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EN 102/1280

4-7-19

Just Salt & Water, Right?

Make sure to wear the rubber gloves that reach to the elbows. Protective eyewear is a must, to prevent ocular damage. All skin must be covered, a plastic or chemical resistant apron is recommended. Lastly, a respirator is essential in order to minimize exposure from toxic fumes. Make sure there is proper ventilation as the off-gas will cause "minor irritation" to the body. Begin by diluting the product, too high of a concentration results in toxic substance formation. Caution, common dirty surfaces and their stains may react with the product to produce a poisonous gas; refer to the do not mix list. The product is considered safe if all precautions are followed, and remember, it is just salt and water. The safety measures described above are for using typical household bleach. The cleaning industry has peddled the idea of their synthetic bleach formulations as being "harmless" and "safer than table salt," while their own directions beg to differ. Bleach products are harsh, caustic, and volatile chemicals that should be phased out; while the United States (US) transitions to natural, safe alternatives.

The concept of bleaching has been around for centuries dating to before the 17th century. Early forms of bleaching involved, the sun & water, and alkaline (pH greater than 7) & acidic (pH lower than 7) baths. In 1785, chlorine (one of the most common chemicals for bleach) was discovered to have bleaching effects and disinfecting properties. Sodium hypochlorite (active ingredient in most bleaches) became the most common commercial bleach until the 1920s when manufacturers began to dilute chlorine bleaches. In 1941, the US began using chlorine gas &

water chlorination to disinfect drinking water; implementing this process throughout the country. In present day US, bleach products have become the number one cause of accidental poisonings, with around 50,000 cases reported each year. Bleach has also come under scrutiny by environmental groups because of: harmful carcinogens, organochlorine compounds, and dioxin byproducts given off by bleach products; which can persist throughout the environment.

Seemingly "harmless" household bleach can easily be converted to poisonous chlorine gas through chemical reactions. Deriving from the infamous warfare agent, chlorine gas, used during World War I, typical household bleach is still manufactured using the poison; creating a highly reactive product. During a reaction, bleach gives off chlorine gas in conjunction with other products, such as: ammonia, acids, other cleaners, pesticides, urine, detergents, paints, and many others ("You and…). Household bleach is a highly reactive chemical that is easily transformed into a toxic vapor; reacting with common surfaces and stains that one would typically clean. The chlorine gas produced by bleach causes a wide variety of deadly effects, including: chest pain, nausea, irritation to eyes & skin, fluid in the lungs, chemical burns, and death. The gas (and other gases produced by bleach) wreaks havoc on the respiratory system by damaging the epithelium lining the airways. Effects are long-lasting because the poison activates inflammatory cells, mimicking an allergy attack, from the nose to the bronchi. Acute exposure (i.e. cleaning or swimming in pools) can have chronic effects, leading to asthma and other respiratory diseases; through inhalation or absorption (White and Martin). Repeated low-level exposures intensify adverse health conditions for the long-term. This synthetic chemical is highly corrosive to respiratory airways; inducing illnesses & diseases.

Bleach is commonly used as a disinfectant for cleaning and water chlorination; however, studies have shown the chemical poses a serious health threat. Researchers from the National

Institute of Health have conducted studies into the cytotoxicity and genotoxicity of sodium hypochlorite and chlorine compounds on human cells in water. Sodium hypochlorite was found to be: mutagenic (able to mutate DNA), carcinogenic, and toxic to cells. The poison disrupts chromosomes within cells and allows them to become cancerous. The cells throughout the studies were exposed to the bleach ingredients at levels 33 times lower than what is found in drinking water (Gül, et al). Concentrations in average drinking water are well above the amounts needed to induce toxic and cancerous effects. The disinfecting properties of bleach allow for its corrosiveness to human skin. According to the Environmental Protection Agency (EPA), sodium hypochlorite is, "… extremely corrosive and can cause severe damage to the eyes and skin." Bleach, as with bacteria, reacts with skin cells through oxidation and denatures its proteins; rendering them useless. If not quickly removed, household bleach can cause chemical burns and permanent scarring (Environmental…). The properties of bleach that give it its usefulness are also the qualities that adversely threaten the health of its users.

Bleach acts as an excellent antimicrobial and antiseptic by killing and reducing the growth of harmful microbes. Household bleach is regularly used to disinfect the home of infectious bacteria, and its efficacy holds true. Bleach denatures the proteins of bacteria and other microorganisms in order to eliminate target pests and reduce the chance of contracting illnesses ("Antimicrobials."). Bleach is very useful for sterilizing the home or workplace as it destroys most any microbe that crosses its path.

The antimicrobial action of bleach works all too well on the microbes that make up humans. Household bleach has been proven to be toxic to human cells, as it oxidizes them in a similar action to target bacteria. Once in contact with skin, bleach works to destroy tissue with cruel efficiency by denaturing the proteins within the skin (Environmental…). These synthetic

chemicals work considerably well against unwanted microbes; however, they work all the same against human tissue.

