



BEAUTY PILLOWCASE, SHEETS
And
ANTI-MICROBIAL MATTRESS COVERS

Made by Cuprotex using
CUPRON COPPER TECHNOLOGY

1. How do the copper ions get into the body/skin?

- A. The copper oxides impregnated in the yarn are highly reactive to the vapor in the air and moisture in your skin. When activated by this moisture the copper ions readily dissociate from the oxygen atoms and interact with other molecules in your skin, where they then can begin to exert the important roles they play in skin formation. The normal amount of moisture we all lose from our bodies each night, while we are sleeping, is more than that necessary for the constant release of the copper ions.

2. How does copper help the appearance of our skin?

- A. Based on scientific knowledge, there are studies showing that copper plays a key role in many of the processes that together comprise skin generation. For example, copper stabilizes fibronectin and induces integrin expression. Both proteins are key molecules, without which, collagen would not be able to perform its role of holding together the cells in the skin. Copper is also critical in the generation of new blood capillaries. Without them there would not be the necessary blood supply for the generation of the new skin!

3. What about the creams and other products I already use at night?

- A. Expensive and time-consuming facial creams of varying benefit are not necessary as the pillowcase is designed to work best on clean skin.

4. How long should I expect to wait before noticing a change in the appearance of the tone and texture of my skin when sleeping on the Cuprotex pillowcase?

- A. An independent four week double blind study by a large cosmetics company concludes that the women using the pillowcases with the Cupron copper technology showed “statistically significantly better” results than their peers that used the Placebo products. The Cupron pillowcases performed statistically significantly better than the placebo pillowcases after two (2) weeks, and this was more noticeable at four (4) weeks, for the facial attributes of crow’s feet, wrinkles, fine lines and overall skin appearance.

5. How long will the copper in my pillowcase or mattress cover last?

- A. The copper is imbedded in the polymer as it is spun, so it will continue working as long as the product is functionally useful. It will not wash out. It is throughout the yarn, much like a carrot is orange from inside to outside. As the article is washed and used, new particles of copper oxide are exposed to regenerate ion release. Machine wash warm, tumble dry medium. Do not use washer or dryer softeners, as this leaves a film over the fabric which will reduce the efficacy of the copper technology.

6. Why does my anti-wrinkle pillowcase contain other fibers such as cotton?

- A. The Cuprotex pillowcase fabric made with the Cupron copper fibers has been carefully engineered to insure the maximum performance and ultimate comfort. The polyester or nylon polymers used to carry and release the copper oxide are synthetic micro denier yarns and are both somewhat hydrophobic but very soft. A fine, soft, combed cotton, which is a very hydrophilic yarn, is mechanically merged with the micro denier to collect the moisture and therefore insure constant copper ion release with incredible softness and comfort.

7. How does the copper oxide fabric in my pillow case and mattress cover affect my general wellness and sleep environment?

- A. Copper is the safest, most broad spectrum natural antimicrobial known today, and has been used for thousands of years. In this copper oxide format, commercialized and patented by Cupron, the Cuprotex fabrics made with Cupron copper fibers are permanently and fully protected from attack by bacteria, mold, and fungus. Your sleep environment is improved by the absence of these microbes. The space that you spend one third of your life, your bed, is depleted of the causes of many allergens. The bacterium that causes odor is also mitigated, providing the appearance of a clean and fresh sleep environment. The copper technology is completely safe and non-toxic to humans or animals.

8. How does the Cupron copper technology in the Cuprotex fabrics work to eliminate the growth of bacteria, mold, and fungi?

