

# DISINFECTANT OVERKILL



■ HOW TOO CLEAN MAY BE  
■ HAZARDOUS TO OUR HEALTH



**WVE**

A REPORT BY WOMEN'S VOICES FOR THE EARTH  
NOVEMBER 2009

## DISINFECTANT OVERKILL

A look at five common antimicrobial chemicals and their associated health impacts

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The author is grateful for the assistance of the many people who contributed to this report. Content and scientific review were provided by Ann Blake PhD; Ted Schettler MD MPH Science and Environmental Health Network; Anne Steinemann PhD University of Washington College of Engineering; Carol Westinghouse Informed Green Solutions Inc; and Ian Illuminato Friends of the Earth. Women's Voices for the Earth would like to acknowledge the generous contributions of our partners Ms Foundation for Women, anonymous donors, and the following supporters who helped make production of this report possible:

Linda Angeloni	Kate Lupo
Simmie Antflick	Harriet & Donald Marble
Martha Arter	Bonnie McCool
Rebecca Baril	Daniel McCourt
Lucy Butler	Nancy Otterness
Kerrie Byrne	Geri F. Parsons
Pamela Cauble	Gretchen Philp
Amy Clark	Marlene Rockey
Catherine Converse	Lynn Sainsbury
Dan Crockett	Lissa Sather
Linda Eichwald	Annie Schaub
Louise Flanagan	Suzanne K. Seaton
Maryanna Foskett	Alex Thieme
Derek Goldman	Mary & Jack Thorndike
Gail Gutsche	Judith Wine
Linda Jensen	Kaye Garnett Zamboni
Susie Leiper	

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Bozeman, MT



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## EXECUTIVE SUMMARY

**A**s stories on the dangers of flu viruses, contaminated foods, and contagious illnesses proliferate in the media, advertisers increasingly try to convince consumers that antimicrobial cleaning products will protect their homes and families from infection. Likewise, manufacturers have capitalized on consumer fears by producing more products that contain antimicrobial chemicals. However, it is unnecessary to disinfect one's homes to the degree that advertisers and manufacturers would have consumers believe.

Antimicrobial cleaning products (also known as disinfectants) are specifically intended to both clean surfaces and kill germs such as bacteria, viruses, or fungi. But research has shown that some of the most common antimicrobial chemicals used in cleaners could have serious health consequences, especially for women, cleaning workers, and young children. Also, the overuse of antimicrobials contributes to the growing problem of antibiotic-resistant bacteria, which some scientists say could leave the public with fewer tools in the fight against infectious diseases.

Women's Voices for the Earth (WVE) produced this report to provide an alternative perspective on antimicrobial products and to shed light on the potential harm that the use and overuse of the chemicals in these products may be causing to human health. The report discusses the potential hazards of five commonly found classes of antimicrobial chemicals: chlorine bleach, ammonia, Triclosan and Triclocarban, ammonium quaternary compounds ("quats"), and nano-silver, a newly emerging chemical. Potential health impacts from these chemicals range from simple irritation of the eyes, skin, and respiratory system to hormone disruption and adverse impacts on the immune system.

This report is intended to encourage a prudent approach to the use of antimicrobial cleaners, and a return to safer and scientifically effective methods for keeping one's home clean and healthy on a regular basis. It also offers consumers recommended actions for reducing their exposure to these potentially hazardous chemicals, as well as information on non-toxic cleaners with antimicrobial properties.

### COMMON ANTIMICROBIAL CHEMICALS FOUND IN HOUSEHOLD DISINFECTANTS

**Chlorine bleach** is commonly used to treat drinking water, sanitize swimming pools and to whiten laundry, and is a strong eye, skin, and respiratory irritant. Mixing chlorine bleach with other cleaners like ammonia can release dangerous chlorine gas. Exposure to chlorine gas can cause coughing, shortness of breath, chest pain, nausea, or other symptoms.

**Ammonia** is often included in glass cleaners and other hard-surface cleaners, and can be irritating to the skin, eyes, throat, and lungs. Ammonia can burn your skin, and can damage your eyes (including blindness) upon contact.

**Triclosan** and **Triclocarban** are commonly added to household cleaning products such as hand soap and dish soap as well as a broad range of other products from toothpaste to socks. These chemicals are persistent in the environment, and are linked to endocrine disruption, and potential increased risk of breast cancer.

**Ammonium quaternary compounds** ("quats") are found in household cleaning products like disinfectant sprays and toilet cleaners, and have been identified as known inducers of occupational asthma. Some quats have also been linked to decreased fertility and birth defects in mice.

**Nano-silver** is incorporated into some textiles, plastics, soaps, packaging, and other materials, giving each the natural antibacterial property of silver metal. Nano-silver particles can penetrate deep into your body and have been shown to be toxic to the liver and brain.

## FROM SURGICAL ROOMS TO LIVING ROOMS

**M**any of the powerful antimicrobial chemicals available in the home today were initially developed for hospital and clinical settings, where illness-causing germs are frequently found. In hospital settings, disinfecting specific surfaces is critical to the health of patients. For individuals whose immune systems are especially vulnerable to germs, disinfecting can also



mean the difference between life and death. Additionally, there is greater opportunity for new infections to occur during invasive medical procedures such as surgery. Targeted disinfection with antimicrobial chemicals is an important public health strategy in the hospital setting that can reduce the spread of serious disease.

The same powerful antimicrobial chemicals used in industrial-strength cleaners are increasingly found in household cleaning products. But for the vast majority of people, the home does not need to be as sterile as an operating room. Cleaning, which means to rid a surface of dirt or soil, is often sufficient for maintaining a healthy home. In fact, old-fashioned cleaning with

**For the vast majority of people, the home does not need to be as sterile as an operating room.**

soap and hot water has been scientifically proven to keep most homes sanitary. On the other hand, disinfecting, which means to cleanse so as to destroy or prevent the growth of microorganisms, is meant for specific situations. For example, stringent disinfection might be necessary in certain situations, such as in the homes of people with immune system diseases such as Multiple Sclerosis or HIV/AIDS, or those undergoing chemotherapy. And there may be certain circumstances in a household, if a family member already has the flu or another contagious disease, where antimicrobial cleaners could be useful. **However, in most households the need for routine disinfection is rare.**

Despite this, extensive marketing has been developed to convince consumers, and especially mothers, of the need to “kill germs” and “eliminate bacteria” from their homes. Every day women are bombarded with the message that they must buy X, Y, or Z disinfectant product to ensure a clean home and a healthy family. With heightened media attention and confusion around

the severity of flu viruses, this message is both persuasive and powerful. And millions of consumers are buying into it.

