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(54) **METHOD OF INCREASING THE CONDUCTIVITY OF WATER AND USES THEREFOR**

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(57) **ABSTRACT**

A method of increasing the conductivity of water by mixing sodium benzoate with tap water at various concentrations. A sodium benzoate solution, in low doses is not toxic and can be consumed by humans and animals. Some embodiments of this invention are further improved by combining the water having increased conductivity with coatings that will cause the solution to adhere to the surfaces of organic and inorganic material. The increased conductivity solution can be used to reduce rust, corrosion and mold as well as the resulting offensive odors caused by mold. This product has many uses in industrial processes to prevent rust and mold and to reduce undesirable odors, for example a process for recycling newsprint and other paper containing ink.

METHOD OF INCREASING THE CONDUCTIVITY OF WATER AND USES THEREFOR

RELATED APPLICATIONS

[0001] Provisional Patent Application Serial No. 60/419,471, filed Oct. 18, 2002 and Provisional Patent Application Serial No. 60/479,635 filed Jun. 19, 2003.

BACKGROUND OF THE INVENTION

[0002] Water is an electronically conductive medium that can function as the mediator for the transfer of electrons from one substance to another. Water has a dielectric constant of 78.5 which is considered very high and is responsible for water being known as the universal solvent. Corrosion is generally considered to be a process of eating away by degrees as if by gnawing resulting in weakening or gradually destroying its prey. However, the most commonly recognized form of corrosion, is the electrochemical reaction that involves the loss of a negatively charged electron from a metal that is transferred to another substance. The substance that accepts the electron or electrons is called the oxidizing agent and the substance losing the electron is the reducing agent. This flow of electrons from the reducing agent to the oxidizing agent is controlled by an electrochemical potential, or voltage difference that exist between the oxidizing and the reducing agents that is measure in terms of voltage. Electron flow occurs from a substance that is relatively electrochemically negative toward another substance that is relatively electrochemically positive. For example if the reducing agent is iron, the iron molecule reacts with oxygen to produce iron oxide commonly known as rust.

[0003] Oxides of sulfur, magnesium and or calcium are similarly formed and are deposited as layers of scale.

[0004] Also, many microorganisms such as fungi must oxidize organic carbon based material in order to produce biological energy.

[0005] All of these processes rely upon electron flow and the electrical conductivity of water. Although the oxidation of metal and the growth and development of microorganisms and scale seem spectacularly different the underlying mechanisms are identical.

BRIEF SUMMARY OF THE INVENTION

[0006] If the electro conductivity of water is increased, rust, corrosion, mold and the resulting odors caused by mold can be eliminated or reduced.

[0007] The strength of a current of electricity can be expressed in amperes. This invention provides a method of increasing the conductivity of water by adding sodium benzoate at various concentrations. Sodium benzoate, in low doses is not toxic and can be consumed by humans and animals. This sodium benzoate solution is clear in color and thus will not distort the color of products that it is combined with. Sodium benzoate is frequently used in commercially available soft drinks, and is identified on soft drink labels as an ingredient. Some embodiments of this invention are further improved by combining the sodium benzoate solution with coatings that will cause the solution to adhere to the surfaces of organic and inorganic material. Applicant has found that cornstarch, potato starch or corn syrup will cause the solution to better adhere to the surfaces of organic products. Cornstarch, potato starch and corn syrup are ingestible non-toxic substances that when used in this sodium benzoate solution will not rot or mold. For inorganic surfaces such as steel and aluminum surfaces as well as for non-absorbing organic material such as grain applicant has found that an acrylic coating combined with the increased conductivity solution causes the solution to adhere to the surface that it is desired to protect. A commercially available acrylic coating containing niethylene glycol monoethyl ether and tributoxyethyl phoephate has been successfully used for this purpose.

[0008] Corn syrup does not include water and when water is added to corn syrup mold will form. For this reason commercial corn syrup is not diluted with water and is sold in its natural viscous state. Applicant has found that corn syrup will go into solution with his aqueous sodium benzoate solution and the resulting solution will not mold. Thus, applicant can with this invention produce corn syrup that has a lowered viscosity. This lowered viscosity corn syrup will pour easier and faster, and will have fewer calories per volume, as well as having other commercial advantages.

[0009] Applicant has also found that the corn starch, potato starch or corn syrup as well as the acrylic coating ingredient can both be added to the sodium benzoate solution and the resulting product will adhere to both organic and inorganic products.

[0010] The invention disclosed herein is not toxic and thus does not function to kill or destroy micro-organisms that may be present. Rather, as a result of increasing the conductivity of the solution, products exposed to this solution are stabilized and the viableability for growth of microorganisms and the process of producing rust and corrosion is inhibited. An advantage of this aspect of this invention is that it will not harm substances that it comes into contact with.

[0011] The coating additive material, cornstarch or corn syrup, that is added to the sodium benzoate solution and then applied to products that may be ingested by animals including humans, are a common ingestible substance.

[0012] The stability of the sodium benzoate solution can be improved by adding sodium citrate in an amount that will raise the ph to a level in the range of 7.5 to 9.5. Another benefit of maintaining the sodium benzoate solution within this range is that the clearness of the solution is enhanced and stabilized. An important advantage of this sodium benzoate solution over other solutions that could be used for the same purposes is that it is clear in color and does not distort the color of products that it is used with. Other similar solutions, such as sorbate solutions, have a yellowish cast, and the color of products that it is combined with can be distorted. A benefit of utilizing sodium citrate to maintain the ph of the solution in the range of 7.5 to 9.5 is that the sodium benzoate and sodium citrate can be mixed together when both of these substances are in a solid state and shipped to users in a solid state. Shipping this combination of chemicals in a solid state is a much more economical means of providing this product to the user than providing the solution in a liquid state. Sodium Benzoate alone in a solid state can be combustible and explosive under some conditions and thus special precautions must be taken when shipping this chemical in the solid state. However when solid state sodium

benzoate is combined with solid state sodium citrate the resulting solid combination is not combustible or explosive.

