SHEPROS®

Safety, Heath & Environment Product Solutions

Eliminate Pathogens, Odors and Biological VOCs

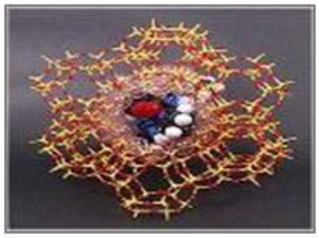
Refrigerator Deodorizer

Shepros Sdn. Bhd.

Welcome to SHEPROS, a global provider of innovative green chemistry solutions for a greener, safer and healthier life and planet. We have been working diligently by through nanotechnology, nanobiotechnology and green chemistry to create eco-friendly products and a carbon neutral company with a zero environmental footprint.

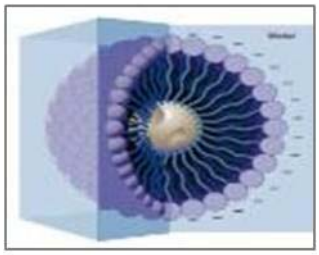
We are the market leader in supplying deodorizer, air purifier, air freshener and sterilizer which are eco-friendly, safe, reusable, recyclable, non-toxic, non-flammable and non-caustic odor, pollution and moisture control products that do not contain petrochemical based ingredients, VOCs, CFCs, harmful or ozone depleting chemicals. All of our formulations are based on non-toxic, food based, plant and plant derivatives based ingredients.

Our Specialty Technologies



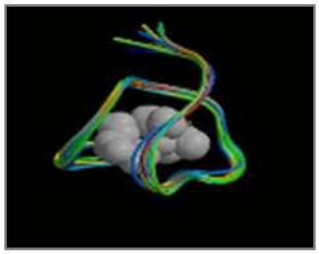
NANO PORES

Nano Pores are three-dimensional, crystalline solids, microporous and nanoporous with well- defined structures that contain aluminum, silicon and oxygen in their regular framework; cations and water are located in the pores. This is a natural mineral and has void that can host cations, water, or other molecules.



NANO BIOTECH COLLOIDAL MISCELLES

NBCM are very fine molecules with spherical aggregate structure which remain in suspension indefinitely and are not affected by gravity when dispersed in a liquid colloid. They also undergo thermal fluctuations and Brownian motion. It works well with hard, soft, cold, hot, fresh and salt water.



COLLOIDAL SILVER

Colloidal silver is a type of colloid that consists of solid particles suspended in a liquid. The solid is very small particles of metallic silver and the liquid is water. A silver colloid then must have silver particles in suspension. Colloidal silver also contains another form of silver called ions.

GREEN CHEMISTRY

Green chemistry, also called sustainable chemistry, is a chemical philosophy encouraging the design of products and processes that reduce or eliminate the use and generation of hazardous substances. It aims to avoid problems before they happen.

Clean Refrigeration and Food Safety

A refrigerator is one of the most important pieces of equipment in the kitchen for keeping foods safe. These electric units are so common today that we forget a refrigerator was once little more than a box with a block of ice used to supply a rather undependable source of cold air. But we are instantly reminded of its importance to our daily lives when the power goes off or the unit fails, putting our food's safety in jeopardy.

Importance of Refrigeration

Refrigeration slows bacterial growth. Bacteria exist everywhere in nature. They are in the soil, air, water, and the foods we eat. When they have nutrients (food), moisture, and favorable temperatures, they grow rapidly, increasing in numbers to the point where some types of bacteria can cause illness. Bacteria grow most rapidly in the range of temperatures between 40 and 140 °F, the "Danger Zone," some doubling in number in as little as 20 minutes. A refrigerator set at 40 °F or below will protect most foods.

Types of Bacteria in Refrigerated Foods

There are two completely different families of bacteria: *pathogenic* bacteria, the kind that cause food borne illness, and *spoilage* bacteria, the kind of bacteria that cause foods to deteriorate and develop unpleasant odors, tastes and textures.

Pathogenic bacteria can grow rapidly in the "Danger Zone," the temperature range between 40 and 140 °F, but they do not generally affect the taste, smell, or appearance of a food. In other words, one cannot tell that a pathogen is present.