Disinfectant and antimicrobial cleaners are a growing sector of business for cleaning product manufacturers. The industry has seen significant growth in recent years; one study found a 23% growth rate in disinfectant products in the U.S. in 2004-2005<sup>1</sup>. And analysts project that the global disinfectant market will reach \$2.5 billion by 2012<sup>2</sup>. This is reflected in the cleaning product aisles of supermarkets across the country, where a wide variety of products on the shelves contain a disinfecting chemical. **Many of these products claim to kill germs, but none mention that they may also pose inadvertent health hazards to our bodies, our families, and our environment.**



**Chemicals stored in a woman's body are passed onto her child during pregnancy and later through breast-feeding.**

## The Downside to Disinfecting

There is growing research of the potential problems unleashed by the increased use of antimicrobials in the home. Health impacts such as asthma and dermatitis (skin rashes) are associated with several common antimicrobial chemicals. New research is examining the potential for more serious health impacts such as endocrine disruption, reproductive toxicity, breast cancer, and immune system effects. These health risks are simply unnecessary when non-toxic alternatives to disinfectants are available.

Health hazards associated with these chemicals are particularly concerning to women and children. Although gender roles have changed over time, women continue to do more than 70% of the housework in an average home, meaning that they are much more frequently exposed to these potentially dangerous chemicals. Women who spend most of their time at home may also have higher exposures to these chemicals. In addition, women carry the health impacts of these chemicals in a unique way. Many chemicals accumulate in fat and women generally have a higher percentage of fat tissue than men. Women are also the first environment for the next generation, and the chemicals stored in a woman's body are passed onto her child during pregnancy and later through breast-feeding.

Disinfectants also tend to kill a wide variety of bacteria. This means they will reduce both "bad" bacteria associated with illness, as well as the "good" bacteria that perform useful functions in our environment and in our bodies.

There are also concerns that the overuse of antimicrobial products is creating drug-resistant bacteria, more commonly known as “superbugs.” For example, bacteria have been found in the laboratory, and in some cases in our environment, which are resistant to these antimicrobial chemicals. Just as not completing a course of antibiotics allows for the growth of resistant bacteria within the body, so does the excessive use of antimicrobial products. This results in more robust strains of infections that are immune to the germ-killing effects of these cleaners. And with a finite number of antimicrobials available to fight infection, it is imperative that scientists and doctors not lose any of these critical resources. While it is still unclear whether or how much household use of antimicrobials is driving an increase in drug-resistant microbes, a cautious approach is justified in the use of these chemicals.

## GLOSSARY:

**Antimicrobial product:** A general term for a substance intended to reduce or eliminate growth and development of microorganisms such as bacteria, fungi, or viruses.

- ◆ **Disinfectant:** A substance used on hard surfaces and inanimate objects to destroy fungi and bacteria. A disinfectant is expected to reduce microorganisms by 99.99%.
- ◆ **Antibacterial:** A term to describe substances intended to destroy or inhibit the growth of bacteria.
- ◆ **Sanitizer:** A substance used to reduce microorganisms (mainly bacteria) on hard surfaces to a safe level. These substances are not intended to completely destroy all microorganisms.
- ◆ **Antiseptic:** A substance used on humans or other living things to inhibit the growth of microorganisms. Hand sanitizers are considered antiseptics as defined by the EPA.

*For the purposes of this report, these families of chemicals will be referred to as “antimicrobials.”*

**Cleaning:** To rid of dirt or soil.

**Disinfecting:** To cleanse so as to destroy or prevent the growth of microorganisms.

**Bacteria:** Plural for bacterium, which is a single-celled microorganism. Many bacteria are harmless to humans, and some perform important functions for the human body, such as breaking down waste. Some bacteria are harmful to humans and can cause infections. Examples of disease caused by bacteria are strep throat, some types of food poisoning, and pneumonia.

**Germ:** A microbe capable of causing disease. The term “germ” encompasses both bacteria and viruses.

**Virus:** A microscopic particle that can cause disease by infecting the cells of an organism. Unlike bacteria, which can live on their own, viruses need a host organism (like a human body) to survive and replicate. Examples of disease caused by viruses are the flu, the common cold, rotavirus, and hepatitis.

# COMMON ANTIMICROBIALS IN HOUSEHOLD CLEANERS AND THEIR POTENTIAL IMPACTS TO HUMAN HEALTH

## CHLORINE BLEACH:

### What is it?

Chlorine bleach, also known as sodium hypochlorite, has long been used as a disinfecting chemical. It is commonly used to treat drinking water, sanitize swimming pools, and whiten laundry. Bleach works by breaking down bacteria or other germs and rendering them harmless. It is registered by the Environmental Protection Agency (EPA) as a pesticide.

### Potential harms of bleach:

Chlorine bleach is a potent eye, skin, and respiratory irritant<sup>3</sup>. Anyone who has opened a bottle of bleach has experienced an instant reaction to its fumes. The higher the concentration of the bleach, the more damage it can cause. It is highly corrosive, which means it can cause permanent damage to human tissue. For this reason gloves and eye protection, as well as good ventilation,

are commonly recommended for bleach use. Domestic cleaning workers who used bleach regularly were found to be more likely to have asthma symptoms<sup>4</sup>. At very high levels of exposure, contact with chlorine bleach can cause death. Chlorine bleach can be very hazardous when mixed with other cleaning chemicals such as ammonia or vinegar (or any cleaning products containing these ingredients). Chlorine gas, a potent poison, is formed by this mixture and released into the air in your home. Chlorine gas exposure can cause coughing, shortness of breath, chest pain, nausea, or other symptoms. In 2007, the American Association of Poison Control Centers recorded over 50,000 calls regarding chlorine bleach poisoning events, making it one of the most common household substances to lead to poison control calls. One third of these calls concerned children accidentally ingesting chlorine bleach<sup>5</sup>.

**Bottom line:** Chlorine bleach can cause permanent damage to human tissue. If you choose to use it, take care to wear gloves and clean in a well-ventilated area. Never mix chlorine bleach with other chemicals like ammonia or vinegar.



## AMMONIA:

### What is it?

Ammonia is a naturally occurring nitrogen-containing gas. It can be dissolved in water to form liquid ammonia, which is the common form used in a variety of household cleaners. Ammonia has a distinct and strong odor and is used in a variety of cleaning products as well as in smelling salts. It is often included in glass cleaners and other hard-surface cleaners because it leaves a streak-free shine. Ammonia works as a disinfectant by increasing the cleaner's pH (making a solution more alkaline), which can kill some microbes. It is registered by the EPA as a pesticide.

### KEEP ANTIMICROBIALS AND ANTIBIOTICS WORKING

There is great concern in the public health field about the potential impact of "superbugs," which are bacteria and viruses that have become resistant to the antimicrobial compounds and antibiotic drugs developed to control them. These resistant superbugs have developed naturally in response to the widespread use and overuse of antibiotics and other antimicrobial compounds in the U.S. Once resistant, these bacteria and viruses can cause infections and other illnesses that are difficult to treat, leading to greater harm to human health.

A problem with the spread of superbugs is that they lead to the overuse of antimicrobials by people who are eager to avoid exposure to these organisms, and the overuse of these products further enhances the problem.

