Patent Name：

A fabrication method of natural antibacterial tableware

Abstract：

The invention discloses a formula and fabrication method of a kind of natural antibacterial tableware. It consists of 40-99 weight percent of Antimicrobial sterilization amino resin0.1-8 weight percent of Antibacterial agents, and 0.1-5 percent of Additives。 The tableware has a continuing long-term, broad-spectrum, strong bactericidal inhibition for more than 300 kinds of harmful microorganisms, including Aspergillus flavus, Pseudomonas aeruginosa, Staphylococcus aureus, Escherichia coli, Rhodococcus rhodochrous, Candida albicans, the budding big blue bacilli.It also functions as self-cleaning.

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Claims

1. A kind of natural antibacterial tableware which is made of 40-99 weight percent of antimicrobial sterilization amino resin, 0.1-8 weight percent of Anti, agentsand 0.1-5 percent of Auxiliaries.
2. According to the claim 1, this kind of tableware made of amino materials, for example, plates, bowls, chopsticks, spoons, and tea wares, has the antibacterial function and the ability of self-cleaning.
3. According to the claim 1 and 2, products are fabricated by the model pressing or injection molding. The temperature is 60 – 165 degree C, and the curing time is 0.5 – 8 minutes with holding pressure exhaust.
4. According to one of the claim 1 to 3, all of tableware has the feature in common that a thermosetting amino resin is an amino resin or melamine-modified unsaturated polyester.
5. According to one of the claim 1 and 2, the tableware has the feature in common that The antibacterial agent is natural extracts sorbate, the hexanoyl urea of the inorganic antimicrobial agent silver activated carbon, titanium phosphate salts, silver zeolite, silver glass beads, silver, silica, or polystyrene.
6. According to one of the claim 1 to 3, the The antibacterial agent is natural extracts sorbate, the hexanoyl urea of the inorganic antimicrobial agent silver activated carbon, titanium phosphate salts, silver zeolite, silver glass beads, silver, silica, or polystyrene.
7. According to one of the claim 1 to 5, the tableware is fabricated by the molding. Thermosetting. . .Materialis preheated at the temperature of 60-165 degree C for 1 – 8 minutes, and then placed into the mold, followed by heating, pressing, and finally curing.
8. According to one of the claim 1 to 5, it also can be fabricated by the injection molding. The raw materials are added into the barrel with the internal and external heating so that they are melted. The temperature is kept at 80 to 165 degree C, and the pressure at 80 – 260 MPa. After holding the pressure for 0.5 – 8 min, the curing occurs.
9. According to the claim 1 to 3, the antibacterial effect of the tableware in the day-to-day using could be kept 95 to 99.9 percent, and the effect is permanent.

Manual

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Field:

The invention is to introduce the fabrication method and technological process of a kind of natural antibacterial tableware.

Background:

In our everyday lives, plastic cutlery, chopsticks, and drinking wares are the most items we use; however, the plastic surfaces often are contaminated by a variety of infectious diseases and bacteria, which in turn threat the people's health. In addition, the disposable wood chopsticks have the negative influence on the environment.

The patent of a producing method of antibacterial tableware submitted by the applicants has some problems in raw materials; subsequently it cannot be fabricated successfully.

Contents:

The raw materials of 40-99 weight percent of Antimicrobial sterilization amino resin0.1-8 weight percent of Antimicrobial agentsand 0.1-5 percent of Additives are blended in certain condition. In the patent, the Thermosetting amino resin is Amino resin or melamine-modified unsaturated polyester. Antibacterial fungicide is natural sorbic extract, or a thermosetting amino resin, melamine-modified unsaturated polyester, silver zeolite, silver glass beads, silver, silica, polypyridine, titanium phosphate salt, silver activated carbon or polystyrene hexanoyl urea. Antibacterial fungicide

can be use Coupling agent, a curing agent, a coloring agent, a lubricant, a stabilizer, a plasticizer or an accelerator. The accelerator is zinc stearate, calcium stearate, aluminum stearate, stearic acid, tallow, stearic acid or glyceridesd at a high temperature above 90 degree, the antibacterial effect is more than 99.9 percent. ~~Additives is~~

The tableware is made by the molding method. Thermosetting. ~~. .~~Materialis preheated at the temperature of 60-165 degree C for 1 – 8 minutes, and then placed into the mold, followed by heating, pressing, and finally curing. ~~The process is illustrated in Figure~~

It also can be fabricated by the injection molding. The Thermosetting. . .Materialis added in the barrel, and then is heated by heating the barrel and friction heat between the barrel and materials. The melt materials come through a nozzle under a strong pressure of the screw, and then injected through a mold gate, tunnel, and filled in all of a cavity. The curing occurs under the temperature at 80 to 165 degree C and the pressure at 80 – 260 MPa. It will be done within 0.5 – 8 min.