[0013] Currently products such as corn starch and potato starch are sold only in a dry powder form, because in an aqueous form it will in a short time mold and turn rancid. Aqueous solutions of corn or potato starch containing as low as 0.1% sodium benzoate will have an acceptably long shelf life with out molding.

[0014] It has been found that this sodium benzoate solution is further stabilized when a small portion of potassium sorbate, or 2,4 hexadienoic acid potassium salt (hereinafter PS) is added to the solution. PS, a salt of sorbic acid, is extensively used as a wide spectrum anti-microbial for maintaining freshness in foods, beverages, animal feed, cosmetics and as a preservative for products destined to come in contact with foodstuffs such as adhesive for food packaging. PS has obtained worldwide approval for use in a wide variety of foods when used in a concentration of about 0.1% and in the general range of 0.05% to 0.3%. The PS has excellent water solubility as compared to sorbic acid which has low water solubility. The addition of PS in the range of 0.05% to 1.0% stabilizes and increases the shelf life of this invention.

[0015] It is an objective of this invention to provide a method by which the conductivity of water can be increased and thereby reduce the process of corrosion as well as the growth and development of microorganisms, mold and scale.

[0016] Rust and corrosion cannot occur in an aqueous solution in which the conductivity has been increased. The process of electrolyses is essential to the process of rusting or degradation of metal. Similarly, microbiological degradation, for example the formation of mold, cannot occur in an aqueous solution in which the conductivity has been increased. Thus, the electrical conductivity of water is very important in preventing corrosion, scale and mold. Many objectionable odors originate from microbiological degradation. Thus, by increasing the conductivity of an aqueous solution, and thereby impeding microbiological degradation the odors created by this process are substantially reduced or eliminated.

[0017] In accordance with this invention the conductivity of water is increased and the various processes that depend upon the electrical conductivity of water are affected. The conductivity of the water is increased by the addition of sodium benzoate, in various concentrations dependent upon the intended use for the solution.

[0018] As a result of increasing the conductivity of water this invention can prevent the degradation of metals and other substances.

[0019] This product has many uses in industrial processes to prevent rust and mold and to reduce undesirable odors. In industrial processes in which an aqueous chemical solution must be processed in an apparatus that is prone to damage by rust this product can prevent rusting of the apparatus and thus prolong its useful life. A preferred process of this type is an industrial paper making process and particularly a process for recycling newsprint and other paper containing ink.

[0020] An important use for this sodium benzoate solution is to stabilize decomposition of and preserve food products. The seafood industry exerts great efforts to maintain the wholesomeness of their products to insure that their products have normal nutritional value, and are free from pollution, caused by microbial or chemical contamination. Since the process for causing seafood to become unpalatable for human consumption is retarded by cold temperatures fresh fish are maintained at a temperature slightly above freezing (1-2° C.) for shipping to the fish merchants and eventually to the ultimate consumer. However, fresh fish maintained at this temperature have a relatively short shelf life. Fish are also frozen to maintain their wholesomeness until they are thawed at which time the thawed fish have a relatively short shelf life. Ocean going trawlers and airplanes are used to transport the iced fish to their markets. The shelf life of both fresh and thawed seafood can be greatly extended by utilizing a sodium benzoate solution formed in accordance with this invention for processing the fresh or thawed fish or utilizing a process for freezing fish that utilizes water that has been treated in accordance with this invention. Fresh fish that are sold through fish markets or supermarket are regulated by local laws and must be sold within several days, if not sold in the required period they must be disposed of. When fresh fish are sprayed with the sodium benzoate solution of this invention or are packed in ice made from the sodium benzoate solution of this invention the time period from when the fish is caught to when it can be sold to the ultimate consumer can be greatly increased. Ice made from the sodium benzoate solution of this invention can also be used in the supermarkets where the fish are offered for sale to maintain the fish in a fresh and odor free state. The sodium benzoate solution of this invention as well as ice made from the sodium benzoate solution of this invention can also be used for shipping and displaying fresh vegetables to and at consumer outlets.

[0021] Another result of increasing the conductivity of water is to provide a non-toxic method to prevent the growth of weeds or other plant life that it is desired to control. For example, this invention could be sprayed on fields of cocoa to assist in the fight against illegal drugs. It is also contemplated that water that has been processed in accordance with this invention, at an appropriate concentration, could be used to water lawns and cause the growth rate of the grass to be reduced and thus reduce the mowing requirements.

[0022] Another use for this invention is in animal food. The moisture content of animal food can be increased and this food will not mold. It has also been found that animals that have consumed food that has been processed using this invention have improved breath odors and the odor of their excretions is not as noxious.

[0023] Another use for this invention is in the paper industry. When paper is made with water that has been processed in accordance with this invention the shelf life of the wet lap pulp is increased which increases the uses for wet lap pulp. Another advantage is that the wet lap pulp maintains its white color over time. Also when water, that has been processed in accordance with this invention, is used in the paper making process the SO_2 is greatly reduced and the odors of the finished paper and board is improved. When applicant's sodium benzoate solution is used in the paper industry the increases in conductivity of the solution results in a lower electrical resistance, which helps break down printed secondary fibre to a micron size that that is not visible to the naked eye. This phenomena is accomplished

without a surfactant or alkali, which have always been added in de-inking processes. Still further, when food products are packaged in paper or board made from pulp that has been processed in accordance with this invention the shelf life of the food product is increased. For example when fruit is wrapped in tissue or vegetables are packaged in corrugated boxes made from pulp that has been processed in accordance with this invention the shelf lives of the fruit and vegetables are increased

[0024] Another use is in the food and beverage industry. When food is processed using an aqueous solution that has been processed in accordance with this invention it will retain its flavor for longer periods and will prevent the formation of mold in and on the food. Beverages made with water that has been processed in accordance with this invention will have an increased shelf life because the formation of mold will be reduced.