The overuse of antibiotics in agriculture, particularly the use in healthy livestock animals such as cows, pigs, and chickens is also a major contributor to this problem. An estimated 70% of antibiotic drugs used in the U.S. are also used in the agricultural industry<sup>34</sup>. Efforts to promote sustainable agriculture that do not require this extensive use of antibiotics in livestock are key to breaking this cycle and reducing the problem of superbugs, as is reducing consumer usage of disinfectant products.

### Potential harms of ammonia:

High levels of ammonia in the air can irritate the skin, eyes, throat, and lungs. Skin contact with ammonia can cause burns, and eye damage (including blindness) can occur upon contact with eyes<sup>6</sup>. Ammonia should never be mixed with cleaners containing chlorine bleach, as this mixture can release poisonous chlorine gas. While use of diluted ammonia cleaners is less likely to cause harm, full-strength ammonia can lead to harmful exposures. For example, using full strength ammonia in small unventilated spaces (like a small, windowless bathroom) can lead to dangerous levels in the air in as little as five minutes<sup>7</sup>.

**Bottom line:** Full-strength ammonia can cause burns to skin and eye damage. Do not mix ammonia with cleaners containing chlorine bleach. Only use ammonia in a well-ventilated area.

## TRICLOSAN AND TRICLOCARBAN:

### What are they?

Triclosan and Triclocarban are similar synthetic antimicrobial chemicals that are commonly added to household cleaning products such as hand soap and dish soap, as well as a broad range of other consumer products from toothpaste to socks. They are often the active ingredients in cleaning products marketed as "antibacterial" as they are effective at destroying bacteria. (**Note: these chemicals do not destroy viruses, which are the causes of colds and the flu.**) Triclosan and Triclocarban were originally designed and used only in hospital settings to prevent infections, yet the market for these chemicals has since been broadened to household products. A survey of household products conducted in 2000 found that 76% of liquid

soaps and 29% of bar soaps contained an antibacterial agent. Triclosan was the most commonly found antibacterial agent (often in liquid soaps), with Triclocarban found less frequently (often in solid bar soaps)<sup>8</sup>. Triclosan is also found in some brands of toothpaste. Both chemicals are registered as pesticides by the EPA.

## Potential harms of Triclosan and Triclocarban:

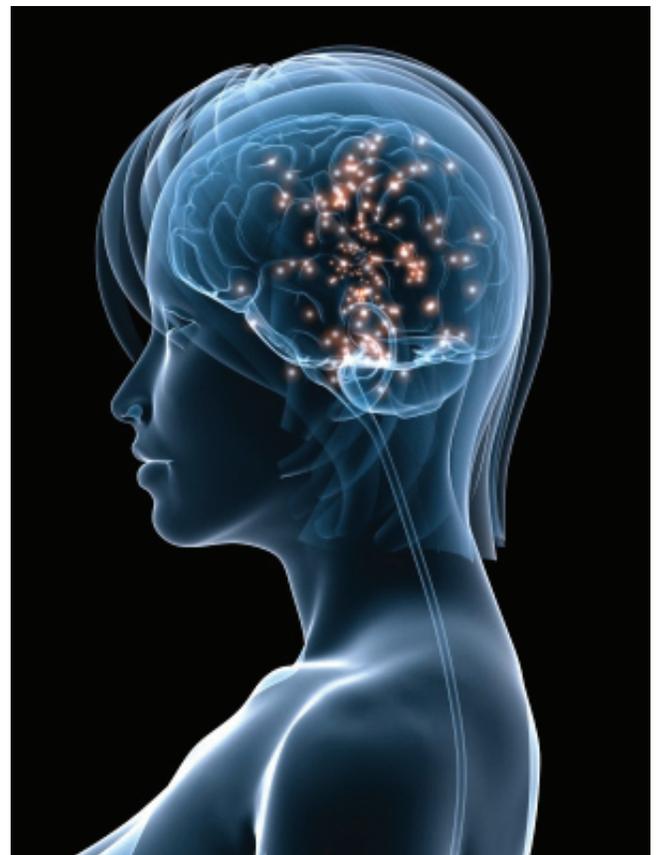
Although we do not yet know how most of the Triclosan and Triclocarban have entered our bodies, we do know that they are present. Human biomonitoring studies have detected both chemicals in the bodies of nearly 75% of the population tested<sup>9</sup>. Triclosan has also been detected in breastmilk<sup>10</sup>, which means that women are passing on this chemical to their babies. Studies show that Triclosan and Triclocarban may have endocrine-disrupting effects, which means they mimic or affect the activity of hormones in your body. For example, Triclocarban appears to amplify the activity of sex hormones like testosterone<sup>11</sup>. Triclosan has been shown to interfere with a type of signaling in brain and heart cells<sup>12</sup>, and exposure to Triclosan was shown to significantly reduce thyroid hormone levels in rats<sup>13</sup>. These endocrine-disrupting effects could have serious health consequences, which many scientists find troubling. For example, one study done on human breast cancer cells found that Triclosan mimicked both estrogen and testosterone, generating concern that Triclosan exposure may increase breast cancer risk<sup>14</sup>.

There are also concerns that the widespread use of Triclosan may lead to the creation of Triclosan-resistant bacteria. Although these resistant bacteria have not yet been identified in homes, scientists have been able to create them in the laboratory<sup>15</sup>. The American Medical Association (AMA) has also expressed concern about antimicrobial-resistant bacteria. In 2000, the AMA published a recommendation that stated:

*The use of common antimicrobials for which acquired resistance has been demonstrated in bacteria as ingredients in consumer products should be discontinued, unless data emerge to conclusively show that such resistance has no impact on public health and that such products are effective at preventing infection*<sup>16</sup>.

Neither chemical easily breaks down once they are washed off skin and enter the environment; they appear everywhere from rivers and fields to breast milk, blood, and urine. Triclosan and Triclocarban have been found in water downstream from wastewater treatment plants, indicating that some proportion of these chemicals have survived the treatment process intact<sup>17,18</sup>.

Triclosan has been shown to interfere with a type of signaling in brain and heart cells.



While these chemicals are largely removed from wastewater, they are found at high levels in sludge (biosolids) from wastewater treatment plants<sup>19</sup>. Sludge is often applied to farmed fields as fertilizer, leading to potential contamination of the soil in the fields. One study of sludge-applied fields found high levels of Triclosan in earthworms present in those fields<sup>20</sup>. Although no research



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has been done to confirm the presence of the chemical in crops grown using Triclosan-contaminated sludge, it begs the question: If an earthworm is impacted by Triclosan-contaminated fields, how might humans be impacted by eating food grown in those same fields?

The contamination of agricultural lands also poses threats for both ground and surface water contamination. Triclosan has been found in 57% of the 139 waterways tested nationwide<sup>21</sup>. When exposed to sunlight, Triclosan in water can be converted to even more toxic chemicals such as dioxins<sup>22</sup>. Short-term exposure of high levels of dioxins may result in skin lesions and altered liver function. Long-term exposure is linked to problems with the immune system, the developing nervous system, the endocrine system and reproductive harm. Chronic exposure of animals to dioxins has resulted in several types of cancer<sup>23</sup>. This raises the concern of potential drinking water contamination as well as pollution of fish in waterways downstream from treatment plants.

