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Disinfectants and sanitizers for use on food contact surfaces

Original text by Colette Gaulin, Mê-Linh Lê, Mona Shum, Daniel Fong
Revision by Tina Chen
National Collaborating Centre for Environmental Health

National Collaborating Centre for Environmental Health
Centre de collaboration nationale en santé environnementale

ncceh.ca

Key Messages

- Health Canada authorizes a range of biocides for use in food premises, including products containing chlorine-releasing compounds (e.g., sodium hypochlorite/bleach, hypochlorous acid), hydrogen peroxide, peracetic acid, quaternary ammonium compounds (QUATS), and iodine-based compounds. These active ingredients are commonly used to sanitize and disinfect food contact surfaces and food processing equipment.
- Canada's *Biocides Regulations,* which came into force in May 2025*,* establish a unified regulatory framework for both surface disinfectants and sanitizers under the Food and Drugs Act.
- Previously authorized disinfectants and disinfectant-sanitizers must transition to a biocide market authorization by May 31, 2029, while surface sanitizers used in food premises have until May 31, 2031, to comply with the new requirements. All biocides must demonstrate safety, efficacy, and quality before receiving an 8-digit market authorization number from Health Canada.
- Not all biocides are suitable for food contact surfaces because some products may leave residues that require rinsing or may not be approved for food-contact applications. Operators should always verify that a product is authorized for its intended use and follow label directions carefully.
- Selection of a food contact surface sanitizer should consider more than antimicrobial efficacy. Important factors include effectiveness against target microorganisms, compatibility with operating conditions, cost, ease of use, required contact time, rinsing requirements, and compatibility with local water quality and food-contact materials.
- Sanitizer performance is strongly influenced by environmental and operational conditions, including temperature, pH, water hardness, and the presence of organic matter. Effective cleaning and rinsing before sanitizer application are essential, as food residues and biofilms can reduce sanitizer efficacy and limit microbial reduction.
- Products such as tea tree oil, baking soda, vinegar, ozone, and silver compounds are not registered disinfectants for food premises, according to the Health Canada definition.

Introduction

Raw ingredients or food products can become contaminated by pathogenic and spoilage microorganisms in food premises, such as restaurants or processing plants, presenting serious threats to food safety. A robust cleaning, sanitization, and disinfection system is necessary to ensure food safety and reduce risks of foodborne illness.

In food premises, food contact surfaces and environmental surfaces require different commercial products for cleaning, sanitizing, and disinfecting. A food contact surface is defined as any surface, equipment, or utensil that comes in contact with food products during production, processing, or packaging.[1] Contaminated food contact surfaces such as meat slicers can transfer pathogens onto foods, which may lead to inadvertent consumption and subsequent illness.[2] Environmental surfaces refer to all other non-food contact surfaces in a food production operation. Table 1 lists some of the food contact surfaces and environmental surfaces that may be found in a food premise.

Table 1. Examples of food contact and environmental surfaces in food premises

Food contact surfaces	Environmental surfaces	
	High touch	Low touch
Counter tops	Door handles	Walls
Utensils	Light switches	Floors
Dishes and cutlery	Faucets	Windows
Pots and pans	Cabinet handles	Windowsills
Cutting boards		Thermostats
Food processing equipment		Blinds

Food contact surfaces are generally cleaned then sanitized in place or in dishwashers or sinks. Sanitizing is typically done via two methods:

- Thermal sanitization: uses hot water or steam at a specified temperature

- Chemical sanitization: uses an approved chemical sanitizer at a specific concentration and contact time[3]

As food processing equipment are less accessible, general methods for cleaning include[3]:

- Mechanical cleaning or clean-in-place: Requires no disassembly or only partial disassembly
- Clean-out-of-place: Partially disassemble and cleaned in specialized tanks
- Manual cleaning: Total disassembly for cleaning

This document reviews Canadian regulations for chemical food contact surface sanitizers and summarizes characteristics such as targeted organisms, concentrations, and factors influencing effectiveness of several common active ingredients that have been approved for disinfecting and sanitizing food contact surfaces. This document is intended for food safety inspectors and auditors who may review the types and usage of sanitizers in food premises.

Methodology

Literature search and review of Canadian guidelines

For the current update, we reviewed changes to the Canadian regulations for chemical food contact surface sanitizers since 2011. We also performed a rapid scan of the literature using Medline (PubMed), Google Scholar, and Google for English-language peer-reviewed and grey literature from 2016-2026 on active ingredients in disinfectants and sanitizers used in food premises, factors that affect their efficacy, and antimicrobial resistance. Older literature from the previous version of the document was retained where relevant. Additional references were added via forward and backward chaining of those search results and supplemental searches, as necessary.

