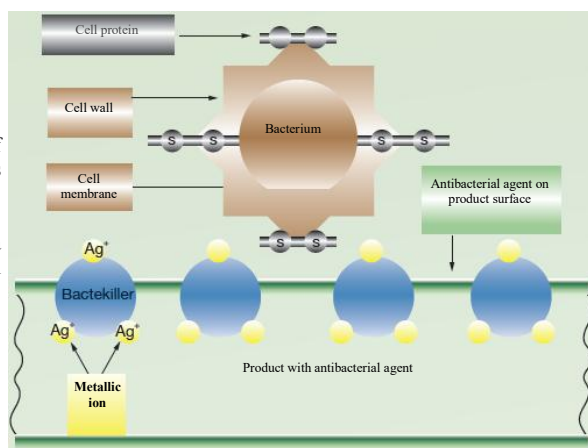
Antibacterial rate

Refers to the percentage difference being used to represent the difference in the number of bacteria or fungi between the control group and the test group in antibacterial testing.

Antibacterial product

Refers to products having the function of killing or hindering the reproduction and activity of microorganisms such as bacteria and fungi. Examples include antibacterial pigments, antibacterial ceramics and antibacterial textiles. (The above content is excerpted from T/CIAA 101-2021 Antibacterial Terminologies)

Antibacterial properties



Antibacterial products should have an antibacterial activity value of ≥ 2 or an antibacterial rate of $\geq 99\%$.

If products claim antifungal properties, the *Candida albicans* test should be performed, and the antibacterial activity value should be ≥ 2 or the antibacterial rate should be $\geq 99\%$.

To prove the antibacterial durability of a product, it should have an antibacterial activity value of ≥ 1 or an antibacterial rate of $\geq 90\%$.

Test grade of light resistance and light conditions

Grade	Light hours of different test equipment (hr)		Applicable scope
	Xenon lamp (60W/m ²)	weather resistance test box	
0	N/A		Products without exposure to light (e.g. disposable products)
1	10	8	Products exposed to limited light (e.g. products being used indoors)
2	100	80	Products exposed to much light (e.g. outdoor products and lighting devices, etc.)

Grade, temperature and immersing time of waterproof test

Grade	Immersing conditions		Applicable scope
	Water temperature (°C)	Immersing time (hr)	
0	N/A		Products generally not exposed to water, or only exposed to limited water when cleaning
1	Room temperature (Note 1)	16	Products rarely exposed to water
2	50±5	16	Products usually exposed to water, such as products used to store water or in water.
3	90±5	16	Products constantly exposed to warm water, such as products used to store water or in water.

(Note 1) Room temperature range: 5 ~ 35°C (subject to the specific application environment)

Antibacterial agents

Function carrier	Product name	Type	Average particle size	Package	Use case
Glass series	BM-102TG	Ag-Zn series	5µm	10kg	Resin molding
Glass series	BM-502FA	Ag-Zn series	7µm	10kg	Resin molding
Glass series	BM-102VT	Zn series	5µm	10kg	Resin molding
Glass series	BM-103NA(5)	Ag series	3µm	16kg	Resin molding (transparent)
Glass series	BM-102SD	Ag-Zn series	10µm	20kg	Resin molding (transparent)
Glass series	BM-103CK	Ag series	0.5µm	10kg	Spinning
Phosphas phosphate series	BM-102SVP01	Ag-Zn series	3µm	10kg	Water based paint
Phosphas phosphate series	BM-102SVP02	Ag-Zn series	3µm	10kg	Solvent paint

Safety requirement

Test item	Test result	Test organization
Acute oral toxicity test	LD50: Above 5000mg/kg	(C) Japan Food Research Laboratories No. OS1040370-3
Ames test	Negative	(C) Japan Food Research Laboratories No. OS1040370-5
Primary skin irritation test	Extremely weak irritation P.II:0.03	(C) Japan Food Research Laboratories No. OS1040370-4
Skin allergy test	Negative	(Z) Institute of Biochemistry No.1214

GB 9685-2016 Additives allowed to be used in plastic materials and products for food contact and their application requirements (continued)

FCA No.	Chinese name	CAS No.	Scope of use and maximum amount /%	SML/QM/ (mg/kg)	SML(T)/ (mg/kg)	SML(T) Group No.	Other requirements
FCA1288	Silver glass	-	PE, PP, PS, AS, ABS, PA, PET, PC, PVDC:2.25	0.05 (with silver liquid, SML)			
FCA1289	Silver-Zinc glass	-	PE, PP, PS, AS, ABS, PA, PET, PC, PVDC:3	0.05 (with silver liquid, SML)			Zinc element SML should satisfy the requirements in Attachment C
FCA1290	Silver zinc zeolite	-	PE, PP, PS, AS, ABS, PA, PET, PC, PVDC:3	0.05 (with silver liquid, SML)			Zinc element SML should satisfy the requirements in Attachment C