**Bottom line:** Triclosan and Triclocarban are not effective against colds and flu. They are found in water, soil, and our bodies. Scientists are concerned that they may increase the risk of breast cancer, interfere with thyroid hormone, and could lead to drug-resistant bacteria.

## **AMMONIUM QUATERNARY COMPOUNDS (QUATS):**

### **What are they?**

Ammonium quaternary compounds, also known as “quats,” are a family of chemicals with a similar chemical structure known for their disinfectant and detergent properties. Quats are found in household cleaning products such as disinfectant sprays and toilet cleaners, among other applications. They work by disrupting cell membranes, making them effective in killing many types of bacteria, some viruses, fungi, and algae. Hospitals are frequent users of quats due to their comprehensive disinfecting capabilities. Quats have been increasingly introduced into household products in recent years, including

antibacterial soaps and hard surface cleaners. They are registered as pesticides by the EPA.

## Potential harms of ammonium quaternary compounds:

Quats are powerful irritants. Skin exposure to quats can lead to dermatitis (skin rashes)<sup>24</sup>, and exposure through breathing can irritate the lungs. The links between respiratory conditions and quats are of particular concern. Studies of farmers who regularly used disinfectants containing certain quats showed that such exposure led to higher rates of chronic respiratory conditions and decreased lung function<sup>25</sup>. In two studies, specific quats have been identified as inducers of occupational asthma in cleaning workers<sup>26,27</sup>. Certain quats have also been identified as triggering new cases of work-related asthma (asthma caused by work) as well as cases of work-aggravated asthma (work conditions worsen pre-existing asthma)<sup>28</sup>. Laboratory studies have shown that exposure to certain quats in mice leads to greater immune reactions to allergens<sup>29</sup>. While the mechanism that leads to asthma is not fully understood, there is concern that quats may play a role in causing the immune system to overreact to allergens, potentially worsening asthma symptoms. These findings emphasize that more research is needed to better understand how quat exposure affects human immune systems, particularly as it relates to chronic respiratory disease.



**In two studies, specific quats have been identified as inducers of occupational asthma in cleaning workers.**

Recent research also suggests that certain quat exposure could have negative effects on reproductive health. A study found that when a disinfectant containing quats was used to clean out the cages of mice, the fertility of the mice declined significantly, and birth defects in newborn mice increased. It took several months to get rid of the quat residue on the cages, even after switching to a different type of cage cleaner<sup>30</sup>. Using products that contain quats in one's home increases the chance of exposure to these chemicals over time, even after the initial application.

The widespread use of quats is also of concern as they enter the environment. One study found that microbes in lake water adapted and became resistant to specific quats<sup>31</sup>. This capacity for generating disinfectant-resistant microbes could become a public health hazard if the resistant microbes become more widespread. (See the sidebar “Keep Antimicrobials and Antibiotics Working” on page 8 for more information.) The production of quats may also be of concern due to the toxicity of chemicals needed to manufacture them. One such chemical, benzyl chloride, has recently been proposed as a “substance identified as a high hazard to humans and presenting a high likelihood of exposure to individuals in Canada” by the Canadian government through their chemical substances management program<sup>32</sup>.

**Bottom line:** Exposure to quats has been linked to asthma, and they may interfere with your immune system, leading it to overreact to allergens and worsen allergic reactions. Quats can leave a residue that lingers on surfaces well after the initial application, and widespread usage of quats can create antibacterial-resistant microbes.

## NANO-SILVER:

### What is it?

Nano-silver is silver that has been manipulated into tiny particles that are only a fraction of the width of a human hair. Silver metal has long been known to have antibacterial properties. More recently, however, the development of nano-silver has been introduced into commerce as an antimicrobial



substance. At this nano-scale size, silver can be incorporated into textiles, plastics, soaps, packaging, and other materials, giving each an antibacterial property. Although these particles are intentionally engineered, products containing nano-silver are often misleadingly marketed as “all natural.”

### Potential harms of nano-silver:

Preliminary research shows that at this small size, nano-silver particles are toxic to liver and brain cells in laboratory tests<sup>33</sup>. Researchers are concerned that these particles may also be harmful to

**Preliminary research shows that nano-silver particles are toxic to liver and brain cells in laboratory tests.**

human health and have called for a moratorium on their use until further studies can be conducted to assure safety. The recent proliferation of the use of nano-silver in numerous products increases the release of, and thus potential exposure to, nano-silver in the environment.

**Bottom line:** Because nano-technology is a new science, we do not know how these particles will affect long-term health outcomes. Initial research shows nano-silver to be toxic to human liver and brain cells. WVE recommends avoiding this chemical until further research has been performed. Because this ingredient might not be listed on the product label, call the manufacturers of your favorite products and ask.

**A**ntimicrobial chemicals are effective at killing germs, but given their associated health risks, they should be used with extreme care. The difficulty for consumers lies in distinguishing the difference between a situation that necessitates disinfection, and one in which non-toxic alternatives will work just as well. This decision is made even more confusing by messages from manufacturers about the importance of using antimicrobial products on a regular basis.

Unfortunately, there has been little research studying the effectiveness of antimicrobials in the home. While we cannot rule out the usefulness of antimicrobials in certain situations, we also cannot guarantee their efficacy in preventing disease. The best advice is to disinfect sparingly using your best judgment. Reach for an antimicrobial cleaner only when and where you feel you have a specific reason for doing so. For all other routine cleaning, make sure you have a non-toxic cleaner available and easy to access.

WVE has compiled the following guidance to help you reduce your usage of disinfectants.

## **NON-TOXIC ALTERNATIVES FOR A HEALTHY HOME**

If you are concerned about the potential health impacts of antimicrobial chemicals, there are simple ways to keep your house clean and your family healthier without using them.

