Antibacterial Agent (Bio Cera A) _- NANO SILVER Materials

■ NANO SILVER PRODUCT INTRODUCTION

Bio Cera A is composed of Hydroxy Apatite, Zeolite as carrier and Ag, Zn ions, which are harmless to the human body. **Bio Cera A** is an inorganic antibiotic agent and active function to the living body by the infrared rays radiation ceramic at the same time.
Bio Cera A is added to the product, which is endowed with antibiotic function, thus it shows most effective antibiotic ability through contact with various kinds of microbe.
Generally, organic antibiotic agent does not have high heat resistance. In contrast, the inorganic agent, **Bio Cera A** permits better thermal stability even at temperature up to 1200℃ thus is displaying a wide range of applicability.

■ NANO SILVER MECHANISM

- Sterilization by active oxygen of ceramic.
- Sterilization by Nano Ag ions.
- Adsorption of bacteria, organic matter and gas.

■ SPECIFICATIONS- NANO SILVER

Appearance	Fine White Powder
Particle Size	3～4 ㎛(micron)
Heat Stability	800℃
Components	SiO2, CaO, P2O5, Ag, Zn, Mg, tec
Main Killing Agent	Ag, Zn, Active Oxygen
Main Function	Killing Bacteria, Fungi, Mould Active Function To The Living Body Deodorizer Water Purify

■ NANO SILVER PRODUCTS USAGE

Household electric appliance	Plastics components (inner, housing) of washing Machine and refrigerator Automatic-dishwasher/Humidifier/Air cleaner Kitchen plastic wares (dish, chopping board) Housing and filter of clean-water machine
Synthetic fibers	Acryl Polyester Nylon
Construction materials	Water Tank Paints Bathtub Laminated paper F.R.P. Cooling tower Cement Mixture of soil, sand to flowerpot and playground

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Wrapping and putting	Film (PET, Nylon, P.E) Wrap (PVC, P.E) All sorts of vinyl Corrugated cardboard
Paper	Wall paper Antibiotic paper Medical chart paper
Stationery and Toy	Crayon pastel Case of ball-point pen Eraser Plastics components of toy
Cosmetic	Foundation Cream Lipstick Puff Hairbrush

■ ANTIMICROBIAL EFFICACY TEST

- Shake flask Method: cells number/ml
- Test condition : At 25℃ for 24hrs, dilutions of cultures are divided by pour agar plate method to determine bacteria cell growth inhibition rate. (Surface area : 5cm × 6cm)
- Test bacteria: *Escherichia coli* (ATCC 25922)

□ Test Result

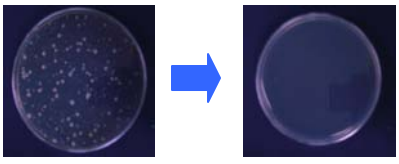
	Blank	Added	
Start	5.9×10^3	5.9×10^3	Cells number / ml
After 24hrs	2.8×10^5	10	

□ Percent reduction of bacterial (%)

$$= \frac{\text{Cells number of Blank 24hrs - cells number of added 24hrs}}{\text{Cells number of Blank 24hrs}} \times 100$$

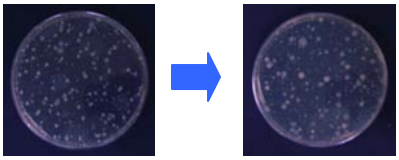
$$= \frac{2.8 \times 10^5 - 10}{2.8 \times 10^5} \times 100 = 99.99\ \%$$

Add **Bio Cera A** 2wt% to P.E



Start After 24hrs

Not Added



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Antibacterial Agent (Bio Cera A)

■ SAFETY DATA

Follow results, **Bio Cera A's** safety data to the human body.

□ Oral toxicity test - FDA Certification
Test animal: ICR mouse
Test items: LD50 value > 10,000mg/kg
Clinical symptoms: None
Variation of weight: None

□ Clastogenic activity Test
Test results: NO

□ Mutation test
Object of test: Salmonella Typhimurium
Test result: (-)

So, the **Bio Cera A** is harmless to the human body.

