Notice

DESCRIPTION CN101336640A

Tetrasilver tetroxide fungicide, preparation method and application thereof

[0001]

Technical Field

[0002]

The invention relates to a tetrasilver tetroxide fungicide, a preparation method and application thereof.

[0003]

Background Art

[0004]

At present, the research and application of fungicides are mainly focused on the agents for preventing and controlling diseases caused by fungi, while the research and development of agents for preventing and controlling diseases caused by bacteria and viruses is still insufficient.
The bactericidal effect of silver has long been discovered. In recent years, while people have cracked the bactericidal principle of silver, they have gradually wanted to apply the bactericidal principle of silver to products. However, there is no example in the market of using silver as a bactericide to prevent bacteria and viruses and applying it to products. The "Progress in the Medicinal Research of Tetrasilver Tetraoxide" was reported in the July 2005

issue of "Chinese Journal of New Drugs and Clinical Practice", pointing out that tetrasilver tetroxide is expected to become a new type of antimicrobial agent and be used in the treatment of diseases such as AIDS and cancer.

[0005]

Summary of the invention

[0006]

Purpose of the invention: The purpose of the present invention is to provide a tetrasilver tetroxide fungicide prepared from tetrasilver tetroxide, a preparation method and its application as a fungicide additive.

[0007]

Technical solution: A tetrasilver tetroxide fungicide, which comprises the following components by weight: 800-1200 parts of weak alkaline solution, 0.1-0.5 parts of tetrasilver tetroxide, and 8-20 parts of polyvinyl alcohol.

[0008]

The tetrasilver tetroxide fungicide comprises the following components by weight: 1000 parts of weak alkaline solution, 0.2 parts of tetrasilver tetroxide and 10-15 parts of polyvinyl alcohol.

[0009]

The preparation method of tetrasilver tetroxide fungicide comprises the following steps:

[0010]

(1) Using a weak alkaline solution with a pH value of 7.0 to 7.5 as a solvent, take 800 to 1200 parts of the weak alkaline solution, add 0.1 to 0.5 parts of tetrasilver tetroxide to fully dilute it;

[0011]

(2) Using 8 to 20 parts of polyvinyl alcohol as a carrier, uniformly mix the polyvinyl alcohol with the solution obtained in step (1) to prepare tetrasilver tetroxide fungicide.

[0012]

The weak alkaline solution in step (1) is aqueous ammonia, sodium hydroxide or potassium hydroxide.

[0013]

Application of tetrasilver tetroxide fungicide as fungicide additive.

[0014]

Application of tetrasilver tetroxide fungicide as fungicide additive in antibacterial plastic products.

[0015]

Application of tetrasilver tetroxide bactericide as bactericidal additive in antibacterial fiber products.

[0016]

Application of tetrasilver tetroxide bactericide as bactericidal additive in antibacterial fabrics.

[0017]

The application of tetrasilver tetroxide fungicide as a fungicide additive in protecting plants against diseases caused by various pathogenic microorganisms.

[0018]

Application of tetrasilver tetroxide fungicide as fungicide additive in antimicrobial coatings.

[0019]

According to the two mechanisms of action of fungicides: Kill bacteria by interfering with the breathing process of bacteria and inhibiting the production of energy.
Interfere with the biosynthesis of bacterial life substances such as proteins, nucleic acids, alcohols, etc. to kill bacteria.
The tetrasilver tetroxide fungicide prepared from tetrasilver tetroxide belongs to the second type of mechanism of action as a fungicide.
Analyzing the mechanism of action of tetrasilver tetroxide (Ag₄O₄), the antibacterial order of silver ions is: Ag³⁺Ag²⁺Ag¹⁺, and tetrasilver tetroxide (Ag₄O₄) is a "polyvalent silver" oxide with a unique conformation. It can undergo redox reactions with the exposed 2N and

2S groups on the protein surface, thereby producing electrocidal and chelating effects that cause changes in the protein conformation.
Its mechanism of action is different from that of general antimicrobial preparations. It is unlikely to cause pathogens to develop drug resistance or mutation, has no toxicity to normal tissues, and has antimicrobial and diseased cell-killing effects.

[0020]

Beneficial effects: Tetrasilver tetroxide has the function of interfering with and preventing the biosynthesis of life substances of bacteria, especially bacteria and viruses. The tetrasilver tetroxide bactericide is used as a bactericidal additive to produce antibacterial plastic products, antibacterial fiber products, antibacterial fabrics, anti-plant diseases caused by various pathogenic microorganisms, additives for medical equipment and reagents, antibacterial coatings and antibacterial sanitary ware, etc., which are widely used in these fields and have a good inhibitory effect on bacteria and viruses. The preparation method of the present invention is simple and suitable for large-scale industrial production, and the application method is simple and practical.

[0021]

DETAILED DESCRIPTION

[0022]

The present invention is further described in detail below in conjunction with specific implementation methods.