### **Back to Basics:**

#### **Soap and Water**

Your grandmother relied on it and so can you! Washing with regular soap and water does wonders to get surfaces clean. The surfactants in soap help lift the dirt off surfaces, while a little scrubbing and good rinsing will carry the dirt (and any microbes) away. While antimicrobial chemicals would actually kill germs, regular cleaning removes microbes from surfaces and washes them down the drain. Although killing germs sounds like a better idea, studies show that there is no demonstrated advantage to using these types of cleaners. A study conducted in New York measured illnesses and infectious disease symptoms such as runny nose, coughing,



Room	Manufacturers Say:	Reduce Your Usage & Alternatives
Kitchen	Disinfect sinks, refrigerators, counters, stove tops, and high chairs on a daily basis.	<p><b>Reduce:</b> If you practice good food safety, wash your hands (especially after handling raw meat), and do not leave cooked food on counters for longer than two hours, daily disinfection at home is simply unnecessary. <i>You can learn more about safe food practices on page 18.</i></p> <p><b>Alternatives:</b> To clean your sinks and counters without unnecessary exposure to disinfectants, try a creamy soft scrub made with baking soda, castile soap, and vegetable glycerin. Baking soda is great for neutralizing acid, and cleaning stainless steel and porcelain. For tough cleaning jobs, spray the surface first with vinegar, which will eliminate 90-98% of bacteria. Vinegar is safe enough to eat, making it a good choice for everyday cleaning!</p>
Bathroom	Disinfect areas that get contaminated with germs, including counter tops, bath tubs, toilet bowls, and sinks.	<p><b>Reduce:</b> Bathrooms are often small, poorly ventilated, or unventilated spaces; and fumes from antimicrobials can build up to problem levels fairly quickly. Focus on disinfecting only those areas that get frequent hand contact—like toilet flush handles, sink faucets, and light switches.</p> <p><b>Alternatives:</b> Instead of using a tablespoon full of bleach to clean your toilet bowl, sprinkle the bowl with baking soda, drizzle with vinegar, let sit for 30 minutes, and scrub with a toilet brush. Vinegar not only deodorizes, it's highly acidic, making it effective at destroying bacteria. Baking soda also deodorizes in addition to cleaning and polishing porcelain.</p>
Baby's Room	Disinfect throughout the day, especially areas like changing tables, diaper pails, teething toys, and bottles.	<p><b>Reduce:</b> Being a mom means constant cleaning. But cleaning and disinfecting are not the same (see the Glossary for definitions). The majority of messes, like food spills and spit up, can be cleaned without using antimicrobials. In fact, experts agree that the best way to prevent the transmission of germs to a baby is to wash your hands before handling her/him.</p> <p><b>Alternatives:</b> Don't keep disinfectant wipes near the changing table; you don't want to confuse them with your baby wipes when you're changing diapers! Instead, keep a spray bottle full of half vinegar, half water, and few drops of essential oil for quick clean-up jobs. The vinegar deodorizes, and is as effective or nearly as effective as commercial disinfectant cleaners in reducing microbes like E.coli on a surface. Essential oils have natural anti-bacterial properties, not to mention give your baby's room a pleasant (and non-toxic!) smell.</p> <p>Wash your baby's bottle with soap and hot water instead of soaking it with bleach; soap and water is still the best way to get rid of germs, and won't leave a bleach residue on a bottle lid that regularly goes into your baby's mouth. If you need to sanitize the bottle (because milk was left in it for too long, for example) you can put it through your dishwasher—or just boil the parts in water for a few minutes to get rid of any lingering bacteria.</p>
Laundry Room	Get clothes their whitest by using bleach.	<p><b>Reduce:</b> You can get clothes white and keep colors bright by using less-toxic ingredients than bleach. Apart from health concerns around using bleach, overuse or misuse of bleach can also eat holes in your clothing.</p> <p><b>Alternative:</b> Ditch the bleach for whitening your laundry and try a ½ cup of borax (a naturally occurring powdered substance) instead. Borax's chemical properties not only make it a good bleaching agent, but a great cleaner and freshener, too.</p>

vomiting, etc. in family members in over 200 households, where half of the households had been given antibacterial cleaners to clean their homes, and half were given non-antibacterial cleaners. The study found no difference in the amount of illness or symptoms experienced by the two groups over the 45 weeks of the study. The antibacterial cleaners had failed to keep families any healthier than those that used regular (non-antibacterial) cleaners. This was partly due to the fact that most of the illnesses tracked, like the common cold, are caused by viruses and not bacteria<sup>35</sup>.

## Alternative cleaning products:

**Vinegar** Vinegar has been used as a cleaning agent for generations. It is often used as a glass and window cleaner due to its ability to produce a “streak-free” shine. Vinegar, which is also known as acetic acid, is highly acidic, making it effective at destroying bacteria. Although vinegar has not been registered as a disinfectant by the EPA, studies have shown it to be as effective, or nearly as effective as commercial disinfectant cleaners in reducing microbes on a surface<sup>36</sup>. One study compared the efficacy of undiluted vinegar to chlorine bleach and found that vinegar was as effective as bleach for eliminating E. coli bacteria, and was only slightly less effective at destroying salmonella<sup>37</sup>. Given that vinegar is safe enough to eat, it is a good choice for everyday cleaning and will help to reduce levels of bacteria on the surfaces in your home.

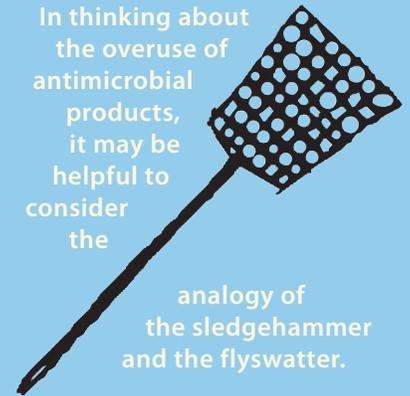
**Borax.** Household borax\* is a naturally occurring powdered substance also known as sodium borate or sodium tetraborate. Borax is often used as a water softener and makes an excellent freshener when added to laundry. The chemical properties of borax make it a good cleaner as well as a bleaching agent. It disinfects by interrupting metabolic processes of microorganisms. Several studies have demonstrated the effectiveness of borax: One study found borax to be a superior cleaner for bathroom dirt<sup>38</sup> and another study found borax to be as good as commercial antibacterial cleaners for destroying mold on drywall<sup>39</sup>.

*\*While borax is not acutely toxic, it should not be eaten. Ingesting large doses of borax can cause nausea, vomiting, abdominal pain, diarrhea, and other symptoms of general gastrointestinal distress. It should also be kept out of eyes and away from any skin abrasions where it can cause irritation.*

**Essential Oils** Essential oils are concentrated liquids distilled from the leaves, flowers, roots, or other parts of plants. Several essential oils such as thyme oil, rosemary oil, clove oil, eucalyptus oil, oregano oil, and others have been shown to have natural antibacterial properties. For example, one study found that thymol and carvacrol, which are substances found in thyme oil and oregano oil, were effective at destroying E. coli, a bacterium commonly associated with food poisoning<sup>40</sup>. Another study examining thyme oil and eucalyptus oil found that they both had antibacterial effects on MRSA (methicillin resistant Staphylococcus aureus), which causes an infection

## THE SLEDGEHAMMER VS. THE FLYSWATTER

In thinking about the overuse of antimicrobial products, it may be helpful to consider the



analogy of the sledgehammer and the flyswatter.

If you have a pesky fly in your house, you can reach for a flyswatter. Assuming you get a direct hit on the fly, your problem is neatly and efficiently solved. But imagine if all you have handy is a sledgehammer. Again assuming you get a direct hit, you will certainly take care of the problem fly. However, you are likely to put a hole in your wall in the process. The sledgehammer, while supremely effective at killing flies, is simply overkill for the job and has negative side effects (i.e. holes in your wall).