Antibacterial masterbatches

Resin	Processing mode	Type	Features	Use case
PE	Injection molding	BME-102TG20	Strong dispersibility without easy agglomeration	Chopping block
	Film processing	BAE-103NA10	Certified by FDA	Food packaging film
PP	Injection molding	BZP-102VT20	Anti-tarnish, applicable to white and light color product	Toilet seat
	Injection molding	BMP-502DI20	Transparent	Storage box
	Injection molding	BMP-102TG20	Strong dispersibility without easy agglomeration	Chopping block
	Spinning	BAP-103L20	Strong dispersibility and continuity	Spun-bond non-woven fabric
	Spinning	BAP-103CKK20	Strong dispersibility and continuity	Melt blown non-woven fabric
PPR	Extrusion	BMP-102SD20W	Certified by FDA	Water pipe
ABS	Injection molding	BZA-102VT20	Anti-tarnish, applicable to white and light color product	Gamepad
	Injection molding	BMA-102SD20	Certified by FDA	Doornob
	Injection molding	BAAB-503DJ05	Transparent	Dust cup and water tank
GPPS	Injection molding	BMGPPS-103GC05	Transparent	Fruit box and drawer in refrigerator
HIPS	Vacuum forming	BMPS-102TG20	Strong dispersibility without easy agglomeration	AC base
PCTG	Injection molding	BATG-502DG05	Transparent and hydrolytic resistance	Cold water cup
PA	Additive forming	BAPA-502B40	Use directly	Antibacterial part in air humidifier
PBT	Spinning	BABT-103NA10W	Strong dispersibility; certified by FDA	Cosmetic brush thread

Mold proof

Mold proof

Refers to the process of killing molds and/or hindering the reproduction and activity of molds by physical and chemical methods.

Mold proof grade

In antibacterial test, the grade of mold killing and/or hindering capability of the sample is represented by the growing of molds.

Mold proof product

Products that use antibacterial techniques to kill or hinder the growth, reproduction or inactivation of molds.

Mold proof property

Refers to the property to kill or hinder the growth, reproduction or inactivation of molds.

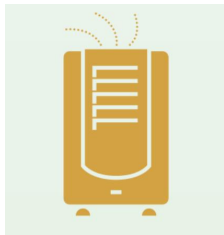
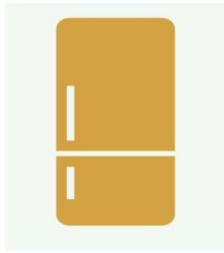
(The above content is excerpted from T/CIAA 101-2021 Antibacterial Terminologies)

Mold proof grade (GB/T 24128-2018 Plastic-Evaluation of mold proof effect of plastic anti-mold agent)

Grade	Mold growth condition	Description
0	No mold observed	This is a mold proof material.
1	Initial phase of growth (Compared with the other agar surface)	This material can prevent molds to some extent or is likely to be eroded by molds.
2	Obvious growth and produce spores	This material is vulnerable to molds.








Item	TZA-125CS5C	TZA-301	TZA-206-220	TZA-100	Note
Active ingredient	2-Octyl-2H-isothiazol-3-one (OIT) + Zinc compound	2-Octyl-2H-isothiazol-3-one (OIT) + inorganic compound	Hydroxypyridine thione compounds + inorganic compound	Imidazole compound	
Appearance	White powder	White powder	Yellow and white powder	White powder	
Thermotolerance	230°C	230°C	240°C	250°C	
Recommended amount	0.3% ~ 0.5%	0.5% ~ 0.7%	0.5% ~ 1%	0.7% ~ 1%	
Maximum amount	5%	9%	10%	4%	
Acute oral toxicity	LD ₅₀ ≥ 2,000 mg/kg (mouse)	LD ₅₀ ≥ 2,000 mg/kg (mouse)	LD ₅₀ ≥ 2,000 mg/kg (mouse)	LD ₅₀ ≥ 2,000 mg/kg (mouse)	Active ingredient 100%
Primary skin irritation	None (human: 8,900PPM solution)	None (human: 8,900PPM solution)	No impact on <i>Cavia porcellus</i>	Data not available	
Ames test	Ames on microorganism: Negative	Ames on microorganism: Negative	Ames on microorganism: Negative	Ames on microorganism: Negative	
Skin allergy	None (human: 250PPM solution)	None (human: 250PPM solution)	Negative	Data not available	
SIAA positive mold proof list	Under application	Registration completed	Registration completed	Registration completed	
PRTR	Not applicable	Not applicable	Not applicable	Not applicable	
USA EPA	Certified	Certified	Certified	Certified	Active ingredient 100%
USA FDA	Certified	Certified	Certified	Certified	Active ingredient 100%
Europe BPD	Under registration application	Under registration application	Under registration application	Under registration application	Active ingredient 100%