Results

Cleaners, sanitizers, and disinfectants

A sanitary environment is achieved by removing soil deposits (e.g., dust, dirt, food residues, grease, biofilms etc.) and subsequently applying a sanitizer or disinfectant to reduce the number of residual microorganisms. Several factors influence sanitizer and disinfectant effectiveness. This includes surface characteristics such as porousness, and the presence and type of dirt/soils (e.g., protein, fats, grease), as well as chemical contact time, concentration, temperature, and pH.[3]

Mechanical or physical cleaning (also called precleaning) is an important step in a sanitization program as some debris, such as organic matter, can decrease the effectiveness of disinfectants. Mechanical cleaning prior to disinfection can increase disinfectant efficacy, and improve log reductions of microorganisms.[4] Regular and effective cleaning can be more important than use of a disinfectant for reducing bacterial concentrations overall (e.g., cleaning and rinsing alone may achieve 2 to 3 log reduction).[5] To assist food premise operators with safe and hygienic operations, the Canadian Food Inspection Agency created guidance on the step-by-step process of developing and implementing a robust cleaning and sanitation program in food premises. The guidance can be found here: Cleaning and sanitation program.

Health Canada distinguishes between cleaners, disinfectants, sanitizers, and sterilants, as described below. Although sanitizers and disinfectants may have similar efficacy, the standards and criteria used to test their efficacy claims differ.

Cleaners

Cleaners include detergents or abrasive cleaners that physically or chemically remove soil, dust, organic matter, or microorganisms. They are usually intended for specific areas (e.g., floors, walls, tables) and can be used on surfaces that come into contact with food. Physical cleaning (also called precleaning) is an important step in a sanitization program. Some forms of debris, such as organic matter, may inactivate or lead to decreased effectiveness of several disinfectants, including alcohol, aldehyde, sodium hypochlorite (bleach), and quaternary ammonium (QUATS) compounds, so cleaning can help maximize disinfectant efficacy.

Cleaners may remove significant numbers of microorganisms, but they do not kill or inactivate them. Additional agents are required to disinfect or sanitize the surface.

Sanitizers

Sanitizers can reduce, but do not necessarily eliminate all microorganisms on surfaces they come into contact with.[6] Sanitizers are ordinarily used by the food processing, food handling, preparation, and service industries.[7]

There are two types of sanitizers:

- Food contact surface sanitizers: a substance or a mixture of substances that are used on surfaces that come into contact with food. In order to be authorized for sale by Health Canada as a food contact surface sanitizer, the chemical must reduce microbial contamination of specific bacteria by 99.999% or 5 log in 30 seconds at 20°C[8-13]

- Non-food contact sanitizers: a substance or a mixture of substances that are used on surfaces that do not come into contact with food. Health Canada specifies that the chemical must reduce microbial contamination by 99.9% (3 log) or more within 5 minutes at room temperature (around 20-22°C)[12,13]

For efficacy requirements for either of these sanitizers, consult this Health Canada website: Guidance on efficacy requirements for biocides: Hard-surface disinfection and sanitization.

Operators must be careful not to mix or use multiple sanitizers at once. For instance, mixing ammonia and sodium hypochlorite solutions produce chloramines, while mixing sodium hypochlorite and acid solutions (e.g., vinegar) can produce dangerous chlorine gas.[14] It is important to ensure that manufacturers' instructions are followed, and that the chosen biocide product is compatible with the application method. Some studies have found that quaternary ammonium cations can bind to microfibre, cotton, and some disposable cleaning cloths, which reduces the concentration of the cleaning solution.[15,16] One study found that after soaking microfibre cloths, cotton cloths, and disposable cloths in buckets of quaternary ammonium compounds solution for 5 minutes, the concentration of the solution was reduced by 21% with microfibre cloths and 50% with cotton cloths and disposable cloths.[16] Another study found that exposure to cotton towels reduced quaternary ammonium compound concentrations by up to 85.3% on average.[15]

There are several desired characteristics of sanitizers as outlined in Table 2, but no single product will have all the characteristics listed below. Operators must decide which characteristics are important to their specific needs.

Table 2. Desired characteristics in a sanitizer

Desired characteristics in a sanitizer [4,5]		
Ease of application	Low toxicity	Non-corrosive
Good penetrative power	Fast acting	No harmful or offensive odour
Stability (long shelf life for concentrate)	Not adversely affected by organic matter	Active before and after dilution with hard water
Compatibility with other chemicals and material of construction	Broad spectrum of activity towards gram-positive and gram-negative bacteria, fungi, and viruses	Not persistent in the environment
Demonstrate residual activity	Cost-effective performance	

Disinfectants

Health Canada defines disinfectants as a substance or a mixture of substances that are capable of destroying or irreversibly inactivating (4-6 log reduction) pathogenic and potentially pathogenic microorganisms, but not necessarily bacterial spores.[17] There are various levels of disinfectants (low, intermediate, and high) categorized by biocidal and efficacy levels for different purposes. For environmental surfaces, generally only low level disinfection is necessary.[18] Efficacy requirements for various levels of disinfectants can be found on the Health Canada website: Guidance on efficacy requirements for biocides: Hard-surface disinfection and sanitization.