- A. The copper ions released from the Cupron copper fibers in the Cuprotex fabrics cause direct damage to several key components of microbes (bacteria, viruses and fungi are all microbes), including to their membranes, proteins and genetic materials. The microbes are more susceptible to the detrimental effects of the copper ions when duplicating or reproducing. Bacteria and fungi have developed some mechanisms to tolerate excess copper. However, constant exposure to the copper concentrations in these fabrics is toxic to them. Resistant microbes have evolved to antibiotics other than copper in less than 50 years of use. Microbes resistant to copper have not evolved even though copper has been a part of the earth for millions of years. The main reason for this is that copper ions attack several key functions of the microbes in parallel, reducing dramatically the capacity of a particular microbe to generate the necessary multiple mutations needed to develop resistance. Viruses are more susceptible than bacteria and fungi to copper ions as they do not have defense or repair mechanisms. In contrast to the high susceptibility of microbes to copper ions, human skin is not sensitive to copper and the risk of adverse reactions due to dermal exposure to copper ions is extremely low. Copper is considered safe to humans, as demonstrated by the widespread and prolonged use by women of copper intrauterine devices. Copper is also permitted for use in fabrics by the EPA.

9. What other uses are being made with this incredible new Cupron copper technology?

- A. Some of the products either being sold or developed are: Socks to cure your athlete's foot, panties that eliminate the fungus that causes yeast infections, hosiery that makes your legs look better, wound care dressings that render the area aseptic and speed the rate of wound closure, post-surgical garments that reduce the rates of infection and speed the rates of healing, sheets that reduce the risk of pressure ulcers and bed sores, face masks, gloves, protective clothing, etc. to deactivate the H5N1 (Bird Flu) virus, blood filters to deactivate HIV, and fabrics to reduce hospital-acquired infections.

10. Will the Cupron copper oxide in the fabrics cause any discoloration on my skin or other bedding?

- A. No, no discoloration or coloration occurs.

11. Do you have to lie directly on the pillowcase fabric to get the copper ion transfer? Will it still help my skin's appearance if I put another pillowcase over it?

- A. While copper ions may be able to travel through moisture in the air and through other fabrics, direct contact with the skin provides the best results. There is no test data regarding the efficacy of the pillowcases when another fabric is put over the Cupron fabric.

12. Why copper?

- A. Copper is one of the earth's oldest metals, dating back more than 10,000 years. Still usable fragments of copper plumbing have been found that are more than 5,000 years old. Today, it remains a popular choice for plumbing worldwide because it offers many benefits over other materials. In fact, copper acts as a natural inhibitor to bacterial growth, with tests showing that 99% of opportunistic pathogens are eliminated from copper tubing in just 5 hours. Copper ions, either alone or as complexes, have been used for centuries to disinfect fluids, solids, and tissues. Today, copper has wide use as an algicide in water purification, agricultural pesticides, fungicide, nematocide, molluscicide, and as an anti-bacterial and anti-fouling agent. Copper also has potent antiviral activity. Copper functions as a natural spermicide and is used in intrauterine devices for birth control.

Technical-Answer: In contrast to the extremely low sensitivity of human tissue (skin or other) to copper (Hostynek JJ and Maibach HI; 2003; *Rev. Environ. Health* 18, 153-183), micro-organisms are extremely susceptible to copper. Copper toxicity to micro-organisms, including viruses, may occur through the displacement of essential metals from their native binding sites, from interference with oxidative phosphorylation and osmotic balance, and from alterations in the conformational structure of nucleic acids, membranes, and proteins. For example, exposure of intact *Saccharomyces cerevisiae* to Cu^{2+} (copper oxide) causes a loss of the permeability barrier of its plasma membranes within 2 minutes at 25°C. Extensive metal-induced disruption of membrane integrity inevitably leads to loss of cell viability. However, even relatively small alterations in the physical properties of biological membranes can result in marked changes in the activities of many essential membrane-dependent functions, including transport protein activity, phagocytosis, and ion impermeability.

13. Can the bacteria develop resistance to copper?

- A. While copper has been used for thousands of years, as opposed to antibiotics, no micro-organism has evolved which is resistant to constant exposure to copper. In most micro-organisms, but not in viruses, there is an integrated set of proteins that delivers copper to specific sub-cellular compartments and copper-containing proteins without releasing free copper ions. Although some organisms have reduced sensitivity to excess copper, exposure of most micro-organisms to high concentrations of this trace element results in damage to cellular components. The lack of resistance development to copper by micro-organisms is also a consequence of the many cellular targets attacked by the copper ions. This reduces significantly the possibility that in the same organism several mutations, which confer resistance, would appear simultaneously in the different cellular targets attacked by the copper ions. This is in contrast to the relatively rapid emergence of resistance to antibiotics that attack only one cellular target.

