NEOSAN LABS | CBRNE

The U.S. Government and DARPA assembled a team of scientist with a specific mission, to develop a nontoxic response to hazardous chemical and biological contamination. The solution had to be safe for humans, animals, and plants, broad-spectrum, and deliver a “7-log kill” (99.99999%) on Anthrax spores within 15 minutes—the highest benchmark for biological threats. Several years later,

the most comprehensive, effective, nontoxic chemical and biological decontaminating agents had been created.

Licensed from Sandia National Labs for military and commercial use, NeoSan Labs continues to develop and optimize this complex, innovative technology for a broadened range of applications.

Sandia National Labs License #19-11424

SPECIFICATIONS: NEOSAN LABS CBRNE

At the core is a nontoxic, biodegradable, aqueous formulation with enhanced physical stability, enabling rapid mitigation and decontamination of chemical and biological agents, and hazardous materials.

In collaboration with the Armed Forces, NeoSan Labs® has advanced the original Sandia National Labs DF200 technology and developed the 3rd Gen version of the product line.

NEOSAN LABS® CBRNE (DF200 3rd Gen.)
The most advanced, ready-to-use, high-temperature-resistant, high-foam decontaminant

NEOSAN LABS® CBRNE Powder
Can be used with freshwater, seawater, and water drawn from rivers and ditches with no adverse effect on performance.

NEOSAN LABS® CBRNE Surrogate
Intended for training, this product mimics appearance, handling, mixing process, and application method of the actual decontamination product.

DKON™ Military-Grade Laundry Detergent
Neutralizes pepper spray and tear gas residue in a single laundry cycle. Free of dyes, fragrances, and brighteners

NEOSAN LABS® CBRNE HIGH-TEMPERATURE-RESISTANT FOAM

NEOSAN LABS CBRNE APPLICATIONS

NEOSAN LABS® CBRNE provides an efficient and quick response against any chemical, biological, and radiological incident or attacks. It is fully adaptable to existing decontamination systems and guarantees the maximum efficiency in the decontamination/detoxification of:

Personnel Decontamination
Disabled or ambulatory

Equipment & Materials Decontamination
Small personal equipment, such as IPE masks, gloves, over boots, and small arms

Vehicle Decontamination
Light and medium vehicles, towed equipment, aircraft, radar, command and control systems

Ground Decontamination
Terrain, including roadways, tarmacs, parking and storage areas

Sensitive Or Electronic Device Decontamination
Computers, medical and lab equipment, laptops, screens, and personal devices

NEOSAN LABS® CBRNE WEAPON DECONTAMINATION

LIGHT, MEDIUM & HEAVY DECONTAMINATION

Canadian Armed Forces decontamination.

CBW DECONTAMINATION

NEOSAN LABS® CBRNE destroys or detoxifies chemical agents in a single application.

- **Destroys at least 95.0% of HD within 60 minutes**
- **Destroys at least 99.0% of GD within 60 minutes**
- **Destroys at least 99.0% of VX within 60 minutes***
- **Destroys biological agents in a single application**
- **Minimum of 6-log reduction for Bacillus Anthracis spores within 60 minutes**
- **Remains effective 8–10 hours after mixing in a batch process**

SURFACE COMPATIBILITY

No damages observed in the following surfaces:

Stainless steel, glass, aluminum, porcelain, granite, concrete, brick, asphalt paving, treated wood, butyl rubber, acoustic ceiling tile, commercial carpet, fabric-covered office partition panels, smooth latex painted wallboard, CARC painted metal, fabrics (cotton, polyester, microfiber, wool, acrylic, with elastomeric fibers).

** In the neutralization reaction of agent VX, NEOSAN LABS® CBRNE decontaminant reaction products contain no more than 1.0% by mole of by-product EA2192 (S-(Diisoporpopylaminoethyl methyl phosphonothionate) (C9H22NPO2S; CAS 73207-98-4)*

APPLICATION METHODS

The mixed, ready-to-use NEOSAN LABS® CBRNE is a liquid that can be fogged, sprayed, or foamed on vehicles, large vertical surfaces, and underneath horizontal surfaces. A single pass or application of the sprayed or foamed NEOSAN LABS® CBRNE adheres for at least 30 minutes after application, to surfaces in any orientation, horizontal, vertical, or underside.