Sterilants

Sterilants destroy or irreversibly inactivate all types of microorganisms on inanimate objects, including vegetative bacteria, bacterial spores, fungi, fungal spores, and viruses.[17] Sterilants must demonstrate absence of growth in test samples, or a 99.9999% (6 log) reduction.[19] Sterilants include specialized chemicals such as glutaraldehyde, formaldehyde, and peroxyacetic acid, and other substances in liquid, gas, or vapour form. Dry heat (use of dry-heat ovens) and moist heat (use of steam under pressure or autoclaving) are also used for sterilization.

Regulation of disinfectants, disinfectant-sanitizers, and sanitizers in Canada

Since the previous version of this document, the *Biocides Regulation* came into force in May 2025, significantly changing how disinfectants, disinfectant-sanitizers, and sanitizers are regulated in Canada. Previously authorized products were provided a new transition pathway to obtain new market authorizations. Surface sanitizers for use in food premises were also given a transition period to obtain market authorizations. This section describes the changes and the timelines that apply.

Regulatory framework prior to May 31, 2025

Chemical products intended to disinfect or sanitize environmental surfaces, inanimate objects, and non-critical medical devices were regulated in Canada as drugs under the *Food and Drugs Act* and its *Regulations* or the *Pest Control Products Act*. The Natural and Non-prescription Health Products Directorate (NNHPD) within Health Canada assessed applications for products that were represented for use as[17]:

- Surface disinfectants for use on non-critical medical devices and environmental surfaces and inanimate objects in domestic, industrial/institutional, hospital, food processing and/or barn premises; or
- Surface disinfectants with secondary use on food and non-food contact surface sanitizers, also known as disinfectant-sanitizers

Disinfectant drugs required pre-market assessments and a drug identification number (DIN) prior to being authorized for sale in Canada. These assessments included evaluations of the efficacy, toxicity, and safety (e.g., residue levels) for the intended use and labels that comply with the *Food and Drugs Act* and *Regulations* as outlined in the Health Canada document *Guidance Document: Regulatory Requirements for Drug Identification Numbers (DINs)*. Surface sanitizers without disinfectant claims were registered under the *Pest Control Product Act* by the Pest Control Regulatory Agency.

Surface disinfectants and surface sanitizers authorized prior to May 31, 2025 are listed in these databases[20]:

- Pesticide Product Information Database for sanitizers registered under the PCPA
- Drug Product Database for disinfectants authorized under the FDR

Surface sanitizers for use in food premises, including non-food contact surface and food contact surface sanitizers, were considered incidental additives and were not regulated by the NNHPD. Manufacturers could *voluntarily* request an evaluation of their products by Health Canada's Bureau of Chemical Safety (BCS). If the BCS had no objections to a specific product and its use, a Letter of No Objection (LONO) was issued.[21]

Regulatory framework after May 31, 2025

As of May 31, 2025, the *Biocides Regulations* came into force, which introduces a single framework for both surface disinfectants and surface sanitizers under the common term "biocides".[20] Health Canada defines biocides as drugs that are used for the purpose of destroying, irreversibly inactivating, or reducing/controlling the numbers of pathogenic microorganisms but not all pathogenic bacterial spores on non-living and non-liquid surfaces.[22] The following chemical products meet the definition of biocides:

- Surface disinfectants and disinfectant-sanitizers with a DIN authorized for sale under the *Food and Drug Regulations*
- Sanitizers for use on non-living and non-liquid surfaces that are registered as pest control products under the *Pest Control Products Act and Regulations*

- Surface sanitizers for use in food premises that are subject to the *Food and Drugs Act*

The definition of biocides does not include drugs that are used for invasive or medical devices. Under the new regulatory framework, all biocides must undergo pre-market assessment with the NNHPD and be issued a market authorization before they can be advertised, sold, or imported in Canada. The application for market authorization includes detailed information on the biocide's safety, efficacy, and quality.[20] The NNHPD assigns an 8-digit identification number to biocides that have been issued a market authorization, and this number must be on the label to indicate that it has been authorized for sale.[20]

As a result of this new regulatory framework, previously authorized disinfectants, disinfectant-sanitizers, and registered surface sanitizers have been given a four-year transition period to obtain a market authorization by May 31, 2029 through a transition application pathway with reduced application requirements.[23] Surface disinfectants with a DIN will be issued the same 8-digit identification number, while surface sanitizers will be issued a new 8-digit identification number to replace the pest control product registration number.[20]

Surface sanitizers for use in food premises do not have a transition application pathway and were given a six-year transition period to obtain a biocide market authorization by May 31, 2031.[20] Appendix A describes the process of application and regulatory requirements in greater detail. The Regulatory Operations and Enforcement Branch of Health Canada handles compliance and enforcement activities associated with these products.