Spoilage bacteria can grow at low temperatures, such as in the refrigerator. Eventually they cause food to develop off or bad tastes and smells. Most people would not choose to eat spoiled food, but if they did, they probably would not get sick. It comes down to an issue of quality versus safety:

- Food that has been left too long on the counter may be dangerous to eat, but could look fine.
- Food that has been stored too long in the refrigerator or freezer may be of lessened quality, but most likely would not make anyone sick. (However, some bacteria such as *Listeria monocytogenes* thrive at cold temperatures, and if present, will multiply in the refrigerator over time and could cause illness.)

Keeping the Refrigerator Clean

One very important step in keeping your food safe is keeping your refrigerator clean. Wipe up spills immediately – clean surfaces thoroughly with hot, soapy water; then rinse.

Once a week, make it a habit to throw out perishable foods that should no longer be eaten. A general rule of thumb for refrigerator storage for cooked leftovers is 4 days; raw poultry and ground meats, 1 to 2 days. Refer to the cold storage chart for storage of meat, poultry, and egg products in the home refrigerator.

The exterior may be cleaned with a soft cloth and mild liquid dishwashing detergent as well as cleansers and polishes that are made for appliance use. The front grill should be kept free of dust and lint to permit free air flow to the condenser. Several times a year the condenser coil should be cleaned with a brush or vacuum cleaner to remove dirt, lint, or other accumulations. This will ensure efficiency and top performance.

Removing Odors

If food has spoiled in a refrigerator – such as during a power outage – and odors from the food remain, they can be difficult to remove. The following procedures may have to be repeated.

- Wipe inside of unit with equal parts vinegar and water. Vinegar provides acid which destroys mildew.
- Wash inside of unit with a solution of baking soda and water. Be sure to scrub the gaskets, shelves, sides, and door. Allow to air out several days.
- Stuff unit with rolled newspapers. Close the door and leave for several days. Remove paper and clean with vinegar and water.
- Use Refrigerator Deodorizer (RD). Follow the manufacturers' instructions.

Elimination of Odor through Odorless Disinfectants and Purification

Colloidal Silver vs. Bacteria

Catalytic Oxidation:

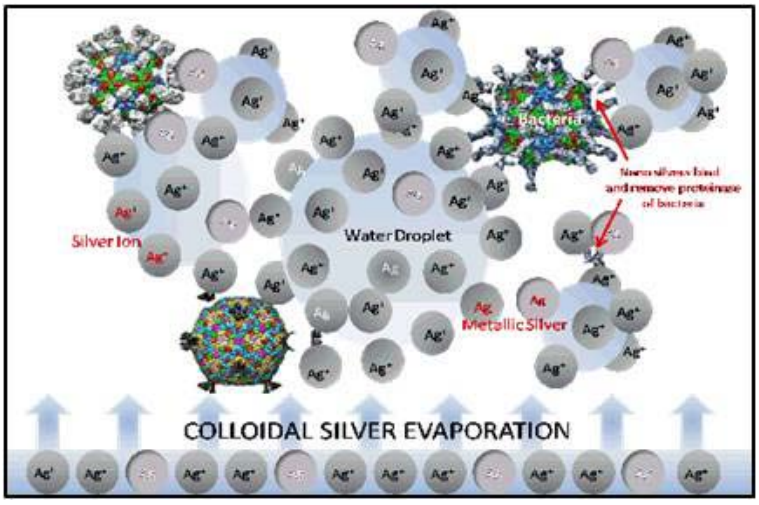
Silver, in its atomic state, has the capacity to absorb oxygen and act as a catalyst to bring about oxidation. Atomic (nascent) oxygen absorbed onto the surface of silver ions in solution will readily react with the sulfhydryl (-S-H) groups surrounding the surface of bacteria or viruses to remove the hydrogen atoms (as water), causing the sulfur atoms to form an R-S-S-R bond; blocking respiration and causing the bacteria to expire. Employing a simple catalytic reduction or oxidation reaction, colloidal silver will react with any negative charge presented by the organism's transport or membrane proteins and deactivate them.