[0023]

Example 1: Preparation of tetrasilver tetroxide fungicide.

[0024]

(1) Use 1 kg of ammonia (NH₃) solution with a pH value of 7.0 as solvent, add 200 mg of tetrasilver tetroxide and dilute it thoroughly;

[0025]

(2) 0.01 kg of polyvinyl alcohol is used as a carrier and uniformly mixed with the solution obtained in step (1) to obtain 1 kg of tetrasilver tetroxide fungicide.

[0026]

Example 2: Application of tetrasilver tetroxide fungicide as fungicide additive in antibacterial plastic products.

[0027]

The reagent containing the tetrasilver tetroxide bactericide obtained in Example 1 is sprayed on the air conditioning filter element, and after natural curing and drying, an air conditioning filter element with antibacterial effect is obtained.
Tetrasilver tetroxide fungicide can also be added in the form of a plastic coupling agent, that is, a solution containing tetrasilver tetroxide fungicide is sprayed on plastic particles and then dried before use.

[0028]

After testing, the survival rates of Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Bacillus aerogenes, Bacillus fragilis, and mixed bacteria in the air conditioning filter element sprayed with tetrasilver tetroxide fungicide were all 0. This shows that tetrasilver tetroxide fungicide has the effect of killing bacteria and molds.

[0029]

Example 3: Application of tetrasilver tetroxide bactericide as bactericidal additive in antibacterial plastic products.

[0030]

The tetrasilver tetroxide bactericide obtained in Example 1 is directly applied to the formed air conditioner shell in a mist or coating manner to combine the tetrasilver tetroxide bactericide with the air conditioner shell.
Since the outer surface of the air conditioner is very smooth, it can be treated with corona first. That is, under the action of a high-voltage electric field, the electron flow strongly impacts the surface of the air conditioner shell, which can make the shell surface fluffy and rough, thereby increasing the surface area. When the fungicide comes into contact with its surface, it can produce good infiltration and penetrate into the roughened grooves. Relying on the anchoring effect, it firmly bonds to the plastic shell.
Using this principle, after corona treatment, the tetrasilver tetroxide fungicide is applied in the form of mist or coating, and dried at 60-80°C for 8-12 minutes, so that the tetrasilver tetroxide fungicide is fixed to the surface of the plastic shell through complexation.

[0031]

After testing, the survival rates of Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Bacillus aerogenes, Bacillus fragilis, and mixed strains in the air conditioner shell sprayed with tetrasilver tetroxide fungicide were all 0. This shows that tetrasilver tetroxide fungicide has the effect of killing bacteria and molds.

[0032]

Example 4: Preparation method of tetrasilver tetroxide fungicide.

[0033]

(1) Use 0.5 kg of sodium hydroxide solution with a pH of 7.2 as solvent, add 100 mg of tetrasilver tetroxide and dilute thoroughly;

[0034]

(2) Using 0.006 kg of polyvinyl alcohol as a carrier, uniformly mix it with the solution obtained in step (1), thereby obtaining 0.5 kg of tetrasilver tetroxide fungicide.

[0035]

Example 5: Application of tetrasilver tetroxide bactericide as bactericidal additive in antibacterial fiber products.

[0036]

The PP drawing grade fiber product is cross-linked with a solution of tetrasilver tetroxide bactericide prepared in Example 4 at 60-85°C and then dried to obtain an antibacterial fiber product with bactericidal effect.

[0037]

After testing, the survival rates of Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Bacillus aerogenes, Bacillus fragilis, and mixed strains in PP drawing-grade fiber products coated with tetrasilver tetroxide bactericide were all 0. This shows that tetrasilver tetroxide bactericide has the effect of killing bacteria and molds.

[0038]

Example 6: Application of tetrasilver tetroxide bactericide as bactericidal additive in antibacterial fiber products.

[0039]

The tetrasilver tetroxide bactericidal agent obtained in Example 4 is added to the hot melt adhesive, and a diaper for children with bactericidal effect can be prepared by a coating method.

[0040]

After testing, the survival rate of Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Bacillus aerogenes, Bacillus fragilis, and mixed bacteria in children's diapers coated with tetrasilver tetroxide fungicide was 0. This shows that tetrasilver tetroxide fungicide has the effect of killing bacteria and molds.

[0041]

Example 7: Application of tetrasilver tetroxide bactericide as bactericidal additive in antibacterial fiber products.

[0042]

The tetrasilver tetroxide bactericidal agent obtained in Example 4 is added to the hot melt adhesive, and a sanitary napkin and a sanitary pad having a bactericidal effect can be prepared by a coating method.

[0043]

After testing, the survival rates of Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Clostridium difficile, Bacillus fragrans, and mixed samples of bacteria in sanitary napkins and sanitary pads coated with tetrasilver tetroxide bactericide were all 0. This shows that tetrasilver tetroxide bactericide has the effect of killing bacteria and molds.