[0025] The efficiency of the process for producing water based consumer products is improved as a result of preventing rust, mold and odors.

[0026] Another industry that will benefit by the use of this invention is the plastic industry. When an aqueous solution that has been treated in accordance with this invention is used in the injection molding process the formation of mold is prevented and the corrosion of metal components of the injection molding machines is prevented.

[0027] The use of this invention in the textile industry will enhance dying and bleaching as well as prevent mold in fabric and carpet.

[0028] In the paint industry this invention will prevent the formation of rust in metal containers of water based paints without the need of applying toxic non rust coatings to the internal surfaces of the cans and lids.

[0029] In the mortuary industry embalming fluids typically contain significant quantities of formaldehyde, other embalming chemicals and tap water. There are a number of drawbacks to the use of formaldehyde since formaldehyde has been associated with a number of health and environmental risks. Furthermore, formaldehyde dehydrates the tissue and thus distracts from a lifelike presentation of the cadavers after embalming.

[0030] When water that has been processed in accordance with this invention is substituted for the tap water used in the embalming fluid several advantages are obtained. The first advantage is that the cadaver has a more lifelike appearance when the water of this invention contains a minimum of 1% of sodium benzoate. Rusting of the embalming chamber is a problem, caused by the use of tap water, in the mortuary industry. When water that has been processed in accordance with this invention is combined with the embalming chemical this rusting is prevented. A Sodium benzoate solution having a 2% sodium benzoate concentration is recommended.

[0031] Also, the embalming area in a mortuary has a very noxious odor that can be eliminated or diminished when odor eliminating sodium benzoate solution processed in accordance with this invention is sprayed in the embalming area before and after embalming. For this purpose a concentration of 6% sodium benzoate is recommended.

[0032] Furthermore, formaldehyde is under scrutiny by the environmental protection agency because it is not biodegradable and contaminates the environment. The proportion of formaldehyde contained in the embalming fluid can be reduced when water that has been processed in accordance with is invention is substituted for the tap water normally used. Another advantage is that medical students have found that the muscles of cadavers, that have been embalmed with fluids containing aqueous sodium benzoate that has been processed in accordance with this process, are more flexible and thus working with such cadavers is easier.

[0033] When water that has been treated in accordance with this invention is used in packaging organic and inorganic products rust, corrosion, mold and odors is prevented.

[0034] The miring of military vehicles and weapons will be greatly reduced as a result of using the sodium benzoate solution of this invention to prevent rust and scale on the equipment. Currently an unrefined form of petroleum jelly is used for this purpose which is difficult to remove.

[0035] The agricultural industry will benefit greatly, as a result of preventing mold, when water that has been treated in accordance with this invention is used during the growing process as well as to wash fruits and vegetables after they have been harvested.

[0036] The cosmetic industry will benefit from this invention by using hydrogen peroxide that has been produced with a sodium benzoate solution that has been processed in accordance with this invention. The stability of such hydrogen peroxide is greatly improved and it is more reliable in bleaching and other hair coloring processes.

[0037] Another use for this invention is in the care of teeth. Drinking water that has been processed in accordance with this invention will leave a thin coating on the teeth, similar to what occurs with fluoridated water. This thin coating will prevent plaque from forming on the teeth.

[0038] Another very important use of this product is in wastewater lagoons that receive runoff from cattle, pigs and poultry farms. These lagoons normally become high in nitrate and have a very offensive ammonia odor. When these lagoons are treated with the solution of this invention the formation of mold and thus the production of ammonia is eliminated or decreased.

DETAILED DESCRIPTION OF THE INVENTION

[0039] This invention involves increasing the electrical conductivity of tap water by combining the chemical sodium benzoate in the tap water at appropriate concentrations.

[0040] Tests were conducted to measure the electrical conductivity of tap water with varying concentrations of sodium benzoate. In these tests the conductivity has been measured in micromho/cm. One micromho/cm (UMHO/CM) equals one microsiemens/cm (US/CM). In other words a micromho is the same as a microsiemen.

[0041] Applicant's solution has been found to prevent oxidation and rusting of ferrous metals. Elemental iron (Fe°) readily undergoes oxidation with the loss of electrons to give ferrous iron (Fe^{2+}) that can then undergo an additional loss of an electron to produce a ferric ion (Fe^{3+}). This stepwise electron loss is chemically promoted by oxygen (O_2), and

other factors. Other metals such as aluminum can also undergo oxidation. Coating a metal surface with a layer of rust inhibiting material can prevent corrosion. A rust inhibiting layer of material can be provide on a metal surface by an electrostatic attraction between the inhibitor and the metal surface. Such an adsorptive process that protects metals from corrosion can occur as a result of electrostatic forces between the electric charge on the metal and the counter charge on the corrosion inhibitor. If the metal surface is positively charged, the adsorption of negatively charged inhibitors will occur. This process may also replace water molecules from the metal surface during the process of forming the protective layer. It is applicant's opinion that this process occurs with his solution and is at least partially responsible for unique advantages of his solution.