The same is true for antimicrobial products; they are often too strong for the average daily need. Occasionally they may be warranted, just as a sledgehammer has its place and purpose. But on a daily basis, simple soap and water or other non-toxic cleaners will do the trick without causing potentially harmful side effects.

## DISINFECTING AROUND INFANTS AND SMALL CHILDREN



With little ones at home, parents want to do the best they can to prevent their children from getting sick. Unfortunately, when it comes to cleaning, this poses a dilemma. On the one hand, infants may be more susceptible to some infectious diseases. This can lead a parent to choose to disinfect frequently to reduce exposure to disease-causing microbes. On the other hand, because their organs and systems are still developing, infants and small children can be especially vulnerable to the health effects of chemicals in disinfectants. So, what's a parent to do? Below is a list of guidelines to follow in preventing infectious diseases in adults and children:

1. Encourage regular handwashing with soap and hot water.
2. Ask people with colds or other infectious illnesses to avoid contact with infants. All others should wash their hands before handling a baby.
3. Wash your hands after changing a diaper.
4. As children get older, teach them proper handwashing techniques to ensure it is done thoroughly.
5. Instead of routinely using disinfectants on all surfaces that your child might be exposed to, use your best judgment for the situation at hand (see our chart on page 14 for guidance). Many "antibacterial" cleaners will have no effect on viral diseases (like the common cold or flu).

that is difficult to treat<sup>41</sup>. Cleaners (either homemade or store-bought) that contain essential oils may also be useful as natural disinfectants, although research is still needed to better understand the quantity of essential oil needed to be effective as antimicrobial products.

Essential oils are not for everyone, however. Caution should be practiced in the use of essential oils, as some oils can release volatile organic compounds (VOCs) that may contribute to allergies or other respiratory symptoms in some people<sup>42</sup>. Misuse of essential oils has been known to be harmful to pets<sup>43</sup>. There is considerable variety in the purity of essential oils as well. Some brands may be contaminated with solvents or other toxic chemicals used in the process of distilling the oils.

## CONCLUSION AND ACTIONS STEPS

**T**he terms cleaning and disinfecting are often used interchangeably but mean very different things. Both are important in maintaining a healthy home, but they should be treated as unique actions that serve different purposes. The research in this report has shown that the use and overuse of disinfectants in place of everyday cleaners has been linked to serious health problems as well as the spread of antibiotic-resistant microbes. Although more research is needed to determine the impact of antimicrobials on human health and the environment, there is enough evidence to suggest that consumers, and especially domestic house cleaners, mothers, and children, should reduce their exposure to these powerful chemicals.

Unfortunately, there are no hard and fast rules for when to use a cleaner and when to use a disinfectant. Without enough research, this report can only provide suggested guidelines around these decisions. Research has demonstrated that less-toxic ingredients, such as vinegar and borax, have antibacterial properties that may be used in place of harsh chemicals. And there are other steps that can be taken to prevent the need for disinfecting in the first place.

We close our report with a series of action steps ranging from the personal to the political, both for consumers and for manufacturers of antimicrobial products.

### WHAT YOU CAN DO

There are many ways to protect against airborne diseases and food-related illness before they become a problem. Below are a few easy actions to take in the home that will help you reduce your exposure to disinfectant products.

#### Wash Your Hands

Regular hand washing has been shown to be the very best way to prevent the spread of contagious illnesses like colds and viruses. The US Centers for Disease Control and Prevention (CDC) recommends washing your hands vigorously with soap and water for 20 seconds at a time (this is about the time it takes to sing “Happy Birthday”



twice)<sup>44</sup>. Numerous studies have been conducted to show the effectiveness of hand washing in disease prevention. A recent analysis of these studies found that regular hand washing with soap reduces gastrointestinal illnesses by about 31% and respiratory illnesses by about 21%. The study concluded that the best intervention to prevent disease was hand washing with regular (non-antibacterial) soap; the use of antibacterial soap was not found to have any added health benefits over regular soap<sup>45</sup>.

## Practice good food safety

Food and food preparation can be significant sources of illness-causing bacteria in a home. According to the Partnership for Food Safety Prevention, the best ways to prevent illness from bacteria in foods are the following:



**Clean:** Wash your hands before handling food, and rinse fruits and vegetables under running water.

**Separate:** Keep raw meats, poultry, seafood, and eggs separate from ready-to-eat foods to avoid cross-contamination.

**Cook:** Cook foods to a high enough internal temperature to kill harmful bacteria that may be present in raw meats or eggs.

**Chill:** Refrigerate or freeze foods as soon as you get them home from the store. Make sure not to leave cooked foods out for more than two hours.

For more detailed information on food safety, including guidelines on cooking at proper temperatures, see the Partnership for Food Safety Prevention's website: [www.fightbac.org](http://www.fightbac.org).

## Microwave kitchen and bathroom sponges, and regularly launder kitchen cloths, wash cloths

Disease-causing bacteria can survive and grow on sponges and cloths, particularly when they remain wet or damp for long periods of time. These items can then further spread those bacteria on surfaces in your home. There are two simple solutions to prevent this bacteria growth. Microwaving a sponge for just one minute has been shown in studies to destroy 99.9% of bacteria on its surfaces. This is just as effective at reducing bacteria as soaking the same sponge in a bleach solution for five minutes<sup>46</sup>. Similarly with kitchen or wash cloths, you can reduce the growth of bacteria by having a supply of clean cloths available and throwing the used ones in the laundry

basket. Regular laundering of wash cloths will also prevent the buildup of bacteria on these items.

## RAISE YOUR VOICE FOR HEALTHY PRODUCTS

Once you know about the potential health hazards of overusing disinfectants, you may be moved to share this information with others, or even contact companies and ask them to remove harmful chemicals. Here are a few ways that you can take action.

### Call on Congress to strengthen our laws!

We shouldn't have to worry that the products we use contain toxic chemicals. That's why WVE is working with partner organizations to pass laws that protect our health and the health of our families. Go to [www.womenandenvironment.org/disinfectants](http://www.womenandenvironment.org/disinfectants) to learn more and take action!

### Make your own non-toxic cleaners

WVE has compiled six non-toxic cleaning recipes (two of which are featured in this report) in a handy kit that includes product labels, recipe cards, and an educational DVD. The recipes call for ingredients like vinegar, baking soda, and olive oil, and are incredibly effective at keeping a clean and healthy home. Thousands of women across the globe have participated in green cleaning parties with family, friends, co-workers, and community groups to share information on the health benefits of non-toxic cleaners. You can download a kit or purchase one at [www.womenandenvironment.org/merchandise](http://www.womenandenvironment.org/merchandise).



### Spread the word

Make sure that your friends and family know about the potential health hazards of overusing disinfectants by sharing this report with them. If you employ a cleaning company or an independent house cleaner, ask them to reduce their use of antimicrobial products in favor of everyday cleaning products.