Home appliance









Use case	Resin	Properties required	Recommended type	Recommended amount
Refrigerator cover	GPPS	Antibacterial	S-6	0.5%-1.0%
Vegetable box	PP (transparent)	Antibacterial	BM-502DI	0.5%-1.0%
Handle	ABS	Antibacterial	BM-102SD	0.8%-1.0%
Ice maker	GPPS	Antibacterial	S-6	0.5%-1.0%
Water tank	PP		BM-502DI	
Ice cube				
Washing machine shell	HIPS ABS	Antibacterial Anti-dust	BM-102TG FujiSTAT S-6	0.8%-1.0% 5%-7%
Water absorption drum (plate)	PP	Antibacterial Mold proof	BMP-102TG20 PP14-5DF	4%-5% 1.0%-1.5%
Balancer (impeller)				
Control board (Board film)	PET	Antibacterial	BMPET-102SD20	5%-6%
Water pipe on washing machine	PVC	Antibacterial Mold proof	BMPVC-102P20 TZA-301	2.5%-3% 0.5%-1.0%
AC shell	ABS HIPS	Antibacterial Mold proof Anti-dust	BMA-102TG20 FujiStat S-6	4%-5% 20%-30%
Dust box	ABS	Antibacterial Mold proof	BMA-102TG20 TZA-100	3%-4% 0.7%-1.0%
Centrifugal fan	AS	Antibacterial Mold proof Anti-dust	BMAS-102SD20 TZA-100 FujiStat S-6	4%-5% 0.7%-1.0% 20%-30%
Remote controller	PP HIPS ABS PC Silica gel	Antibacterial	BM-102TG	0.5%-1.0%
Air purifier shell	ABS HIPS	Antibacterial Anti-dust	BM-102TG FujiStat S-6	0.8%-1.0% 20%-30%
Filter screen (filter cartridge)	PP PET	Antibacterial	MP-102B-B	1.5%owf
Water tank	PP ABS	Antibacterial	BM-102SD	0.5%-1.0%
Air outlet	ABS HIPS	Antibacterial	BM-102TG	0.8%-1.0%

Kitchen facilities



	Use case	Resin	Properties required	Recommended type	Recommended amount
	Shell of kitchen facilities	ABS	Antibacterial Anti-dirt	BM-102VT CB-50AB	0.8%-1.0% 2%-5%
	Water supplying and sewerage system	PVC PPR rubber	Antibacterial Mold proof	BM-102P BM-102SD TZA-206-220 TZA-301	0.5%-1.0% 1%-1.5%
	Table	Artificial marble	Antibacterial	BM-102SVP02	1.0%
	Drainage system	PP	Antibacterial Mold proof	BM-102TG TZA-301	0.5% 1%-1.5%
	Corner rack	PP	Antibacterial	BM-102TG	0.5%-1.0%
	Sponge	PP	Antibacterial Mold proof	BM-102TG	0.5%-1.0%
	Spoon	PP	Antibacterial	BM-102TG	0.5%-1.0%
	Trash bin	PP	Antibacterial	BM-102TG	0.5%-1.0%

Washing room facilities


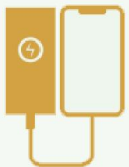

	Use case	Resin	Properties required	Recommended type	Recommended amount
	Shower	ABS	Antibacterial	BM-102VT	0.8%
	Hose	PVC	Antibacterial Mold proof	BM-102P TZA-206-220	0.5% 1%-1.5%




	Sewer line	PP	Antibacterial Mold proof Odor proof	BM-102TG TZA-301	0.5%-1.0% 1%-1.5%
	Bathtub	Unsaturated polyester	Antibacterial	BM-102SVP02	1%-1.5%
	Toilet brush (main body)	Elastic PP	Antibacterial	BM-102TG	0.5% -1.0%
	Bath basin	PP	Antibacterial Anti-dirt	BM-102TG CB-50PP	0.5%-1.0% 2.0%-5.0%
	Bath chair	EVA	Mold proof	TZA-206-220	1.0%-1.5%

Restroom facilities

	Use case	Resin	Properties required	Recommended type	Recommended amount
	Toilet (cover and seat)	PP ABS	Antibacterial	BM-502FA BM-102VT	0.5%-1.0% 0.8%-1.0%
	Under surface of the seat	PP ABS	Easy to clean	CB-50PP CB-50AB	2.0%-5.0%
	Handrail	PA	Antibacterial	BM-102TG	0.8%-1.2%
	Hands dryer	ABS	Antibacterial	BM-102VT	0.8%-1.0%

Antibacterial part of various small home appliances

	Use case	Resin	Properties required	Recommended type	Recommended amount
	Dust cup of vacuum cleaner	ABS	Antibacterial	BM-503DJ	0.8%-1.0%
	Nozzle	PP	Antibacterial	BM-102TG	0.5%-1.0%
	Portable charger	ABS	Antibacterial	BM-102TG	0.8%-1.0%
	Juicer	ABS AS PC	Antibacterial	BM-503DJ BM-103GB	0.8%-1.0% 0.3%-0.5%

	Electric toothbrush (brush)	PBT PA ABS	Antibacterial	FK-72 NY3-20SM1 BM-10TG	3%-5% 2%-4% 0.5%-0.7%
	Air humidifier	ABS GPPS	Antibacterial	BM-503DJ S-6	0.8%-1.0% 0.5%-1.0%
	Cellphone shell	Elastic	Antibacterial	BM-102SD	0.5%-1.0%