Reaction with Bacterial Cell Membranes:

There is evidence that silver ions attach to membrane surface radicals of bacteria, impairing cell respiration and blocking its energy transfer system. One explanation is based on the nature of enzyme construction: Specific enzymes are required for a given biochemical activity to take place. Enzyme molecules usually require a specific metallic atom as part of the molecular matrix in order to function. A metal of higher valance can replace a metal of lower valance in the enzyme complex, preventing the enzyme from functioning normally. Silver, with a valance of plus 2, can replace many metals with a lower, or equal valance that exhibit weaker atomic bonding properties.

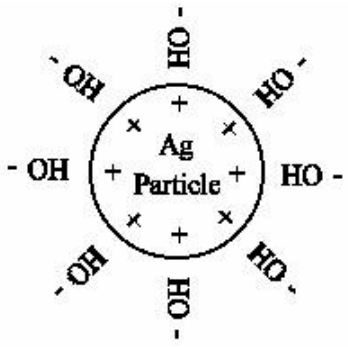
Binding with DNA:

Studies by C.L. Fox and S.M. Modak with Pseudomonas aeruginosa, a tenacious bacteria that is difficult to treat, demonstrated that as much as 12% of silver is taken up by the organism's DNA. While it remains unclear exactly how the silver binds to the DNA without destroying the hydrogen bonds holding the lattice together, it nevertheless prevents the DNA from unwinding, an essential step for cellular replication to occur.



Colloidal Silver vs. VOCs

Ionization breaks the water molecule into hydrogen **H+** and hydroxyl ions **OH-**, which are negatively charged. The negative charge of the hydroxyl ions counters the positive charge of the silver ions and maintains a solution of whose net charge is zero. Thus the negative hydroxyl ions are created at the same time that the positive silver ions and silver particles are created. The hydroxyl ions are non-metallic ions that bond to the atoms of the silver particles thus imparting their negative charge to the particles. This behavior is well documented for colloidal particles which have charged particles adsorbed on them. The mutual repulsion of the similar charges then stabilizes the colloid by keeping the particles from agglomerating. Thus, this process creates super **Silver- Hydroxyl Radicals**.



These highly reactive electrons aggressively combine with other elements in the air, such as bacteria and Volatile Organic Compounds (VOCs) which include harmful pollutants such as formaldehyde, ammonia and many other common contaminates. Once bound together, the chemical reaction takes place between the super Silver- Hydroxyl Radicals and the pollutant, effectively "oxidizing" (or burning) the pollutant.

Nano Biotech Colloidal Micelles (NBCM)

SHEPROS combines the knowledge of nanotechnology and biotechnology in using the unique colloidal chemistry to generate a state of the art formulation that produces the innovative Nano Biotech Colloidal Micelles (NBCM). NBCM are mild but are amazingly powerful colloidal micelles made from non-toxic plant based extracts, plant derivatives and biodegradable surfactants.

NBCM are very fine molecules with spherical aggregate structure which remain in suspension indefinitely and are not affected by gravity when dispersed in a liquid colloid. It is surrounded by a cloud of tightly bound ions. The NBCM aggregates form in order to minimize the free energy of the solution. They are dynamic but equilibrium structures and able to rearrange in response to changing environmental conditions. They also undergo thermal fluctuations and Brownian motion. It works well with hard, soft, cold, hot, fresh and salt water.

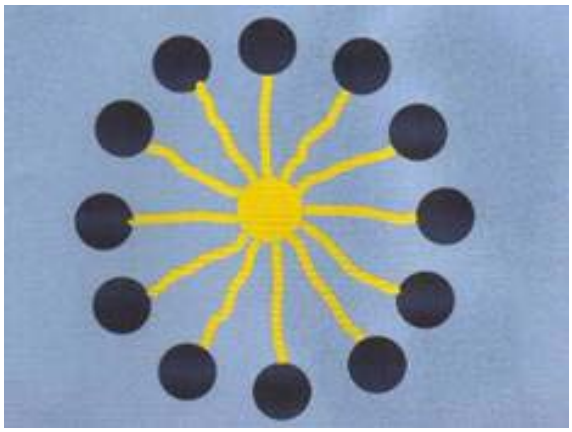


Illustration of Nano Biotech Colloidal Micelles.