[0042] Tests on applicants solution show that its conductivity is higher than that of tap water. It is noted that increased concentrations of the solution beyond 0.1% by weight appear to increase conductivity logarithmically. The higher conductivity of the solution reduces the resistance since conductivity is the reciprocal of resistance. Thus, as the conductivity of the solution increases an electrical current encounters less resistance to its flow through the solution. As the voltage goes down and conductivity goes up, current will remain nearly constant. In accordance with Ohm's Law (Current=Voltage/Resistance) with a constant current when the conductivity increases there will be a corresponding voltage drop.

[0043] The unique antioxidant and anticorrosion effects of applicant's solution are considered to be a result of the altered conductivity of the solution and the resulting voltage drop. It is applicant's opinion that the inhibitor resulting voltage drop contributes to the formation of a protective layer on the product to be protected. More generally it is applicant's opinion that his solution decreased the oxygen available in an aqueous systems that ordinarily promotes the oxidation process.

[0044] Electronic scanning microscope studies show that there is no oxygen on steel surface immersed in applicant's anti-oxidant solution. Furthermore, the anti-oxidant effect of applicant's sodium benzoate solution prevents mold and microbiological degradation on organic and inorganic surfaces, such as wet lap pulp and starch solutions.

[0045] Furthermore, as a result of the higher conductivity of the sodium benzoate solution its electrical resistance is reduced which stabilizes organic colors and prevents their reversion. This color stabilization has been found to be beneficial in soft drinks and in the pulp and paper industry where colored paper utilizing organic dyes is utilized. Also, in the pulp and paper industry the brightness of pulp is enhanced which is a result of applicant's solution impeding the deposition of iron. Also, impeding the iron content in drinking water can help to prevent an iron overload problem in humans and animals. Iron overload can result in cellular degradation that is similar to the rusting of a nail. Applicant's sodium benzoate solution can be used to prevent oxygen free radical degradation in humans and animals. Excess iron in human is very dangerous. Human consumption of applicant's solution could prevent hemochromatosis and the need for phlebotomy. Applicant has found that by daily drinking his solution (0.1%) blended in fruit juice, his iron count has been reduced to normal levels. These results have been confirmed by lab tests performed by medical doctors and the results have been submitted to the research department of a prominent University.

[0046] In preparing a 1% solution of applicants solution 37.84 grams of sodium benzoate were dissolved in one gallon of tap water which weighs 3,784 grams. A sample of tap water was tested that had a conductivity of 74.9 UMHO/CM. The conductivity of the various samples of applicant's invention that were subjected to these tests had conductivities ranging from 635 to 34,500 UMHO/CM. As will be discussed in more detail a separate sample was tested that had a concentration of 10% sodium benzoate and also included an ingredient that that improves the solution's ability to adhere to the surface to which it has been applied. The test results for the 10% solutions with and without the coating additive were substantially the same. Thus the coating additive did not have a significant effect on the conductivity. For solutions of other strengths, proportional amounts of sodium benzoate were added to a gallon of water. This invention is concerned with concentrations of sodium benzoate in the range of about 0.1% and greater. The current test results have been limited to a maximum concentration of about 10%. The results of these tests in the range of 0% concentration to 10% concentration are displayed in the following chart:

CHART 1

Sample No.	% Concentration of Sodium Benzoate	Conductivity in UMHO/CM
41629	0%	74.9
41630	0.1%	635
41631	1.0%	4720
41632	2.5%	10,600
41633	10.0%	34,500

[0047] These tests confirmed the unexpected results of applicant's discovery that the electrical conductivity of tap water is increased when sodium benzoate is added to the tap water in concentrations of 0.1% and greater.

[0048] Applicant has demonstrated that tap water that has been treated in accordance with this invention has an increased electrical conductivity with the following experiment. A light bulb was screwed into the socket at one end of an electric extension cord. The insulation from a portion of the cord was removed and the un-insulated wires were held and maintained apart from each other to prevent them from engaging and shorting out. The extension cord was plugged into an alternating current outlet, causing the light to be illuminated. The light bulb was then lowered into a tank containing water that has been treated in accordance with this invention. The bulb is lowered to a dept at which the un-insulated wires are submerged. The light remains illuminated. When this experiment is conducted in plain tap water the un-insulated wires short out through the water and the bulb does not remain illuminated. This dramatic demonstration proves the accuracy of applicant's operating theory of this invention.

[0049] This product has many uses in industrial processes to prevent rust and mold and to reduce undesirable odors. In industrial processes in which an aqueous chemical solution must be processed in an apparatus that is prone to damage by rust this product can prevent rusting of the apparatus and

thus prolong its useful life. A preferred process of this type is an industrial paper making process and particularly a process for recycling newsprint and other paper containing ink. When repulping inked paper it is desirable for the finished product to be white. Repulping chemicals including deinking chemicals are added to the vat containing the aqueous paper solution to be repulped. In the paper industry this vat is referred to as a pulper, As a result of the presence of the aqueous solution metal pipes connected to the pulper are prone to rust. The product of this invention, in its granular form, is packaged with the repulping and deinking chemicals in a container that will be deposited into the pulper without opening the container. The container used in this process is formed completely from white paperboard that will be defibered and chemically dispersed in the aqueous solution so as to not contaminate the process as would brown or other colored paperboard. An advantage of this process for packaging the repulping and deinking chemicals along with the rust, mold and odor inhibitors is that that workers loading the pulper have a self contained clean package that can be conveniently stored and deposited into the pulper. This avoids exposing the workers to the chemicals and risking spills that would require a clean up that could be hazardous. Furthermore, mold and unacceptable odors from the wet pulp are diminished. This packaging process, of the rust, mold and odor inhibitor of this invention with other chemicals, can be used in numerous other industrial process.