[0044]

Example 8: Application of tetrasilver tetroxide bactericide as bactericidal additive in antibacterial fabrics.

[0045]

The medical staff and patient clothing were immersed in the tetrasilver tetroxide bactericidal solution prepared in Example 4, the solution was recovered by centrifugal dehydration, and the clothing for medical staff and patients with antibacterial effect was prepared by cooling and drying.

[0046]

After testing, the survival rate of Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Bacillus aerogenes, Bacillus fragilis, and mixed samples of bacteria in the clothes of medical staff and patients soaked in tetrasilver tetroxide fungicide was 0. This shows that tetrasilver tetroxide fungicide has the effect of killing bacteria and molds.

[0047]

Example 9: Application of tetrasilver tetroxide bactericide as bactericidal additive in antibacterial fabrics.

[0048]

The wound patch was immersed in the solution of the tetrasilver tetroxide bactericidal agent obtained in Example 4, the solution was recovered by centrifugal dehydration, and the wound patch with antibacterial effect was prepared by the method of cooling and drying.

[0049]

After testing, the survival rates of Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Clostridium perfringens, Bacillus fragrans, and mixed bacteria in the wound dressing soaked with tetrasilver tetroxide bactericidal agent were all 0, which shows that the tetrasilver tetroxide bactericidal agent has the effect of killing bacteria and molds.

[0050]

Example 10: Preparation method of tetrasilver tetroxide fungicide.

[0051]

(1) Use 2 kg of potassium hydroxide solution with a pH of 7.5 as solvent, add 400 mg of tetrasilver tetroxide and dilute thoroughly;

[0052]

(2) 0.03 kg of polyvinyl alcohol is used as a carrier and uniformly mixed with the solution obtained in step (1) to prepare 2 kg of tetrasilver tetroxide fungicide.

[0053]

Example 11: Application of tetrasilver tetroxide fungicide in protecting plants against diseases caused by various pathogenic microorganisms.

[0054]

When watering wheat, the tetrasilver tetroxide fungicide prepared in Example 10 can be diluted to a concentration of 10-30 ppb, and spraying or pouring can effectively prevent wheat diseases caused by various pathogenic microorganisms.

[0055]

After testing, the survival rates of Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Bacillus aerogenes, Bacillus fragilis, and mixed strains of wheat watered with water containing tetrasilver tetroxide fungicide were all 0. This shows that tetrasilver tetroxide fungicide has the effect of killing bacteria and molds, thereby effectively inhibiting diseases caused by pathogenic microorganisms.

[0056]

Example 12: Application of tetrasilver tetroxide fungicide in protecting plants against diseases caused by various pathogenic microorganisms.

[0057]

The tetrasilver tetroxide fungicide prepared in Example 10 is diluted to a concentration of 10-30 ppb and sprinkled on apple trees by spraying or pouring, which can effectively prevent apple tree diseases caused by various pathogenic microorganisms.

[0058]

After testing, it was found that the survival rates of Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Bacillus aerogenes, Bacillus citriodorus, and mixed strains of apple trees watered with water containing tetrasilver tetroxide fungicide were all 0. This shows that tetrasilver tetroxide fungicide has the effect of killing bacteria and molds, thereby effectively inhibiting diseases caused by pathogenic microorganisms.

[0059]

Example 13: Application of tetrasilver tetroxide fungicide in protecting plants against diseases caused by various pathogenic microorganisms.

[0060]

The tetrasilver tetroxide fungicide obtained in Example 10 is diluted to a concentration of 10-30 ppb and sprinkled on the lawn by spraying or pouring, which can effectively prevent lawn diseases caused by various pathogenic microorganisms.

[0061]

After testing, it was found that the survival rates of Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Bacillus aerogenes, Bacillus fragilis, and mixed strains of bacteria in the lawns watered with water containing tetrasilver tetroxide fungicide were all 0. This shows that tetrasilver tetroxide fungicide has the effect of killing bacteria and molds, thereby effectively inhibiting diseases caused by pathogenic microorganisms.

[0062]

Example 14: Application of tetrasilver tetroxide bactericide as bactericidal additive in antibacterial coating.

[0063]

The tetrasilver tetroxide bactericide obtained in Example 10 is added to paint or coating at a concentration of 10 to 50 ppm, and the paint or coating is sprayed on handrails, computers, telephones, toys, wooden floors and other frequently used items with a large number of bacteria, thereby making the articles sprayed with paint or coating have antibacterial effects.

[0064]

After testing, it was found that the survival rate of Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Bacillus aerogenes, Bacillus fragilis, and mixed samples of bacteria on handrails, computers, telephones, toys, and wooden floors that had been sprayed with paint containing tetrasilver tetroxide fungicide was 0. This shows that tetrasilver tetroxide fungicide has the effect of killing bacteria and molds.