By 2031, food safety inspectors and food premise operators should ensure that all biocides used in food premises have an 8-digit market authorization identification number.

Food contact surface sanitizers

Surface sanitizers for use in food premises includes food contact surface sanitizers. Applications for biocides that are intended to be used as hard food contact surface sanitizers must provide efficacy data on the chemical nature of the biocide, which are categorized into two classes: halide and non-halide.[13] Examples of each class are listed in Table 3.

Table 3. Examples of food contact surface sanitizers approved by Health Canada

Non-halide	Halide
• Peracetic acid • Hydrogen peroxide • Chlorinated trisodium phosphate • Anionic detergent-acid formulants • Quaternary ammonium compounds • Hydrogen peroxide-related compounds	• Iodophors • Mixed halides • Chlorine-bearing chemicals

Efficacy data must provide evidence against the following core groups of bacteria[13]:

- Halide biocides: *Staphylococcus aureus* (ATCC 6538) or *Salmonella enterica* (ATCC 6539)
- Non-halide biocides: *Staphylococcus aureus* (ATCC 6538) and *Escherichia coli* (ATCC 11229)
- Towelette biocides: *Staphylococcus aureus* (ATCC 6538) and *Escherichia coli* (ATCC 11229)

Table 12 on the Health Canada website Guidance on efficacy requirements for biocides: Hard-surface disinfection and sanitization provides information on efficacy test requirements against core groups of bacteria and additional bacteria. For biocides that have virucidal claims, the US EPA document Interim guidance for the evaluation of products for claims against viruses may be consulted for efficacy requirements for market authorization applications.

Biocides can leave residues behind on surfaces, which may lead to accidental exposure and chronic toxicity concerns, especially on food contact surfaces.[24] Product labels should instruct users to rinse surfaces with potable water after contact time has passed if the biocide leaves residues. If the manufacturer does not wish to include instructions to rinse with potable water after contact time has passed, a scientific rationale should be included in the safety information section in the application. Such rationale may include:

- Previously issued “Letter of no objection” from the Food and Nutrition Directorate

- Information or residue safety analysis studies from incidental contact with skin, food, drink, animal feed, or young children
- Quantitative data on the worst-case estimated dietary intake from exposure to the residues

If a biocide that is intended for use in food premises only contains a single active ingredient, Table 4 lists the maximum in-use concentrations permitted without a potable water rinse statement as established by the Food and Nutrition Directorate.[24] The surface should be allowed to air dry after sanitizer application before use.

Table 4. Maximum in-use concentrations permitted without a potable water rinse statement

Chemical substance	Maximum in-use concentrations permitted
Chlorine releasing compounds (for example, hypochlorites)	200 ppm of available chlorine
Quaternary ammonium compounds	400 ppm of available active quaternary ammonium compounds
Iodophors	25 ppm, expressed as titratable iodine
Hydrogen peroxide, peracetic/peroxyacetic acid	1,100 ppm of hydrogen peroxide or peracetic acid

Active ingredients in food contact surface sanitizers

Chlorine compounds are the most commonly used sanitizer in food premises, usually in the form of sodium hypochlorite (bleach), inorganic chloramines, and organic chloramines. The chlorine dilution calculator can be used to calculate the amount of bleach to add to water to prepare a chlorine solution for sanitizing. Chlorine-based sanitizers can react with organic matter to produce harmful by-products such as trihalomethanes; therefore it is imperative to remove food residues prior to applying chlorine-based sanitizers.[25]

Of note, accelerated hydrogen peroxide (sometimes known as stabilized hydrogen peroxide) is a patented blend of low levels of hydrogen peroxide with ingredients such as surface acting agents, wetting agents, and chelating agent, which increase the germicidal potency of hydrogen peroxide significantly.[26] It shares many of the same characteristics as hydrogen peroxide (spectrum of activity, odour) but is more stable, non-toxic and only slightly corrosive to soft metals (i.e., it is ideally suited for use on stainless steel).[26,27]

Several environmental factors such as light, temperature, water hardness, and pH affect the effectiveness of sanitizers. Table 5 summarizes active ingredients in sanitizers permitted by Health Canada for use in food premises, including targeted microorganisms, concentrations, rinsing requirements (if available), toxicity, corrosiveness, and environmental factors that affect efficacy.