[0050] Applicant has also demonstrated the operability of this invention by the following Examples:

EXAMPLE 1

[0051] Several ungalvanized nails were immersed in water that had a 1% concentration of sodium benzoate. Several identical ungalvanized nails were immersed in tap water. The nails that were immersed in tap water showed visible evidence of rust in 24 hours. These nails were removed from the solution and were wiped with a clean tissue paper and the rust impregnated and was visible on the paper. The nails that were immersed in the water that had a 1% concentration of sodium benzoate showed no visible evidence of rust after three weeks. These nails were removed from the solution and were wiped with a clean tissue paper and there was no visible rust on the paper.

[0052] Rust is a greater problem in salt water then in non brackish water. The tests of EXAMPLES 1 was modified, EXAMPLE 2, by adding 1.0% by weight of table salt to the solution containing 1.0% sodium benzoate. The result of these modified tests were the same as in EXAMPLES 1 & 2, that is there was no rust on the nails after three weeks of immersion in the salt water solution.

EXAMPLE 2

[0053] Several ungalvanized nails were immersed in water that had a 1% concentration of sodium benzoate and a 1% concentration of table salt. Several identical ungalvanized nails were immersed in tap water. The nails that were immersed in tap water showed evidence of rust in 24 hours, but the ungalvanized nails showed no evidence of rust after 24 hours. Three months after these test commenced the nails that were in tap water were removed from the solutions and were wiped with a clean tissue paper. The nails that were in tap water were rust impregnated and the rust was visible on the paper. The nails that were immersed in the water that had a 1% concentration of sodium benzoate and a 1% concentration of table salt showed no visible evidence of rust after three months. These nails were removed from the solution and were wiped with a clean tissue paper and there was no visible rust on the paper.

[0054] The results of EXAMPLES 1 & 2 are summarized in the following CHART 2 RUST EXAMPLES.

CHART 2

RUST EXAMPLES

Example No.	% Concentration of Sodium Benzoate	Visible Rust on Nails	Visible Rust Impregnated on Paper
1	1%	No	No
1	0%	Yes	Yes
2	1%	No	No
2	0%	Yes	Yes

EXAMPLE 3

[0055] A portion of cornstarch was immersed in water that had a 1% concentration of sodium benzoate. A like portion of cornstarch was immersed in tap water. The cornstarch that was immersed in tap water showed evidence of mold after 4 weeks. The cornstarch that was immersed in the water that had a 1% concentration of sodium benzoate showed no evidence of mold after four weeks.

EXAMPLE 4

[0056] A portion of dry dog food was placed on a plate and sprayed with water that had a 1% concentration of sodium benzoate. A like portion of dry dog food was placed on a plate and sprayed with tap water. The dry dog food that was sprayed with tap water showed evidence of mold and had an odor after 48 hours. The dry dog food that was sprayed with water that had a 1% concentration of sodium benzoate showed no evidence of mold after three months.

EXAMPLE 5

[0057] A portion of wet lap pulp (pulp from which paper is made) was treated with water that had a 1% concentration of sodium benzoate. A like portion of wet lap pulp from the same batch as the above wet lap pulp was not treated (wet lap pulp is moist and contains tap water) but was isolated for observation and comparison. The wet lap pulp that was treated with water having a 1% concentration of sodium benzoate shows no evidence of mold or odor after almost a year. The untreated wet lap pulp showed evidence of mold and had an odor after 48 hours.

EXAMPLE 6

[0058] A commercially available 16 ounce bottle of cranberry-raspberry drink was opened and one ounce

of water having a 30% concentrations of sodium benzoate was added to the contents of the bottle. The resulting cranberry-raspberry drink thus had about a 1.9% concentration of sodium benzoate. A second bottle of the same commercially available drink was opened but not treated in any way. After three weeks the bottle containing the ounce of water having a 30% concentration of sodium benzoate showed no evidence of mold however at this time the untreated bottle showed considerable amounts of mold.

[0059] Applicant has found that to prevent unacceptable odors from devoloping a solution containing up to about 10% sodium benzoate is more effective than lower concentrations. The preferred concentration, for eliminating odors is about 6%.

[0060] The results of EXAMPLES 3, 4, 5 & 6 are summarized in the following CHART 3 MOLD EXAMPLES.

CHART 3

MOLD EXAMPLES

Example No.	% Concentration of Sodium Benzoate	Mold	No Mold
3	1%		X
3	0%	X	
4	1%		X
4	0%	X	
5	1%		X
5	0%	X	
6	1.9%		X
6	0%	X	

EXAMPLE 7

[0061] A growing plant having green leaves and small white flowers was isolated from other plants of the same type. the isolated plant was sprayed with water having a 10% concentration of sodium benzoate. The other plants were not treated. After six hours the isolated plant was shriveled and dried up, however the surrounding untreated plants thrived and showed no evidence of shriveling or drying up.

EXAMPLE 8

[0062] Two similar potted plants each having green leaves and violet colored flowers were obtained for this example. One of the potted plants was watered with tap water and at the same time the other potted plant was watered with water that contained a 10% concentration of sodium benzoate. Three days after watering the potted plants the potted plant that had been watered with tap water was thriving and showed no evidence of wilting or shriveling up. However after three days, the plant that was watered with water containing a 10% concentration of sodium benzoate, was weathered and dried up.

EXAMPLE 9

[0063] A patch of grass about two feet in diameter was sprayed with water having a 10% concentration by weight of sodium benzoate . At the time that the water having the 10% concentration of sodium benzoate was sprayed on this patch of grass the sprayed patch as well as the surrounding grass areas were green and healthy looking. However, 24 hours after the water having a 10% concentration of sodium benzoate was sprayed on the patch, the patch appeared straw like and there was no longer any green appearing.