The manufacturing of chlorine bleach leads to the creation of dangerous byproducts that are extremely harmful to the environment. To obtain the necessary components of typical household bleach, chemical plants split sodium and chlorine atoms to produce “free chlorine”. The reaction process yields poisonous byproducts, such as: organochlorines, pollutants, and specifically dioxin; a toxic hormone-disrupter known to cause: cancer, disorders, and endometriosis, among other things. When chlorine bleach comes into contact with some organic compounds (for example wood pulp) dioxin is produced. Dioxin waste is nearly indestructible in the environment and its contamination lasts for many decades (Ellis). Terrible toxins are created during bleach formulation that pollute entire ecosystems, and other organisms. The ingredients of household bleach are highly toxic to aquatic life. The EPA warns of sodium hypochlorite water contamination as the synthetic chemicals are extremely poisonous to fish and aquatic invertebrates. Bleach waste can also result in the formation of trihalomethanes (potential carcinogens) that are lethal to humans and wildlife (Environmental…). The cost of creating these harsh chemicals is the formation of volatile poisons which threaten all manner of life they encounter.

The bleach industry and their proponents argue household bleach is a necessary tool to win the “war” against infectious bacteria. Clorox, one of the largest bleach manufacturers, stresses the need for bleach to defend against the cold and flu viruses; touting their killing of “99.9% of germs”. They draw comparisons and personify the cold and flu as “sneaky” enemies, hiding throughout homes; waiting to strike. Through this marketing tactic the cleaning industry creates a fearsome foe that preys upon the average consumer, and their product is the last line of

defense (“How to…). Clorox and others stoke fears of common, usually non-threatening illnesses and morph them into beasts and monsters needed slaying.

Although household bleach can help prevent the common cold and flu, it actually works to develop other sinister diseases. Researchers from the U.S. National Library of Medicine found that repeated use of bleach, even low exposures, allows for various diseases to develop. Chlorine bleach irritates the respiratory airways giving rise to asthma and chronic bronchitis. Sodium hypochlorite was also found to alter the mucus through the respiratory system, making it more acidic. Furthermore, inhalation was found to cause allergic reaction response that intensified with repeated exposures. Their study was conducted using bleach exposure at EPA allowable doses (de Genaro, et al). Even at doses allowed by the EPA, chlorine bleach was found to induce various respiratory diseases. A different study conducted by scientists form the US National Library of Medicine found household bleach to be genotoxic to human cells. The components of bleach could lead to carcinogenic effects as they are toxic to lymphocytes (white blood cells). Sodium hypochlorite is able to alter chromosome formation allowing for the buildup of micronuclei. Micronuclei result from fragments of chromosomes and are signs of genotoxicity and are commonly seen in cancerous cells (Gül, et al). The cleaning industry distracts with a rally to arms against bacteria that cause runny noses and head colds, whereas their products lead to chronic diseases and cancers.

There are safer, more effective alternatives to synthetic chemical use. Stephen Tvedten, formulator and patent owner of his enzymatic cleaners, has dedicated his life to providing non-toxic, natural alternatives to conventional poison use. Tvedten has developed a natural-based cleaner comprised of protease enzymes; under the trade name of TweetMint. Enzymes are catalysts, reacting only with certain substrates; and they occur naturally throughout the

environment and in many organisms, including humans. Because protease enzymes can only break down specific materials, they are considered harmless to: humans, plants, and animals (Tvedten). Tvedten's enzymatic solutions provide a safe alternative to caustic chemicals. TweetMint Enzyme Cleaners outperform bleach and other chemicals. In his manual, *The Best Control II*, Tvedten explains the science behind his protease enzymes:

> Dirt is actually layers of fine films made up of greases, oils, fats, bacteria, germs, dust mites, nonorganic material and organic micro-organisms. These films are bonded to each other and to the surface by amino and fatty acids. Most cleaners emulsify some of these films but do not break down amino and fatty acids. Usually the top layers of the films are removed but some of the base layers are left to collect bacteria and, in turn, resoil much faster. Enzymes attack or digest the amino and fatty acids that bond the films of dirt together and emulsifies them so they can be transferred completely off the surface… (Tvedten)

Bleach creates an "out of sight, out of mind" atmosphere, where solely the top layer of stains is removed. TweetMint is more effective, as it fully removes the stain's source without harming people or the shared environment.

Household bleach products are not as safe as they are made out to be. Although routine exposures seem minor, they can have long-lasting effects. The components of these synthetic chemicals harm all manner of life and their waste forms toxic pollutants. Safer alternatives exist, and the US should promote these effective, natural products for a better environment, home, and quality of life.

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