- **NEOSAN LABS® CBRNE applied as foam allows operators to clearly observe coverage**
- **NEOSAN LABS® CBRNE can be used as liquid for personal equipment immersion**
- **NEOSAN LABS® CBRNE can be applied as liquid on roadways**

	Chemical Nerve Agents		Chemical Blister Agents	Biological Agents
Type of Surface	**G Agent**	**V Agent**	**H Agent/Lewisite**	**Bacillus anthracis spores**
Nonporous material	15 minutes	15 minutes	30 minutes	30 minutes
Porous material	30 minutes	30 minutes	60 minutes	60 minutes

TRANSPORTATION, HANDLING & STORAGE

NEOSAN LABS® CBRNE is a three-part kit. Part one (A) is an aqueous solution with a special combination of solubilizing and foam forming agents. Part two (B) a reactive component (hydrogen peroxide). Part three (C) is a bleaching activator. NEOSAN LABS® CBRNE is packaged in UN-compliant Decontaminant Packs. For ease of handling, they are broken down into smaller sub-packages.

- **Compliant with International Transportation of Dangerous Goods Regulations**
- **Compliant with International Civil Aviation Organization (ICAO) Regulations**
- **Withstand shock during transport, per MIL-STANDARD-810G, Method 514.6, Method 516.6 (functional shock of 4G)**
- **Do not exceed maximum weight allowed for single person lift**
- **Include waterproof instructions for use on exterior of containers**
- **Fit within allowable pallet load dimensions**
- **Transportable by forklift**
- **Shelf life, under controlled storage conditions, of at least ten (10) years**
- **Field storage life of at least 18 months when stored between -21°C to +71°C and exposed to elements such as rain, snow, insolation, humidity, sand, or dust**

5-GALLON KITS with an outer packaging made up of polypropylene to allow outdoor storage. Each kit contains a 2.5-gallon translucent bottle of Part A (yellowish liquid), a 2.5-gallon white bottle of Part B (clear liquid), and a 13 ounce bottle of Part C—premeasured quantities of each component for optimal application.

4G/Y27/S/ USA/+CO1455

14.5” x 10.25” x 16.625” (36.8 cm x 26 cm x 42.22 cm)

110-Gallon Kit **(2 x ~55 gal drums)**

The 110-gallon kit contains preweighed drums of Part A and Part B, and one preweighed container of Part C. When combined, this kit yields ~110 gallons of NEOSAN LABS® CBRNE.

500-Gallon Kit **(2 x 275 gal IBL Tote)**

The 550-gallon kit contains preweighed totes of Part A and Part B, and two pre-weighed containers of Part C. When combined this kit yields ~550 gallons of NEOSAN LABS® CBRNE.

MECHANISMS OF ACTION

NeoSan Labs® CBRNE high-impact technology is based on the synergistic effect between two active ingredients: quaternary amines (cationic surfactant and cationic, hydrotropic agents) and hydrogen peroxide (oxidation and reactive compound). The formula also contains several supporting compounds which enhance solubilization and reactivity, accelerate oxidation activity, increase bulk and surface viscosity, extend the shelf life of the formula, and control the chemical reaction and pH. All ingredients in the formulation, including water, are balanced in order to guarantee maximum efficacy under stable and safe conditions.

Toxic Industrial Chemicals (TICs) Chemical Warfare Agents (CWAs) Nonconventional Toxic Agents (NTAs)

The decontamination of chemical warfare agents (CWAs) and other toxicants, such as nonconventional toxic agents (NTAs) or toxic industrial chemicals (TICs) can lead to stable and highly toxic products. Water content, reaction time, temperature, order of addition, matrix effects, and/or pH have been shown to be critical parameters for controlling the reaction paths in decontamination chemistry, forming nontoxic products, and preventing the formation of toxic residuals.

TICs

NeoSan Labs® CBRNE addresses the need for neutralizing adverse effects of toxic industrial chemicals (TICs). A TIC is defined as any chemical compound, constituent, substance, species, or agent that through its chemical action on life processes can, if left untreated, cause death, temporary incapacitation, acute and chronic health effects, or permanent harm to humans or animals. This includes all such chemical agents, regardless of their origin or of their method of production, and regardless of whether they are produced in facilities, in munitions, or elsewhere.