EXAMPLE 10

[0064] Three large potted plants having green leaves and red flowers, each plant was about 3 feet tall, were utilized for this EXAMPLE. The three plants were aligned adjacent to each other in a sunny area. The large potted plant to the left was watered with tap water and the plants in the center and to the right were watered with water having a 10% concentration by weight of sodium benzoate. Two days after watering these three large potted plants, the plant to the left retained its green leaves and red flowers. However, the large plant in the center and the one to the right had undergone change. The flowers were no longer red and instead appeared pink and white and the leaves were drooping and were a much lighter shade of green. Four days after watering the plants the large plant in the center and the one to the right had undergone further change. The remains of the flowers were now brown and only a few brown leaves remained on the branches. The plant to the left retained its green leaves and red flowers.

[0065] The results of EXAMPLES 7, 8, 9 & 10 are summarized in the following CHART 4 PLANT GROWTH RETARDER EXAMPLES.

CHART 4

PLANT GROWTH RETARDER EXAMPLES

Example No.	% Concentration of Sodium Benzoate	Growth Stunned	Growth Not Stunned
7	10%	X	
7	0%		X
8	10%	X	
8	0%		X
9	10%	X	
9	0%		X
10	10%	X	
10	0%		X

[0066] The water solution containing concentrations of sodium benzoate in the range of 1-10% forms a thin coating on objects that are immersed in it and on objects that it is applied by spraying or other application method. However, this thin coating can be washed of for example if the object is rained upon. In some situations it is preferred that the coating be more adhesive. Accordingly some embodiments of this invention have been further improved by combining the water having increased conductivity with coatings that will cause the solution to better adhere to the surfaces of organic and inorganic material to which it is applied. Applicant has found that cornstarch, potato starch and corn syrup will cause the solution to better adhere to the surfaces of organic products. Cornstarch, potato starch and corn syrup are ingestible non-toxic substances that when placed in the sodium benzoate solution will not rot or mold.

[0067] For inorganic surfaces such as steel and aluminum surfaces as well as for non-absorbing organic material such as grain applicant has found that an acrylic coating material can be combined with the increased conductivity aqueous solution to causes the solution to adhere to the hard surfaces. A commercially available acrylic coating, sold by SC Johnson & Son, Inc. under the brand name "FUTURE"®, containing niethylene glycol monoethyl ether and tributoxy-ethyl phoephate has been successfully used for this purpose. Other acrylic coating material could also be used for this purpose.

[0068] A solution containing a concentration of about 1% sodium benzoate and about 1.3% acrylic coating material can be formulated by the following process.

[0069] In a first bottle mix about 946 grams of sodium benzoate and about 2,838 grams of tap water.

[0070] In a second bottle mix about 1183 grams of acrylic coating material and about 2601 grams of tap water.

[0071] In a third bottle mix 1/25 of the contents of the first bottle, 1/25 of the contents of the second bottle and 3482 grams of tap water. The diluted solution of the third bottle will now contain a concentration of about 1% sodium benzoate and about 1.3% acrylic coating material. This solution can be applied by spraying, wiping or painting to a hard surface and will adhere to the surface. The dried coating will not wash off for example by a rain falling on the surface.

[0072] Applicant has also found that the cornstarch or corn syrup ingredient as well as the acrylic coating ingredient can both be added to the sodium benzoate solution and the resulting product will adhere to both organic and inorganic products.

[0073] Corn syrup does not include water and when water is added to corn syrup mold will form. For this reason commercial corn syrup is not diluted with water and is sold in its natural viscous state. Applicant has found that corn syrup will go into solution with his aqueous benzoate solution and the resulting solution will not mold. Thus, applicant can with this invention produce corn syrup that has a lowered viscosity. This lowered viscosity corn syrup will pour easier and faster, and will have fewer calories per volume, as well as having other commercial advantages.

[0074] In the mortuary industry embalming fluids typically contain significant quantities of formaldehyde, other embalming chemicals and tap water. However, there are a number of drawbacks to the use of formaldehyde since formaldehyde has been associated with a number of health and environmental risks. Furthermore, formaldehyde is under scrutiny by the environmental protection agency because it is not biodegradable and contaminates the environment. Still further, formaldehyde dehydrates the tissue and thus distracts from a lifelike presentation of the cadavers after embalming.

[0075] When water that has been processed in accordance with this invention is substituted for the tap water of the embalming fluid several advantages are obtained. The first advantage is that the cadaver has a more lifelike appearance when the solution of this invention contains a minimum of 1% Benzoate. This is a result of the embalming fluid containing water that has been processed in accordance with this invention functioning as a preservative and also a decreased concentration of formaldehyde. Rusting of the embalming apparatus or chamber is a problem, caused by the use of tap water, in the mortuary industry. Embalming apparatuses are cabinet like devices that house embalming chemical containers, a tap water supply conduit, a mixing manifold in which the embalming fluids and water are combined, pumps and valves for dispensing the embalming fluid to the embalmer's control device as well as suction mechanism for removing liquids from the cadaver. Another advantage is that when water that has been processed in accordance with this invention is used as an ingredient of the embalming chemical rusting of the embalming apparatuses is greatly reduced. Also, the embalming area in a mortuary has a very noxious odor that can be eliminated or diminished when odor eliminating water processed in accordance with this invention is sprayed in the embalming area before and after embalming. Applicant has found that to prevent unacceptable odors from developing a solution containing up to about 10% sodium benzoate is more effective than lower concentrations. The preferred concentration for eliminating unacceptable odors is about 6%. The amount of formaldehyde contained in the embalming fluid can be reduced when water that has been processed in accordance with is invention is substituted for the tap water normally used. Yet another advantage is that medical students have found that the muscles of cadavers, that have been embalmed with fluids containing water that has been processed in accordance with this invention, are more flexible and thus working with the cadavers is easier.