Biofilms, which are a collection of microbial cells, polysaccharides, minerals, nutrients, and debris can present a significant challenge in food premises due to their ability to harbour and shield pathogenic and spoilage microorganisms. They are resistant to several sanitizers and once fully established can continue to contaminate food products and contribute to foodborne illness outbreaks and recalls.[28] Some strategies to control biofilms in the food industry include thermal treatments (steam and hot water), ultrasonic, surface modifications, certain chemical disinfectants and sanitizers, organic acids (e.g., citric acid, acetic acid, lactic acid), and enzyme-based products.[29]

Table 5. Characteristics of permitted active ingredients in sanitizers for use in food premises[30]

Sanitizer	Affected microorganisms/ Resistance or limitations[20]	Sanitizing/ rinse concentration	Toxicity	Stability	Odour	Residual activity	Hard water affects efficacy	Organic matter affects efficacy	pH affects efficacy	Corrosive (metals)
Chlorine-releasing compounds[3,7,9,28,31-33] (most common: calcium and sodium hypochlorite)	Broad spectrum (bacteria, fungi, viruses) Spores: YES Biofilm: NO Resistance: *Cryptosporidium,*[34] *Giardia lamblia* (less so),[35] *Salmonella,*[36] Methicillin-resistant *Staphylococcus aureus* (MRSA)[37]	100-200 ppm available chlorine Although 200 ppm is effective for numerous surfaces, 800 ppm is suggested for porous areas. Rinse @ ≥ 200 ppm	Skin and respiratory irritant. Burning pain, inflammation and blisters	↓ w/ light, >60°C	√	√	√	√	√ pH 6-7.5	√
Peracetic/ peroxyacetic acid (PAA) (usually mixed with hydrogen peroxide)[31,38,39]	Broad spectrum (including *Pseudomonas, Salmonella, E. coli, Staphylococcus, Listeria*) Spores: YES Biofilm: YES Resistance: Biofilms of *Listeria monocytogenes* (exposed for 40 min to the minimum inhibitory concentration)[40] *Salmonella typhimurium, L. monocytogenes, Escherichia coli* O157:H7 can become more acid resistant when exposed to mild acidic conditions[41,42]	200-1100 ppm Solution must contain a minimum of 200 ppm peracetic acid Rinse @ > 1100 ppm	Depends on wetting agents. Highly corrosive and extremely hazardous to skin. Can cause blistering, itching, scaling, or skin burns.	Good	√				√	√ some metals, mild and galvanized steel ↑ w/High T

Sanitizer	Affected microorganisms/ Resistance or limitations[20]	Sanitizing/ rinse concentration	Toxicity	Stability	Odour	Residual activity	Hard water affects efficacy	Organic matter affects efficacy	pH affects efficacy	Corrosive (metals)
Hypochlorous acid[43,44]	Broad spectrum Spores: YES Biofilm: NO	140-200 ppm available chlorine	No reports of toxicity	↓ w/ light ↓ T > 25°C Short shelf life			-	√	√	√
Hydrogen peroxide (H_2O_2)[3,9,45]	Broad spectrum (including *E.coli*, Influenza A and B, *Pseudomonas, Campylobacter, Salmonella*, MRSA, VRE) Spores: YES Biofilm: NO Resistance: *L. monocytogenes* in biofilm[46]	3% to 6% 200-1100 ppm Rinse @ ≥ 1100 ppm	Can cause skin irritation.	↓ w/ ↑ T Accel. H_2O_2 more stable			√	√	√	√
Quaternary ammonium compounds (QUATS)[7,9,31]	Broad spectrum (including *L. monocytogenes*, vegetative bacteria) Generally less effective against gram-negative bacteria due to outer membrane Effective against enveloped viruses Spores: NO Biofilm: YES	200 to 400 ppm typical Rinse @ ≥ 400 ppm	Respiratory and skin irritant	Good	√	√	√	√		

Sanitizer	Affected microorganisms/ Resistance or limitations[20]	Sanitizing/ rinse concentration	Toxicity	Stability	Odour	Residual activity	Hard water affects efficacy	Organic matter affects efficacy	pH affects efficacy	Corrosive (metals)
	Resistance: *L. monocytogenes*[47] Limitations: Microfibre, cotton fibres, and cellulose wipes can absorb some of the QUATS.[15,16,48] Surface morphology, charge density, and microstructures in the cloth fibres influence degree of absorption.[48]									
Iodophors[7,10,31,49,50]	Broad spectrum. Good against yeasts, viruses, bacteria, algae, molds Spores: NO Biofilm: NO Resistance: General absence of resistance to povidone-iodine[51] and iodine,[52] although some resistance to methicillin-resistant *S. aureus* (MRSA) suggested.[37]	25 ppm, expressed as titratable iodine Rinse @ ≥ 25 ppm	Depends on wetting agents. Iodophors may bleach skin or cause irritation.	Vaporizes at 49°C				√	√ Only effective < pH 4	Stains silver May leave yellow residues on surfaces May cause pitting