THE MAJORITY OF TICS ARE NEUTRALIZED VIA ONE OF FOUR REACTION MECHANISMS

Chemical Oxidation is half of a redox reaction. One of the reactants is oxidized, or loses electrons, while the other reactant is reduced, or gains electrons. Oxidizing compounds are used to denature contaminants into harmless compounds. The remediation of certain organic substances such as chlorinated solvents (trichloroethene and tetrachloroethene) and other hydrocarbon compounds (benzene, toluene, ethylbenzene, MTBE, and xylenes) by chemical oxidation is possible. The toxicity level of other contaminants can be reduced.

Chemical Reduction is the opposite of oxidation. One of the reactants loses oxygen, usually by gaining electrons. A reduction reaction always coincides with an oxidation reaction. Oxidation and reduction together are called redox.

Nucleophilic Attack is a reaction class in which a nucleophile electron selectively bonds with or attacks the positive or partially positive charge of an atom or group of atoms to replace a so-called leaving group.

Buffering is the effect the formula has due to its aqueous solution consisting of a weak acid and conjugate base. The acidic and alkaline components do not undergo any reactions that significantly alter their concentration, therefore both remain present in the solution. They only rarely react with water but are very likely to react with any added strong base or strong acid. The pH only slightly changes when a small or moderate amount of strong acid or base is added. Buffer solutions are used to keeping the pH at a nearly constant level in a wide variety of chemical applications.

Dissolution exploits the principles of cationic micelle catalysis and the solubilization power of cationic hydrotropes to dissolve sparingly soluble toxicants. This principle is used for a TIC or a Chemical that is insoluble in water that may be detoxified by nucleophilic attack.

Select constituents in the formulation enable this mechanism, solubilizing sparingly soluble agents and enhancing vulnerability to a nucleophilic attack. This is accomplished through the recognition that certain nucleophilic agents are negatively charged. The insoluble chemical agent (or TIC) is dissolved within the micelle, comprised of an aggregate of surfactant molecules with hydrophobic tails forming the interior core and hydrophilic heads concentrating at the surface of the micelle. These positively charged hydrophilic heads attract the negatively charged nucleophiles. In this sense, the cationic surfactant acts as a catalyst to speed up the reaction between the toxicant and the reactive compound. This principle can also be applied to insoluble chemical agents which are subject to an oxidative attack by a negatively charged oxidizer and to insoluble chemical agents, subject to a reductive attack by negatively charged reductants.

For an oxidative attack of a negatively charged water-soluble chemical agent or TIC, the agent is dissolved in the water phase. Its negative charge attracts it to the cationic micellar environmental where it will react with the negatively charged oxidant. This mechanism is named “inverse phase-transfer catalysis.”

Most of 21 “High Threat” TICs listed by the U.S. Department of Justice can be neutralized by the formula’s reaction mechanisms.

Toxic Industrial Chemicals	% Decontaminated		
	1 Minute	15 Minutes	60 Minutes
Malathion (liquid)	89	95	Below Detection
Hydrogen Cyanide (gas)	>99	>99	>99
Sodium Cyanide (solid)	93	98	>99
Butyl Isocyanate (liquid)	99	Below Detection	Below Detection
Carbon Disulfide (liquid)	>99	>99	Below Detection
Phosgene (gas)	98	>99	>99
Anhydrous Ammonia (gas)	>99	>99	>99

Sandia National Laboratories & Southwest Research Institute

DRUGS

NeoSan Labs® CBRNE has been tested for its efficacy to neutralize drugs. The formula was determined to be highly effective in neutralizing Taxol*, which is the primary by-product formed by the hydrolysis of the parent taxol compound. In addition, the formula has demonstrated its neutralization capability against methamphetamine removing all the detectable methamphetamine contamination after just one application on painted drywall.

NeoSan Labs® CBRNE has the capability to decontaminate Fentanyl and its analogues from equipment, including PPE, facilities and large areas by both decontamination methods: removal and neutralization. The surfactants (quaternary amines) and the water contained in the formula provide NeoSan Labs® CBRNE with high solubilization and particle-removing properties. Hydrogen peroxide is the oxidizing agent with a tested efficacy in Fentanyl neutralization by oxidative degradation.

(*) Taxol is a Paclitaxel trademark, a common chemotherapy medication used to treat different types of cancers.