The hydrophobic poles attract to each other forming interior micelles cluster and the hydrophilic poles form a powerful outer surface.

NBCM in colloidal chemistry can be explained as a sub-division of physical chemistry comprising of the phenomena characteristic of matter when one or more of its dimension lie in the range between 1 nanometer and 100 nanometer. In this nature of science, the dimension of NBCM is more important than the nature of the material. In the size range of nanometer, the surface area of NBCM is much greater than its volume that unusual phenomena of colloidal micelles will occur as following:

a. They do not settle out of the suspension of gravity.
b. They will move in at least one dimension randomly.
c. They have the velocity that will move endlessly without stopping.
d. They will have tremendous wetting capacity.
e. They will reduce the surface tension in water or water solutions.
f. They will have sterilizing effect by disrupting the DNA or RNA of the virus, prokaryotic cell of bacteria, and eukaryotic cell of algae, protozoa and fungi.

How do NBCM destroy bacteria?

A cell wall protects bacteria cell from the effects of osmotic pressure. NBCM destroy the peptidogylan layer of the bacteria cell walls, but not to human beings and animals which do not have cell wall. In the absence of unstable formed peptidogylan, growing bacteria cells will be weaken and destroy through to the following exposures:

1. Inhibition of cell wall synthesis

   Generally, a bacterium is in a hypotonic solution and water tries to move in to the bacterium from a higher water concentration to the lower water concentration. When the cells are less resistant to the effect of osmotic pressure; the underlying cytoplasmic membrane bulges through the weakened portions of cell wall as water moves into the cell, and eventually the lyses.

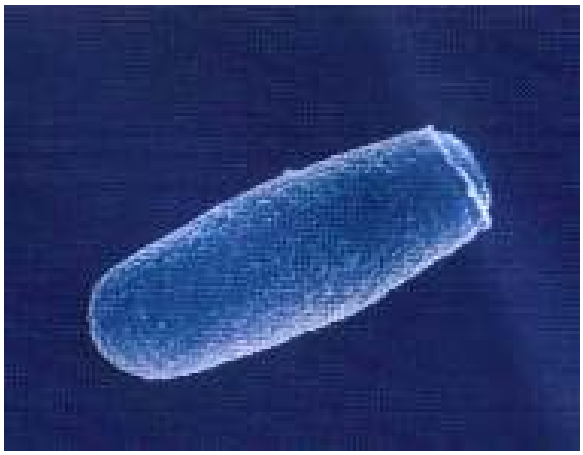
2. Inhibition of metabolic pathways

A damaged cell wall will affect all the chemical reactions in metabolism of the bacterium. The unstable metabolic pathways will result in unstable enzyme activity, temperature and pH in the cell.

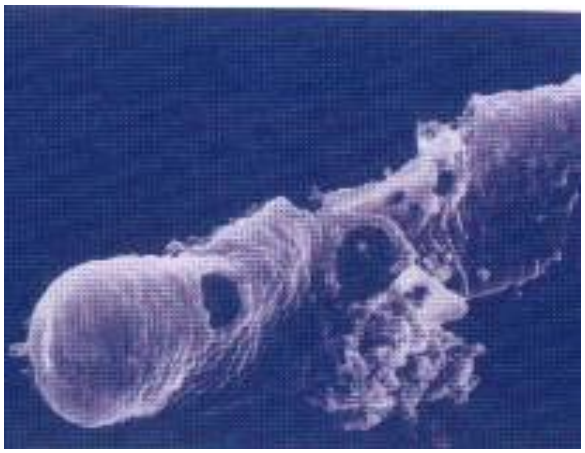
3. Disruption of cytoplasmic membranes

   The disruption of cytoplasmic membranes will severely damage the cytoplasm which is composed with primary 90% of water and proteins. The contents of cytoplasm such as nucleoid and ribosomes will be destroyed.

NBCM Aspects of Disinfectants



A scanning electron micrograph of bacteria cell before the inhibition of cell wall synthesis; inhibition of protein synthesis; and disruption of cytoplasmic membrane.