■ APPLICATION

1. PLASTIC (PE, PP, ABS)

1) Application and added quality
① Process for application
Bio Cera A must be used to plastics with powder itself or by the dilution method of concentrated Master Batch (M/B)
② Recommended Grade
Bio Cera A M/B 20 ~ 40 wt%

2) Key Point
① The antibiotic ability will be depend on the kinds of Resin and property
② The lower density Resin will be better to get the antibiotic effect than the higher density Resin
③ The below case show you which is the most reasonable resin on the basis of the same added **Bio Cera A** Quantity to each Resin
PE (2wt%) > PP > PVC (2.5wt%) > ABS (4.0wt%) > PC (Min 4.5wt%)
④ The added quantity will be changed by each company's technology to the degree of ± 0.2 wt%
⑤ The added quantity of **Bio Cera A** will be higher than that in case of thermosetting plastic
⑥ It is sufficient that M/B will be concentrated between 20 ~ 40wt%

2. PAINT

1) Application and added quantity
① Process for application
Bio Cera A may be used in wet mill processing before the raw material such like

resin, solvent, pigment, interfacial active agent are putted in wet mill.

② Recommended grade
Bio Cera A powder

③ Recommended added quantity
min 2 wt%

2) Key point

① It must be used before wet mill processing

② It will be better for using after make a slice agitation in case of long storage

③ If it requires the dilution before using, it would be better to reduce the ratio of dilution

3. COSMETIC

1) Application and added quantity

① Process for application
Bio Cera A is mainly used for foundation. color cosmetic itself, cosmetic product case and puff

② Recommended Grade
Bio Cera A powder

③ Recommended added quantity
1.0 wt%

2) Key point

① It must be used before mixing process

② It is the best way for user only to use inorganic Biocera A itself without any anti-septic agent, but if in case of needed a little antiseptic agent according to cost and other condition, it is available to use both at the same time

4. CRAYON

1) Application and added quantity

① Process for application
Bio Cera A must be putted in mixing process before crayon strength process

② Recommended Grade
Bio Cera A powder

③ Recommended added quantity
1.0 wt%

2) Key point

① To do raise antibiotic ability at high-dispersion process, it needs to be decided which operation would be reasonable?

5. PAPER

1) Application and added quantity

① Process for application
In case of inner paper, The **Bio Cera A** is used to stencil paper after dispersing uniformly into spread acid.
In case of outer paper, The **Bio Cera A** is used in resin coating process at highly dispersing equally

② Recommended Grade
Bio Cera A powder

③ Recommended added quantity
1 wt% at stencil paper / 1 wt% at final paper

2) Key point
① It needs anti-precipitate agent after spread acid mixing at precipitation tank and It needs to maintain high-dispersion
② To get a excellent antibiotic capability, It must be used in mixing together with spread acid and **Bio Cera A** and effectively wet mill milling.

6. FIBER

1) Application and added quantity
① Process for application
It is mixed with A-Type and synthetic resin, then well melting.
The fiber will be made after mixing under the condition of high-dispersion.
② Recommended Grade
Bio Cera A powder
③ Recommended added quantity
2.0 wt% at resin

2) Key point
① It is not available to use in original fiber.
② It is limited to use in double fiber thickness according to A-Type itself tail's size.
③ The fiber will be manufactured by mixing with M/B

7. RUBBER

1) Application and added quantity
① Process for application
Bio Cera A will be putted before rubber accelerator and other additive had putted in rubber raw material, then fully mixing and subsequent final product strength.
② Recommended Grade
Bio Cera A powder
③ Recommended added quantity
1.0 wt%

2) Key point
① It must be maintained to put rubber accelerator at first before added **Bio Cera A** into product under the condition of full rubber process.

Antibacterial Master Batch

Antibacterial Master Batch Information

1. Appearance: pellet

2. Practicable resins for application

1) Styrene group: ABS, PS (GPPS, HIPS), and SAN etc.
2) Olefin group: PE (HDPE, LDPE), PP etc.

3. Specific characteristics

1) Due to a good dispersion, the antibiotic effect is good and it minimize the quality deterioration of the final product appearance by antibiotic agent.
2) M/B has a good persistence, so it can be applied wildly application
3) M/B has a good heat-resistance, so it is easy to molding and handling
4) M/B is nontoxic and odorless, so the dealing of M/B is safe and it can be applied to food packing.
5) The particle size and shape of antibiotic agent are designed to optimize to commercial use with resin, when molding.
6) The color of M/B itself is light, so the coloring of the final product is easy.

4. Application of antibiotic M/B

1) Food packaging materials
2) Plastics for household goods
3) Stationery
4) Construction materials
5) Sanitary goods
6) Electric home application
7) Interior materials of automobile

5. Recommended Grade

Bio Cera A 20 ~ 40wt% concentrated M/B

Master Batch Pellets

Fine Powder

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