Viruses lack DNA repair mechanisms, permeability barriers, intra- and extra-cellular sequestration of metals by cell envelopes, active metal transport membrane efflux pumps, and enzymatic metal detoxification mechanisms, such as those found in bacteria and cells. These reduced capabilities of viruses may explain their high vulnerability and susceptibility to copper.

14. Are Cupron fibers safe?

- A. Copper is considered safe to humans, as demonstrated by the widespread and prolonged use by women of copper intrauterine devices. Very low risk of adverse skin reactions is associated with copper (Hostynek, J. J., Maibach, H. I. (2003) Copper hypersensitivity: dermatologic aspects--an overview. *Rev. Environ. Health* 18, 153-183).

Both animal and human safety tests have been conducted to examine for possible toxicity or adverse reactions to Cupron fabrics. The animal tests included the Guinea-Pig Maximization Test and the Rabbit Skin Irritation Test. The guinea pig maximization test is used to determine the allergenicity of new chemicals and products. The Rabbit Skin Irritation Test is recommended by the Biological Evaluation of Medical Devices – ISO 10993-10: “Tests for irritation sensitization”. Both animal tests demonstrated that Cupron fabrics do not possess skin-sensitizing properties.

Additionally, none of the hundreds of individuals who used socks containing copper-impregnated fibres to alleviate their athlete’s foot conditions reported any negative effects caused by the socks. These socks, which are manufactured by The Renfro Corporation, are available to the public.

15. Against what micro-organisms have the Cupron fibers shown to be effective?

A. Cupron’s fibers and fabrics have been found to kill gram positive bacteria, such as *Staphylococcus*, Methicillin resistant *Staphylococcus aureus*, Vancomycin resistant *Enterococci* and *Listeria*; gram negative bacteria, such as *Escherichia coli* and *Salmonella*; and fungi, such as *Candida albicans*. In addition, Cupron’s fibers and fabric have been found to deactivate all viruses tested, including enveloped and non-enveloped viruses, DNA and RNA viruses, both airborne and non-airborne viruses. Some examples of the viruses deactivated include: HIV-1, WNV, Influenza, Vaccinia, Cytomegalovirus (CMV), Measles, Respiratory Syncytial Virus (RSV), Yellow Fever, Rhinovirus, Venezuelan Equine Encephalitis (VEE) and Punta Toro Viruses.

TEST RESULTS

Escherichia coli (AATCC 8739) as Gram- Strain Sample	3.81 Log Reduction
Staphylococcus Aureus (AATCC 6538) as Gram+ Strain Sample	3.56 Log Reduction
Candida Albicans (AATCC 10231) as Fungal Strain	3.28 Log Reduction
HIV as a Viral Exposure Sample	5-6 Log Reduction
S. Aureus AATCC 100	2.7 Log Reduction

Escherichia coli Gram- bacteria AATCC 100-1993		
Control	870,000 after incubation	200,000
Cupron	260,000 after incubation	50
		99.98% reduction

Staphylococcus aureus (Gram+ bacteria AATCC 100-1993)		
Control	1,300,000 after incubation	1,000,000
Cupron	650,000 after incubation	7,300
		99% reduction

Candida albicans (fungus) AATCC 100-1993		
Control	2,900 after incubation	11,000
Cupron	2,000	150
		98% reduction

Pseudomonas aeruginosa		99.8% reduction
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FABRIC TESTING

When we show results that a particular fabric is efficacious against one microorganism, it implies that enough copper is there which can be released and cause the necessary damage. When we see clear efficacy against one microorganism by a particular fabric, that fabric will be efficacious against other microorganisms as well. We do not have to test against each organism, but as we have decided, use one or two representative microorganisms (we chose E. coli and Staph) to demonstrate efficacy.