A scanning electron micrograph of bacteria cell bursts from osmotic pressure due to the integrity of peptidoglycan is not maintained. This is due to the followings:

- *Inhibition of cell wall synthesis where bacteria cell walls are destroyed, but not to animals which lack cell walls.*
- *Inhibition of metabolic pathways.*
- *Disruption of Cytoplasmic membranes.*

REFRIGERATOR DEODORIZER (RD)

What Causes Fruits and Vegetables to decay in the Refrigerator?

Ethylene

You can't smell it or taste it, but fruits and vegetables emit ethylene, a naturally occurring gas that hastens the ripening process. Ethylene is the reason why unripened avocados will ripen if you put an apple into a bag with the avocados.

Foods that release the highest amounts of ethylene include apples, apricots, cantaloupe, figs and honeydew. When these items are stored next to other fruits and vegetables that rapidly absorb ethylene, spoilage will occur.

Micro-organisms

Although fruits and vegetables may look perfect when you bring them home from the store, they are living organisms still in the process of decomposition from the minute they are harvested in the fields. Keeping your refrigerator in proper working order is critical for food longevity. The ideal interior temperature of a refrigerator is below 4^{o}C. When refrigerators are kept at this temperature, the cold air can slow down naturally occurring decomposition processes of food, such as mold and bacteria. If your refrigerator is too warm, it will encourage the proliferation of microbial growth that will not only cause food to prematurely decay.

And if interior temperatures are too cold, they may cause fruits and vegetables to freeze, which results in cracked surfaces that leave them vulnerable to bacterial contamination and rapid decay. Fruits and vegetables that are far into the decaying process will spread their bacteria to newer produce stored in the same area. Accidently eating decay food may cause food borne illnesses such as salmonella.

The Solution

The Refrigerator Deodorizer (RD) was specially developed to neutralize and to eliminate pungent refrigerator odors on contact. RD will truly cleanse the air of offensive refrigerator odors while preventing mold and mildew. Using RD will result in a fresh and clean refrigerator that will be appreciated by the whole family.

Effects of Refrigerator Deodorizer (RD)

1. RD has an excellent ability to decompose Biological Volatile Organic Compounds (BioVOCs) with good disinfectants and deodorizing competence.
2. No sediments.
3. Small dosage can generate powerful disinfectant and deodorizing performance.
4. RD technology can decomposed various bacteria and fungi up to 99.99%.
5. It thoroughly decomposes various odor components that arise from odor-prompting bacteria. (deodorization)
6. RP uses evaporation which is a non-electroplating method.
7. Non-toxic and environment-friendly ingredients through green chemistry.
8. RP is also effective where there is no light.

Advantages

- Simply place in refrigerator & smell the difference
- Eliminates refrigerator odors instead of covering them up
- Environmentally friendly & non-flammable
- Safe, non-toxic, natural, non-caustic, odorless
- Improves refrigerator indoor air quality significantly
- Creates a cleaner, healthier, safer refrigerator
- No ozone emission
- No electricity required

No Cover-up with Fragrance

The Refrigerator Deodorizer (RD) is a safe and powerful deodorizer that can be used to eliminate pungent refrigerator odors, musty, and mildew odors instead of merely covering them with fragrances. RD is a green ingredient deodorizer that can be used to eliminate unpleasant odor, destroy biological VOC's and sterilizes microbial. The formulation of RD incorporates 'nano' materials to form powerful disinfectant and deodorizer with a combination of billions of Nano Biotech Colloidal Miscelles and Nano Colloidal Silver. These give RD an enormous surface area to disinfect and eliminate bacteria, biological VOC's and odors.

Environmentally Friendly

The Refrigerator Deodorizer (RD) is non-toxic, safe, non-hazardous, odorless and non-caustic. It is an ideal environmentally friendly solution for eliminating refrigerator odors without adding pollutants to the air in your refrigerator.

Directions

Simply place Refrigerator Deodorizer (RD) in the air outlet of the refrigerator. This product will function most efficiently in with good air circulation. To obtain the best results, remove the odor sources (e.g. spoiled fruits or vegetables) and clean the affected area prior to treating with RD.