Alternative food contact surface sanitizers

Although traditional chemical sanitizers are effective against pathogenic and spoilage microorganisms in food premises, concerns have been raised due to environmental toxicity, chemical residues, and potential for sanitizer resistance in microorganisms. Alternative chemical sanitizers such as tea tree oil, baking soda, vinegar, essential oils, ozone, as well as alternative surfaces coated with silver or copper, have been gaining attention in the food industry. These alternative sanitizers boast characteristics such as lower residues, increased stability, and lower toxicity, though approval for use in food premises differs depending on the country and local jurisdiction. Research on alternative technologies such as cold plasma, intense pulsed light, enzymatic cleaners, ultrasound, antimicrobial surfaces, cryogenics, etc. have also been on the rise.[28] More research and knowledge synthesis are necessary to determine their effectiveness against pathogenic and spoilage microorganisms to support broader adoption in food premises.

Resistance to sanitizers

Antimicrobial resistance continues to be a growing concern worldwide due to the potential for microorganisms to develop resistance to certain therapeutic drugs or antimicrobial agents, including sanitizers. The European Chemicals Agency requires applications for biocidal product authorization to include an assessment of resistance, cross-resistance, or adaptation to the active ingredients.[53] The three types of resistance that may occur are innate, apparent, or acquired. As most sanitizers are non-specific, the development of resistance is mostly caused by innate factors, which are chromosomally controlled properties naturally associated with the organism.[54,55] Potential mechanisms of resistance include:[56-58]

- Impermeable cellular barriers preventing penetration of the sanitizer
- Cellular efflux (mechanisms inside the cell pump compounds out)
- Lack of a biochemical target for antimicrobial attachment or microbial inactivation
- Inactivation of antimicrobials by microbial enzymes

While the development of sanitizer resistance is less common due to the broad-spectrum nature of sanitizers, some studies have found evidence of sanitizer resistance. Some strains of *S. aureus* acquired resistance to some quaternary ammonium compounds through the evolution of efflux pumps.[31] Another study found some *Listeria* cells from a mature biofilm that exhibited resistance to peracetic acid.[31] Presence of qacH and bcrABC genes in a strain of *Listeria monocytogenes* were found to provide increased tolerance to sublethal levels of quaternary ammonium disinfectants in Norwegian meat and salmon processing plants.[47] However, most studies are association studies that do not prove causality between biocide exposure and antimicrobial resistance.[55] More studies on sanitizer resistance in pathogens in food premises are needed.

Practical implications for operators

To ensure that appropriate food contact surface sanitizers are used properly to maximize effectiveness and reduce the chance of resistance occurring, the following points should be conveyed to operators:[56]

- If possible, use products with DIN (applicable until May 31, 2029) or an 8-digit market authorization identification number (in effect from June 1, 2029) that are approved by Health Canada for use in food premises.
- As all disinfectant-sanitizers or biocides with DIN (applicable until May 31, 2029) or an 8-digit market authorization identification number (in effect from June 1, 2029) are effective at reducing bacteria, choose other characteristics that are relevant to the setting (e.g., virucidal cost-effective, low toxicity, non-corrosive) in selecting an product suited to the needs of the premises.
- Ensure surfaces are cleaned (i.e., organic matter and debris are removed) prior to sanitizing and are not worn or pitted, which may allow pathogens to be shielded from sanitizers. Use mechanical force (i.e., scrubbing) to help eliminate biofilms.
- Always use sanitizers according to manufacturers' instructions and only for their intended purpose (i.e., use at recommended concentrations, temperature, pH, and contact time).
- Avoid mixing or using multiple sanitizers at once.
- Determine whether rinsing needs to occur after application by consulting the product label and manufacturer's instructions.
- Use different sanitizers on a rotational basis to prevent sanitizer resistance.[59]
- If resistance is discovered (by specific testing), use a disinfectant with a different active ingredient. Using higher concentrations of the same disinfectant is discouraged, as this could promote the emergence of resistant microbes.

Summary

Disinfectants and food contact surface sanitizers are an important component of food safety programs and help reduce microbial contamination on equipment, utensils, and other food-contact surfaces. In Canada, these products are now regulated under the *Biocides Regulations* and must meet safety, efficacy, and quality requirements before receiving market authorization. This NCCEH document was updated from the previous version to reflect current knowledge and new regulatory frameworks on disinfectants and sanitizers in food premises. Additionally, another notable change in approved food contact sanitizers in food premises was added. Hypochlorous acid, created through the process of electrolyzing water, has been added as an approved sanitizer for food premises.

Despite the changing regulatory landscape, much of the key information related to these products remains the same. After the transition period, food premise operators and inspectors should ensure that biocides used in food premises on food contact surfaces and environmental surfaces have the 8-digit market authorization numbers, which indicates that the products have been approved for marketing and sale in Canada.