[0076] The seafood industry exerts great efforts to maintain the wholesomeness of their products such that these products have normal nutritional value, and are free from pollution, caused by microbial or chemical contamination. The amount of time that seafood products remain in high-quality condition for consumption varies somewhat among species. Generally, the higher the fat content, the more prone the product is to spoilage and flavor changes. The oxidation of the natural oil in the fish, causes the fish to become unpalatable. This process can be retarded by cold temperatures. The shelf life of fresh fish can be extended by maintaining them at a low temperature for example 1-2° C. However, this extended shelf life is relatively short and many of the best fishing grounds in the world are large distances from the major consumer centers. As a result the fishing trawlers must return to port every 3 days to assure that their catch of fresh fish can reach the consumer in a wholesome condition. Seagoing vessels have been developed for catching fish, processing the catch and freezing it at sea. However, when the frozen fish are thawed they have a relatively short shelf life. Thus, a method for extending these shelf life is very important to the seafood industry as well as to consumers.

[0077] When water that has been treated in accordance with this invention is applied to fresh seafood, by bathing in or spraying on, the shelf life of the fresh seafood is substantially increased. Likewise when seafood that has been frozen at sea, in water that has been treated in accordance with this invention, is thawed the shelf life of this seafood is substantially increased. Thus, a seafood merchant that has thawed seafood that was frozen in water that has been treated in accordance with this invention will have an extended time period in which to sell the product to a consumer and the consumer that has purchased such seafood will have an extended period in which to prepare the seafood

for consumption. As a result the fishing trawlers will be able to remain at sea for more than three days and be assured that their fresh seafood will reach the consumer in a wholesome condition. This will save a substantial amount in fuel oil used by the fishing trawlers.

[0078] When fish are frozen either in port or at sea they are placed in water and frozen into a block, which is shipped to the local fish merchants. The fish merchants either thaws the blocks and sells the thawed fish to other merchants that sell to the ultimate consumers or restaurants or resell the frozen blocks to consumer merchants or restaurants. When the water used to form the frozen blocks is water that has been treated in accordance with this invention, when the blocks are thawed the melted water will permeate the seafood product and extend its shelf life. Thus, by using water that has been treated in accordance with this invention to freeze fish either in port or at sea a much improved method for freezing seafood has been provided.

EXAMPLE 11

[0079] Cod fish fillets which were frozen at sea were thawed and minced. The minced fillets were divided into two 200 gram portions. To one portion, 20 milliliters of sterile, deionized water was added (10%) and to the other 20 milliliters of the sodium benzoate solution of this invention containing 1% benzoate was added. Both portions were stirred and then placed at 1-2° C. for storage. Samples were taken 2 hours, 7 days and 14 days after mixing. Counts of psychrothrophic microorganisms was done on Plate Count Agar with 0.5% NaCl added by the pour-plate technique. Plated were incubated at 22° C. for 3 days prior to counting colonies. When a nutrient agar-type medium is incubated, using the streak-plate or pour-plate method, cells are individually separated. In incubation, individual cells reproduce rapidly to generate a visible colony of cells, each colony being a pure sample of a single kind of microorganism. The results are shown in the table below. These results clearly indicate that the 1% sodium benzoate solution drastically reduced and slowed the growth of microorganism in the minced fillets and can increase the shelf life of fresh seafood that is maintained at 1-2° C. to at least 14 days which is about twice its usual shelf life.

CHART 5

SEAFOOD INDUSTRY

Days at 1–2° Centigrade	Count of psychrotrophic microorganisms in water sample	Count of psychrotrophic microorganisms in sample with 1% Sodium Benzoate solution
0	5	5
7	7	4.8
14	9.1	5.2

EXAMPLE 12

[0080] In the above example, a 1% sodium benzoate solution was used, which is considered to be a stronger than acceptable for a food product, and thus a further tests were performed. In these second tests cod fish fillets which were frozen at sea were thawed and minced. The minced fillets were divided into two 200 gram portions. To one portion, 2 milliliters of sterile, deionized water was added and to the other 2 milliliters of the sodium benzoate solution of this invention containing 0.1% benzoate was added. As a result in this test the other portion contained only 10% of the amount of benzoate as was in EXAMPLE 11. In other words EXAMPLE 11 was a 1% sodium benzoate solution and EXAMPLE 12 is a 0.1% sodium benzoate solution. Both portions were stirred and then placed at 1-2° C. for storage. Samples were taken 2 hours, 7 days, 14 days and 18 after mixing. Counts of psychrothrophic microorganisms was done on Plate Count Agar with 0.5% NaCI added by the pour-plate technique. Plated were incubated at 22° C. for 3 days prior to counting colonies. The results are shown in the table below. These results clearly show that the 0.1% sodium benzoate solution drastic reduced and slowed the growth of microorganism in the minced fillets and can increase the shelf life of fresh seafood that is maintained at 1-2° C. for at least 14 days which is about twice its usual shelf life.

CHART 6

SEAFOOD INDUSTRY

Days at 1–2° Centigrade	Count of psychrotrophic microorganisms in water sample	Count of psychrotrophic microorganisms in sample with 0.1% Sodium Benzoate solution
0	4.22	4.21
7	6.38	4.79
14	9.52	6.17
18	9.3	8.09

[0081] Having described the invention it should be understood that the compositions and methods of the invention is intended merely to be illustrative thereof and that other modifications, embodiments and equivalents may be apparent to those who are skilled in the art without departing from its spirit.