WVE created a short, humorous video that sums up the need to reduce your use of disinfectants. Watch the video at [www.womenandenvironment.org/disinfectants](http://www.womenandenvironment.org/disinfectants) and then pass it on to friends!

**Thousands of women across the globe are learning to make non-toxic cleaners using ingredients like baking soda and vinegar.**

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## Join Women’s Voices for the Earth

Get involved and stay informed. We’ll send you updates on news, events, and ways to take action to protect yourself from toxic chemicals. Sign up for WVE’s Action Network at [www.womenandenvironment.org](http://www.womenandenvironment.org).

## Support Women’s Voices for the Earth!

By reading this report, you’ve already shown a commitment to a safe, healthy environment. Your support will strengthen our voice in the national dialogue on regulating toxic chemicals in products you use on a daily basis. Please consider making a tax-deductible donation to our organization. You can donate securely online at [www.womenandenvironment.org/donate](http://www.womenandenvironment.org/donate) or send a check to:

Women’s Voices for the Earth, PO Box 8743, Missoula, MT 59807-8743

## WHAT COMPANIES CAN DO

Manufacturers of antimicrobials have a responsibility to the public to ensure that their products are safe for human health and the environment. Below is a list of action steps that would help reduce consumer exposure to harmful chemicals.

### Remove unnecessary toxic chemicals from cleaning products

Too many products contain chemicals that are unnecessarily harsh, leading to irritation of the eyes, skin, and respiratory system. Many of these chemicals are linked to chronic health conditions such as asthma or endocrine disruption. It is a company’s responsibility to its customers to take a thorough inventory of the chemicals they use and review them for potential harm, screening out chemicals that are unnecessarily harmful.

### End misleading, fear-based marketing of antimicrobial products

Antimicrobial products have a purpose and place, but should not be used for everyday routine cleaning. Such overuse impacts our environment and may negatively affect the health of your family. Advertising and marketing of these products should focus on when and where it is appropriate to use these products safely.

### Produce and market more cleaning products that can be used for everyday cleaning

Keeping a clean household is important, and should be easy to do without risking harm to the health of your family. These days it is difficult to even find cleaners that are not branded as “anti-bacterial” or that contain a “powerful disinfectant.” While there are occasional uses for those products, consumers need a greater range of non-antimicrobial products that can be used safely on ordinary dirt on a daily basis.



## ADDITIONAL RESOURCES

Partnership for Food Safety Prevention: [www.fightbac.org](http://www.fightbac.org)

Mr.Yuk (Poison Prevention Educational Materials): [www.upmc.com/Services/poisoncenter/Pages/educational-materials.aspx](http://www.upmc.com/Services/poisoncenter/Pages/educational-materials.aspx)

Alliance for the Prudent Use of Antibiotics: [www.tufts.edu/med/apua/](http://www.tufts.edu/med/apua/)

*What's Lurking In Your Soap? The Trouble with Triclosan.* A joint project of Food and Water Watch and Beyond Pesticides: [www.foodandwaterwatch.org/water/chemical-contaminants/what-is-lurking-in-your-soap](http://www.foodandwaterwatch.org/water/chemical-contaminants/what-is-lurking-in-your-soap)

*Nano and biocidal silver: Extreme germ killers present a growing threat to public health.* Friends of the Earth: [www.foe.org/healthy-people/nanosilver](http://www.foe.org/healthy-people/nanosilver)

*Industrial and Institutional (I&I) Disinfectant Use.* Informed Green Solutions, Inc.: [www.informedgreensolutions.org](http://www.informedgreensolutions.org)

*Household Hazards: Potential Hazards of Home Cleaning Products.* Women's Voices for the Earth: [www.womenandenvironment.org](http://www.womenandenvironment.org)

*The Dirt on Cleaning Product Companies: How Top Manufacturers Rate in Protecting You from Toxic Chemicals.* Women's Voices for the Earth: [www.womenandenvironment.org](http://www.womenandenvironment.org)

Sampling of brand name products containing antimicrobial chemicals of concern.

<b>NAME OF PRODUCT</b>	<b>CHEMICAL</b>	<b>PERCENT</b>	<b>CAS #</b>
<b>The Clorox Company</b>			
CLOROX® Bleach Pen Gel	Chlorine bleach	.5-2%	7681-52-9
CLOROX® Clean-Up Cleaner with Bleach	Chlorine bleach	1-5%	7681-52-9
CLOROX® Clean-Up Cleaner with Bleach — Spray Formula	Chlorine bleach	1-5%	7681-52-9
CLOROX® Disinfecting Bathroom Cleaner	Ammonium Quat	.1375%	68391-01-5
CLOROX® Disinfecting Floor and Surface Cleaner Refreshing Clean	Ammonium Quat	0.94%	7173-51-5
CLOROX® Disinfecting Kitchen Cleaner	Ammonium Quat	.3-.6%	68424-85-1
CLOROX® Disinfecting Toilet Bowl Cleaner with Bleach	Chlorine bleach	1-5%	7681-52-9
CLOROX® Disinfecting Wipes — Fresh Scent	Ammonium Quat	0.145%	68424-85-1
CLOROX® Disinfecting Wipes — Lavender Scent	Ammonium Quat	0.145%	68424-85-1
CLOROX® Disinfecting Wipes — Lemon Scent	Ammonium Quat	0.145%	68424-85-1
CLOROX® Disinfecting Wipes — Orange Scent	Ammonium Quat	0.145%	68424-85-1
CLOROX® High Efficiency Bleach Cleaner	Chlorine bleach	5-10%	7681-52-9
CLOROX® Outdoor Bleach Cleaner	Chlorine bleach	5-10%	7681-52-9
CLOROX® PLUS Anti-Allergen Liquid Bleach	Chlorine bleach	1-5%	7681-52-9
CLOROX® PLUS Cold Water Bleach Cleaner	Chlorine bleach	5-10%	7681-52-9
CLOROX® PLUS High Efficiency Bleach Cleaner	Chlorine bleach	5-10%	7681-52-9
CLOROX® PLUS Splash-less Liquid Gel Bleach	Chlorine bleach	1-5%	7681-52-9
CLOROX® Proresults Composite Deck Cleaner	Chlorine bleach	5-10%	7681-52-9
CLOROX® Regular Bleach	Chlorine bleach	5-10%	7681-52-9
CLOROX® Toilet Bowl Cleaner — For Tough Stains	Ammonium Quat	.1-1%	68424-85-1
CLOROX® Ultimate Care Premium Bleach	Chlorine bleach	1-3%	7681-52-9
FORMULA 409® All Purpose Cleaner Antibacterial Kitchen Lemon Fresh	Ammonium Quat	.3-.6%	68424-85-1
FORMULA 409® Antibacterial All Purpose Cleaner	Ammonium Quat	.3-.6%	68424-85-1
S.O.S® Heavy Duty All Purpose Cleaner with Bleach	Chlorine bleach	1-5%	7681-52-9
S.O.S® Heavy Duty Multi-Purpose Cleaner — Lemon Scent	Ammonium Quat	0.94%	7173-51-5
TILEX® Bathroom Cleaner	Ammonium Quat	.1375%	68391-01-5
TILEX® Mildew Root Penetrator & Remover	Chlorine bleach	1-5%	7681-52-9
TILEX® Mold & Mildew Remover	Chlorine bleach	1-5%	7681-52-9
TILEX® Mold Killer Mold & Mildew Remover	Chlorine bleach	1-5%	7681-52-9
TILEX® Proresults Mold & Mildew Stain Remover	Chlorine bleach	1-5%	7681-52-9
<b>Church &amp; Dwight</b>			
PARSONS'® Household Ammonia	Ammonia	<3%	1336-21-6