Several important knowledge gaps remain in the evolving world of disinfectants and sanitizers, as new technologies and products continue to emerge. Operator education on the proper use and application of biocides in food premises is imperative, especially in the case of reduced concentration and effectiveness of quaternary ammonium solutions when exposed to cloths. More research and knowledge synthesis is necessary on alternative disinfectants and sanitizers, as well as alternative cleaning and sanitizing technologies to determine their suitability for use in food premises, especially on biofilms, which continue to pose challenges in food premises. In addition, while reduced susceptibility to sanitizers and resistance mechanisms have been reported in foodborne pathogens such as *Listeria monocytogenes* and *Staphylococcus aureus*, evidence linking sanitizer use to clinically important antimicrobial resistance remains limited and largely associative. Further research is needed to better understand by-product formation, sanitizer residues, cross-resistance mechanisms, and the role of sanitizer use in the emergence and persistence of antimicrobial-resistant foodborne pathogens in food premises.

Additional Resources

Health Canada:

The new *Biocides Regulations* can be found here: https://laws.justice.gc.ca/eng/regulations/SOR-2024-110/FullText.html.

Guidance documents to help new biocides applicants and current DIN holders comply with the *Food and Drugs Act* and the *Biocides Regulations* can be found here: https://www.canada.ca/en/health-canada/services/drugs-health-products/biocides/guidance.html.

The Drug and Health Product Portal, with product-specific information on biocides that are currently or were previously authorized in Canada can be found here: https://dhpp.hpfb-dgpsa.ca/dhpp/biocides.

Appendix A: Market authorization

This is a summary of regulatory guidance available on the Health Canada website for informational purposes only. This information may be useful for environmental health officers, food premise operators, policy analysts, or knowledge brokers/translators to learn more about the revised approval process for disinfectants and sanitizers used in food premises. Please visit the Health Canada website for more details about regulatory frameworks and requirements for biocides and related products.

Application pathways and requirements

Prior to May 31, 2025, surface disinfectants and sanitizers were registered for use in Canada by Health Canada or the Pest Management Regulatory Agency respectively. The new *Biocides Regulations* introduce a new regulatory framework for surface disinfectants and sanitizers as well as surface sanitizers for use in food premises. To receive a market authorization for advertisement, sale, and import of a biocide, applicants must provide sufficient information to support the safety, efficacy, and quality of the product when used according to the manufacturer's label.

There are several application pathways depending on the active ingredient, depth of review, or pre-authorization status as outlined below.[60]

Full review application

The application must contain evidence to support the safety, efficacy, and quality of the biocide when used in accordance with its label. A scientific review of supporting studies is required and the number of tests or studies to support efficacy determines the tier and associated fee:

- Tier I: contains 25 or fewer reports of tests and studies
- Tier II: contains 26 to 50 reports of tests and studies
- Tier III: contains at least 51 reports of tests and studies

If a product has variations in formula other than differences in fragrances or dyes that are less than or equal to 1.0% on a weight-per-weight basis (% w/w) of the total formulation, this application pathway should also be used. Visit this page to learn more about formula variations under one market authorization: Formulation variations under one market authorization.

Full review – novel biocide application

This pathway is for biocides with characteristics that have never been authorized in Canada, including:

- Active ingredients or combination or active ingredients
- Use or purpose
    - Intended use or purpose (claim)
    - Additional intended uses or purposes (claims)
- Physical form
    - Physical form of the biocide
- Method of application
    - Method of application

Biocides that have characteristics that were previously accepted or authorized would still have to go through this pathway if it is not substantially similar to the previously accepted or authorized product. For example, the safety and efficacy of a 0.01% concentration of an active ingredient may be drastically different from a 10% concentration. Likewise, combining a novel active ingredient with a non-novel active ingredient would result in a novel biocide. Additional information apart from the requirements for the full review is necessary to determine the unique benefits and risks of the novel biocide and its characteristics. Other characteristics that may deem a biocide to be novel include:

- Characteristics that impact the risks and benefits of the biocide such as extended residual claims, prion-related claims, application methods that prolong user exposure, or the use of technologies that generate the biocide onsite or use UV light for activation
- Characteristics that present unique risks or uncertainties for the biocide

A pre-submission consultation with Health Canada may be requested to determine whether a biocide is considered to be novel. Prior to requesting a consultation, a search for substantially similar biocides should be conducted in the:

- Market authorized biocides database (MABD)
- Drug product database (DPD)
- Pesticide label search

Monograph application

Biocides that have well-characterized benefits and risks under specific conditions of use and meet all the parameters outlined in biocide monograph may be able to use this pathway for an

abbreviated review process. The biocides monograph describes the following parameters that an application must meet:

- Contact times
- Permitted active ingredients
- Target microorganism classes
- Minimum in-use concentrations
- Intended settings for use of the biocide

However, the monograph does not apply to biocides that:

- Are intended for use on porous surfaces
- Have certain efficacy claims such as on biofilm, long-lasting residual, specific microorganisms, or broad-spectrum virucides

Tables 1, 2, and 3 in the biocides monograph lists all permitted active ingredients, minimum concentrations, contact times, intended settings for use, and target microorganism classes. Table 1 applies to all biocides except surface sanitizers for food premises; Table 2 includes an additional active ingredient for biocides intended only for use in toilet bowls, and Table 3 applies exclusively to surface sanitizers for food premises.