1. A method of introducing chemicals into an aqueous industrial process comprising the steps of:

providing an open container that is constructed of white paperboard;

depositing dry chemicals for the industrial process into the container;

depositing dry sodium benzoate into the container in an amount such that the aqueous industrial process will have a concentration of sodium benzoate in the range of 1-10% by weight;

closing the container with a cover that is constructed of white paperboard;

depositing the closed container into a vat containing an aqueous solution.

2. A method as set forth in claim 1 wherein the following additional step is performed:

depositing dry potassium sorbate into the open container in an amount such that the aqueous industrial process will have a concentration of potassium sorbate in the range of 0.05% to 1.0%.

3. The method as set forth in claim 1 wherein the aqueous industrial process is a process for repulping inked paper.

4. The method of repulping inked paper as set forth in claim 3 wherein the following additional step is performed:

depositing dry potassium sorbate into the open container in an amount such that the aqueous industrial process will have a concentration of potassium sorbate in the range of 0.05% to 1.0%.

5. The method for repulping inked paper as set forth in claim 3 wherein the vat is a paper pulper containing an aqueous solution of inked paper.

6. The method for repulping inked paper as set forth in claim 3 wherein the dry chemicals that are deposited into the container for the industrial process are repulping and deinking chemicals.

7. The method for repulping inked paper as set forth in claim 5 wherein the dry chemicals that are deposited into the container for the industrial process are repulping and deinking chemicals.

8. The method of improving the industrial usefulness of water by increasing its electrical conductivity comprising the step of adding sodium benzoate to the water in an amount that the solution has a sodium benzoate concentration in the range of 1-10% by weight.

9. The method of improving the industrial usefulness of water as set forth in claim 1 comprising the following additional step:

adding potassium sorbate, in a range of 0.05% to 1.0%, to the solution.

10. The method of preventing the rust of metal by the following steps:

providing a solution of water having a concentration of sodium benzoate in the range of 1-10%;

immersing the metal in the solution.

11. The method of preventing the rust of metal as set forth in claim 10 comprising the following additional step:

adding potassium sorbate, in a range of 0.05% to 1.0%, to the solution.

12. The method of preventing the rust of metal by the following steps:

providing a solution of water having a concentration of sodium benzoate in the range of 1-10%;

coating the metal with the solution having a concentration of sodium benzoate in the range of 1-10%.

13. The method of preventing the rust of metal by the following steps:

providing a solution of water having a concentration of sodium benzoate of about 1%, and an acrylic coating of about 1%;

coating the metal with the solution having a concentration of sodium benzoate of about 1%, and an acrylic coating of about 1%.

14. The method of preventing the rust of metal by the following steps:

providing a solution of water having a concentration of sodium benzoate in the range of 1-10%, and an acrylic coating in the range of 1-10%;

coating the metal with the solution having a concentration of sodium benzoate in the range of 1-10% ad acrylic coating in the range of 1-10%.

15. The method of preventing the formation of mold on organic substances comprising the following steps:

providing a solution of water having a concentration of sodium benzoate in the range of 1-10%;

coating the organic substance with the substance.

16. The method of preventing the formation of mold on an organic substances comprising the following steps:

providing a solution of water having a concentration of sodium benzoate in the range of 1-10% and corn starch or corn syrup in a concentration of 1-10%;

coating the organic substance with the solution.

17. The method of preventing offensive odors from forming on organic substances comprising the following steps:

providing a solution of water having a concentration of sodium benzoate of about 10%;

coating the organic substance with the solution.

18. The method of preventing the formation of offensive odors from organic substances comprising the following steps:

providing a solution of water having a concentration of sodium benzoate of about 10% and starch in the range of 1-10%;

coating the organic substance with the solution.

19. The method of preventing the formation of mold in a soft drink containing organic matter comprising the following steps:

providing a solution of water having a concentration of sodium benzoate of about 30%;

mixing the solution of water having a concentration of sodium benzoate of about 30% to the soft drink at of ratio of solution to drink in the range of 1 to 10-20.

20. The method of stopping the growth of a plant comprising the following steps:

providing a solution of water having a concentration of sodium benzoate in the range of 1-10%;

coating the plant with the solution having a concentration of sodium benzoate in the range of 1-10%.

21. The method of stopping the growth of a plant comprising the following steps:

providing a solution of water having a concentration of sodium benzoate in the range of 1-10% and a concentration of starch in the range of 1-10%;

coating the plant with the solution having a concentration of sodium benzoate in the range of 1-10% and starch in the range of 1-10%.

22. The method of impeding the growth of a plant comprising the following steps:

providing a solution of water having a concentration of sodium benzoate in the range of 1-10%;

coating the plant with the solution having a concentration of sodium benzoate in the range of 1-10%.

23. The method of impeding the growth of a plant comprising the following steps:

providing a solution of water having a concentration of sodium benzoate in the range of 1-10% and a concentration of starch in the range of 1-10%;

coating the plant with the solution having a concentration of sodium benzoate in the range of 1-10% and starch in the range of 1-10%.

24. The method of increasing the shelf life of seafood comprising the following steps:

providing a solution of water having a concentration of sodium benzoate in the range of 0.1-1%;

coating the seafood with the solution having a concentration of sodium in the range of 0.1-1%;

maintaining the coated seafood at a temperature of 1-2° Centigrade.

25. The method of increasing the shelf life of seafood comprising the following steps:

providing a solution of water having a concentration of sodium benzoate in the range of 0.1-1%;

placing the seafood with the solution having a concentration of sodium benzoate in the range of 0.1-1%;

freezing the solution having a concentration of sodium benzoate in which the seafood has been placed;

maintaining the frozen solution containing the seafood in a frozen state until the seafood is to be consumed;

thawing the frozen solution containing the seafood.

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