NAME OF PRODUCT	CHEMICAL	PERCENT	CAS #
<b>Dial Corporation</b>			
Soft Scrub® with Bleach Cleanser	Chlorine bleach	1-5%	7681-52-9
<b>Procter &amp; Gamble</b>			
Cascade® Complete All-in-1 Gel Phosphate Free	Chlorine bleach	1-5%	7681-52-9
Mr. Clean® Wipes	Ammonium Quat	0.042%	7173-51-5
Mr. Clean® Your Home Pro Spray with Bleach	Chlorine bleach	1-5%	7681-52-9
Swiffer® WetJet® Antibacterial Cleaner	Ammonium Quat	0.03%	7173-51-5
ULTRA DAWN® Antibacterial Hand Soap	Triclosan	0.1%	3380-34-5
ULTRA JOY® Orange Dishwashing Liquid/ Antibacterial Hand Soap	Triclosan	0.1%	3380-34-5
<b>Reckitt Benckiser</b>			
CLEAN & SMOOTH® Kitchen Antibacterial Hand Soap	Triclosan	0.3%	3380-34-5
EASY-OFF BAM® Multi-Surface Power Toilet Cleaner with Ultra Shine Bleach	Chlorine bleach	13%	7681-52-9
Lemon Breeze® Scent LYSOL® Brand II Disinfectant All Purpose Cleaner 4 in 1	Ammonium Quat	0.25%	68424-85-1
LYSOL® Brand 4 in 1 Antibacterial Kitchen Cleaner, Citrus Scent (Trigger & Spray)	Ammonium Quat	0-.05%	68424-85-1
LYSOL® Brand Disinfectant, All Purpose Cleaner, 4 in 1, All Scents (Dilutable)	Ammonium Quat	1-2%	68424-85-1
LYSOL® Brand Disinfectant All Purpose Cleaner with Bleach (Trigger)	Chlorine bleach	0.2%	7681-52-9
LYSOL® Brand Disinfectant All Purpose Cleaner with Bleach, 4 in 1, (Trigger)	Chlorine bleach	2.5%	7681-52-9
LYSOL® Brand Disinfectant Antibacterial Kitchen Cleaning Wipes	Ammonium Quat	0-1%	68424-85-1
LYSOL® Brand Disinfectant Antibacterial Kitchen Cleaner, Citrus Scent (Trigger)	Ammonium Quat	0.02%	68424-85-1
LYSOL® Brand Disinfectant Cling Gel Toilet Bowl Cleaner	Ammonium Quat	0-3%	68424-85-1
LYSOL® Brand Disinfectant Mildew Remover with Bleach (Trigger)	Chlorine bleach	2.5%	7681-52-9
LYSOL® Brand Disinfectant Plus Bleach All Purpose Cleaner	Chlorine bleach	2.5%	7681-52-9
LYSOL® Brand Disinfectant Toilet Bowl Cleaner Plus Bleach	Chlorine bleach	13%	7681-52-9
LYSOL® Brand Disinfectant Toilet Bowl Cleaner Plus Bleach (liquid)	Chlorine bleach	2.5%	7681-52-9
LYSOL® Brand Disinfecting Wipes	Ammonium Quat	0-1%	139-08-2

<b>NAME OF PRODUCT</b>	<b>CHEMICAL</b>	<b>PERCENT</b>	<b>CAS #</b>
<b>SC Johnson &amp; Son</b>			
Antibacterial Scrubbing Bubbles® XXI Bathroom Cleaner-Fresh Clean Scent	Ammonium Quat	0.11%	68391-01-5
Antibacterial Scrubbing Bubbles® XXI Bathroom Cleaner — Lemon	Ammonium Quat	0.11%	68391-01-5
Armstrong® Concentrated Floor Cleaner	Ammonia	.1-1.5%	1336-21-6
Drano® Dual Force Foamer Clog Remover	Chlorine bleach	1-5%	7681-52-9
Drano® Liquid Clog Remover	Chlorine bleach	3-7%	7681-52-9
Drano® Max Gel Clog Remover	Chlorine bleach	5-10%	7681-52-9
fantastik® All Purpose Cleaner with Bleach	Chlorine bleach	<5%	7681-52-9
fantastik® Antibacterial All Purpose Cleaner Lemon Scent	Ammonium Quat	.1-1%	68391-01-5
fantastik® Antibacterial Heavy Duty All Purpose Cleaner	Ammonium Quat	.1-1%	68391-01-5
Scrubbing Bubbles® Antibacterial Bathroom Wipes — Citrus Action® Scent	Ammonium Quat	0.11%	68391-01-5
Scrubbing Bubbles® Bathroom Cleaner — Mildew Stain	Chlorine bleach	1-5%	7681-52-9
Scrubbing Bubbles® Mildew Stain Remover with Bleach	Chlorine bleach	1-5%	7681-52-9



## NOTES:

This list is a sampling of antimicrobial cleaning products from several large cleaning product manufacturers. This is not intended to be a complete list of all products on the market containing these chemicals. Information for this table was taken from Material Safety Data Sheets (MSDS) for each product available on manufacturer websites.

The CAS # (Chemical Abstract Service number) is a unique identifier for the individual chemical present in the document. This table includes information on products containing the following chemicals:

<b>Chemical Name</b>	<b>CAS Number</b>
Ammonia (ammonium hydroxide)	1336-21-6
Chlorine Bleach (Sodium Hypochlorite)	7681-52-9
Triclosan	3380-34-5
<u>Ammonium Quats:</u>	
Alkyl (C12-18) dimethylbenzylammonium chloride	68391-01-5
Alkyl(C12-16) Dimethylbenzylammonium Chloride	68424-85-1
Benzalkonium chloride	8001-54-5
Benzyldimethyltetradecylammonium chloride	139-08-2
Didecyl dimethyl ammonium chloride	7173-51-5



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## **WOMEN'S VOICES FOR THE EARTH**

Women's Voices for the Earth (WVE) is a national organization that engages women to advocate for the right to live in a healthy environment

WVE seeks to reduce and ultimately eliminate environmental pollutants that cause health problems for women, their families and communities. To this end, WVE creates opportunities for women to influence environmental decision making.



**WVE**

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