Application based on comparison

This pathway applies to biocides that do not require a full data review as they are based on comparison to an authorized biocide. This typically occurs under a licensing agreement, allowing the licensee to use the authorized biocide's information to gain market authorization to sell the product under a different brand name. Applications in this pathway may not use a comparison biocide that was already authorized based on a comparison.

There are two streams under this pathway:

- Administrative application
- Labelling only

Specific requirements under each of these streams are outlined on Health Canada's website: Guidance on biocide application pathways and general requirements: Overview

Use of foreign decisions application

Biocides that have been approved for sale by a trusted foreign regulatory authority may apply for a market authorization through this pathway. The biocide in the application must be the same as the foreign biocide in the following aspects:

- Physical form and method of application
- Active ingredients and quantities
- Conditions of use
- Formulants and formulations
- Manufacturing process and specifications

More details can be found on Health Canada's website: Guidance on biocide application pathways and general requirements: Overview

Transition application

Surface disinfectants and surface sanitizers that have been authorized or registered under the *Food and Drugs Regulations* or the *Pest Control Products Act* may transition to the new regulatory framework using this pathway, provided that the biocides remain identical to the authorized or registered product.[61] Surface sanitizers are required to change product labels to comply with the new regulatory requirements.

Table 6 summarizes specific requirements for each application pathway. For specifics on required documents in different application pathways, visit this Health Canada website: Guidance on biocide application pathways and general requirements: Description of information and documents.

Table 6. Specific requirements for each application pathway[62]

Application pathway	Letter of confirmation	Safety and efficacy information	Quality information	Summary	Foreign biocides documents
Full review		√	√	√	
Full review – novel biocide		√	√	√	

Monograph		√	√	√	
Use of foreign decisions					√
Comparison - administrative application	√				
Comparison - labelling only	√			Recommended	

Safety and efficacy requirements

Applications for market authorization through certain pathways must include scientific evidence in the form of safety and efficacy data and a safety and efficacy summary to support the safety and efficacy of the biocide products, the benefits and risk associated with the biocides, and any uncertainties related to these benefits and risks.[63,64] Studies should follow good laboratory practice (GLP) when testing for safety and efficacy of biocides. Other types of GLP compliance standards include those published by the:

- Organisation for Economic Co-operation and Development
- United States Environmental Protection Agency (US EPA)

Certain international standards, such as the International Organization for Standardization (ISO) certification standards, may be equivalent to GLP certification. Manufacturers must verify that the standards used are equivalent to GLP certification. For more information about the safety and efficacy requirements for biocide applications, visit these Health Canada websites:

- Guidance on safety requirements for biocides: Overview
- Guidance on efficacy requirements for biocides: Overview

Quality requirements

Applications for market authorization for biocides in certain pathways must provide evidence in the form of quality information and a quality summary that the product meets the quality and stability requirements as set out in the regulations to ensure that it is of good quality.[65] This includes information on the shelf life and quality control parameters including:

- The manufacturing master formula
- Records demonstrating compliance with the master formula
- Specific manufacturing and packaging requirements for sterile biocides
- Complaint investigation related to the quality of the biocide

For more information about the quality requirements for biocide applications, visit this Health Canada website: Guidance on quality requirements for biocides: Overview.

Labelling requirements

Applications must include label text that complies with labelling requirements to receive market authorization. In general, labels must be clearly visible, bilingual in English and French, and accurate with no false or misleading messaging. The product label must include the following information:

- Principal display panel
  - Brand name
  - Intended use or purpose (claims)
  - Setting(s) in which it is intended to be used
  - Warnings
  - DIN
- Any panel
  - Active ingredient(s) and concentrations
  - Directions for use
  - Risk information
  - Directions for storage
  - Lot number
  - Expiry date
  - Name and contact information of the market authorization holder

Product users should adhere closely to instructions provided on the product label to determine the appropriate method of use and concentration, and to avoid potential health or safety hazards.[7] The effectiveness of chemical disinfectants depends on the contact time, temperature, and concentration of the application. For more information about labelling requirements, visit this Health Canada website: Guidance on labelling requirements for biocides: Template and checklist.

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655 W. 12th Ave., Vancouver, BC, V5Z 4R4
contact@ncceh.ca | www.ncceh.ca