The mechanism of the invention is as follows. When the high speed ions rich of antibacterial fungicide powder is reaching micro-pathogenic organism, antibacterial ingredients with the positive charge are attracted by the microbial cells with the negative charge due to the Coulomb force. Therefore, the positive ions are able to penetrate cell membranes and react with Mercapto, aminoinside the

pathogenic microorganisms. As a result, the protein structure of pathogenic microorganisms is damaged so that its breath, metabolism, and even reproduction cannot function well until dead. It is why there is no pathogen propagation.

The fungicide powder is selected thoroughly based on the physicochemical properties of the base materials in order that they have the above functions, and are consist with the mechanism of photocatalytic activity oxygen.
Compared to the traditional plastic cutlery, the innovated tableware can strongly inhibit and even kill more than 300 kinds of pathogenic microorganisms, ~~including.....~~ In addition, the inorganic active components have the long-term antibacterial sterilization, and it will not affect the physical properties of the tableware, nor harm the human body. It is good enough to clean by water after using, and no further sterilization work is need.

The molding process is as follows. The KAY is preheated by infrared heating or high-frequency heating method. The temperature is remained at 60 – 160 degree C, the time varies by the degree of drying. Then the preheated materials are placed in a mold, followed by heating, pressing, and curing before the tableware is done.

As for the different geometric tableware, different raw materials are adopted, but the principle method and process are similar. The main features are following: 1 during the molding process, both the resin and antibacterial fungicide powders flow and fill with all of mold cavity. 2 The exhaust time is 2 - 25 seconds. 3. The curing time is about 30second to 15 minutes. 4 the temperature is at 80 – 165 degree C. 5. Exhaust must be operated rapidly when the raw materials are still in the plastic state, otherwise it will affect the properties and appearance of tableware.

Next it is the mechanism of the injection molding. The KAY is added in the barrel, and then is heated by heating the barrel and friction heat between the barrel and materials. The materials melt and come through a nozzle under a strong pressure of the screw, and then injected through a mold gate, tunnel, and filled in all of a cavity. The curing happed under the temperature at 80 to 165 degree C and the pressure at 80 – 260 MPa. It will be done within 0.5 – 8 min.

The injection molding and pressing molding have different requirements for the physicochemical properties of raw materials. Because polycondensation and curing properties of thermosetting powder, amino-modified unsaturated polyester mold powder aggregation reduced when they react with antimicrobial sterilization powder under certain temperature and high pressure, it become necessary to add plasticizer before the injection molding to increase the flexibility and mobility of the injected material, meanwhile, using a small amount of a curing accelerator can help antibiosis cured fast under the hot pressing conditions, and shorten the molding cycle. Generally 0.1 to 5.0 weigh percent of magnesium oxide is used as the curing agent.

The base materials used in the tableware can be one of Thermosetting molding powder; unsaturated polyesters, amino resins, alkyd resins, aralkyl ethers. The process is to add an appropriate amount of antimicrobial agent in the production process, or add antibacterial powder directly into the raw materials.

Below are two examples.

Example 1

The KAY is preheated by infrared heating or high-frequency heating method. The temperature is remained at 60 – 140 degree C, and the time is 0.05 hour. Then the preheated materials are placed in a mold, followed by heating, pressing, and curing before the tableware is done.

Procedure: raw materials, drying and preheating, mold closing, 1st exhaust, decals, curing, varnish, 2nd exhaust, stripping, cooling, sorting, polishing, finished. Antibacterial fungicide powder and filler flow with resin, and fill the entire mold cavity. Each exhaust time is 1S - 20S. The temperature is at 120 – 195 degree C. Exhaust must be operated rapidly when the raw materials are still in the plastic state; otherwise it will affect the properties and appearance of tableware.

Example 2
Prepare the raw material with the following percentage:
95 weight percent of Etherified urea-formaldehyde resin, 3 weight percent of antimicrobial agent (silver quinolizin gum), and 2 weight percent of additives (conventional plastic processing using coupling agent, a curing agent, a coloring agent, a lubricant, a stabilizer, a plasticizer etc.).

The KAY is added in the barrel, and then is heated by heating the barrel and friction heat between screw rotation and materials. The materials melt and flow. The curing takes place under the temperature at 100 to 190 degree C and the pressure at 90 – 260 MPa. After a period of time, curing is done. Then open the injection mold, antibiosis tableware, chopsticks and drinking utensils are made.

The injection molding process: barrel loading, pre-plastic, plasticizing measurement, clamping, injection, exhaust, decals, packing, curing reaction, mold ejector finished and clean up mold.