Neutralization Of Methamphetamine On Painted Drywall

Methamphetamine Treatment	Pre-Mean (ug/100 cm2)	Pre-Median (ug/100 cm2)	Post Mean (ug/100 cm2)	Post Median (ug/100 cm2)	Mean % Reduction
No Treatment	15.3	18	14.6	14	4.3%
One Wash	14.8	13	<0.05	<0.05	100%
Three Washes	14	14	<0.05	<0.05	100%

National Jewish Medical & Research Center

OIL SPILLS

NeoSan Labs® CBRNE can be used as a chemical remediation accelerator to break down and remove oil.

Tests conducted by the U.S. Coast Guard in 2001 demonstrated the effectiveness of NeoSan Labs® CBRNE on two contained and controlled oil spills (Marine fuel oil and Alaska crude oil). NeoSan Labs® CBRNE was applied at a 15 to 20 gal/acre flow rate. It reduced the crude oil volume by 60% prevented the oil from dispersing into the water column. Crude oil, including fresh and weathered, contains carcinogenic volatile aromatic compounds like benzene, toluene and naphthalene. With the proper application this highly effective decontaminant could immediately neutralize the off-gassing chemicals and remove harmful components, reducing overall exposure.

NeoSan Labs® CBRNE has been determined to be effective against microorganisms present in diesel. Tests conducted by ITEL (Spanish Technical Institute of Cleaning) with real contaminated diesel samples, showed that NeoSan Labs® CBRNE modifies and destroys pollutants in diesel (bacteria, mold, and yeasts), perfectly conserving the treated diesel and without affecting the metal tanks.

There are only two classes of TICs or NTAs for which the mechanism of decontamination could generate unexpected reactions:

- Strong acids and bases, which are best neutralized by non-aqueous technologies to avoid violent reactions which may occur when water is added to strong acids or bases
- TICs and NTAs that contain toxic metals, which by definition, cannot be chemically neutralized

CWAs

The reactions involved in decontaminating chemical warfare agents (CWAs), particularly nerve agents (such as G agents or V agents) and blistering agents (such as mustard), can be divided into substitution and oxidation reactions. The chemical agents such as sarin, soman and tabun (G agents) are examples of phosphorus-containing compounds which, when altered chemically in substitution reaction like hydrolysis, can lose their toxicity. Mustard, which is an example of H agents, and VX, which is an example of a V agent, can also be altered chemically and rendered harmless with oxidation. NeoSan Labs® CBRNE provides both solubilizing compounds: oxidizing and nucleophilic. Nuclear magnetic resonance (NMR) studies demonstrated the destruction of the chemical warfare simulants without formation of potentially toxic byproducts.

Reaction rates in kinetic testing for NeoSan Labs® CBRNE formula against chemical agents

Chemical Agent	% Destruction of Chemical Agent		
	1 Minute	15 Minutes	60 Minutes
GD	99.98 ± 0.01	99.97 ± 0.01	99.98 ± 0.01
VX	91.20 ± 8.56	99.80 ± 0.08	99.88 ± 0.04
HD	78.13 ± 10.53	98.46 ± 1.43	99.84 ± 0.32

Illinois Institute of Technology Research Institute (IITRI)

Biological Warfare Agents (BWAs)

NeoSan Labs® CBRNE is a bio-decontamination formulation that neutralizes biological pathogens for disinfection and sterilization applications. For neutralization of biological toxicants, the synergistic effect between the cationic surfactants and the hydrogen peroxide is responsible for the high kill rate of bio-agents. The cationic surfactant compounds serve to solubilize and soften the biological agent's outer coat, thereby exposing the biological agent's DNA and vital parts to reactive compounds. The reactive compound reacts with the toxicant, either by oxidation or hydrolysis reaction and neutralizes it.

Bacterial spore formers, like Bacillus anthracis, are considered as one of the most resistant organisms, with the lowest sensibility to disinfectants. The spores of these bacteria resist to heat, drying, and to many disinfectants (including 95% ethanol). They are considered the most difficult bio-agent to kill. Because of these attributes, B. anthracis spores are extraordinarily well suited to be used as biological weapons. When using NeoSan Labs® CBRNE for spore neutralization, the cationic surfactants soften and disrupt the spore coat, resulting in breaches through which hydrogen peroxide can enter and attack the spore DNA/RNA.

Test results against anthrax spores showed a 7-log reduction (99,99999%) in 15 minutes contact time.

Kill rates for B. anthracis AMES-RIID spores in a solution of NeoSan Labs® CBRNE

B. anthracis AMES-RIID	Average CFU/ml	Log Reduction	% Reduction
Control	1.21E+07	0	0.00
15 min contact	NG	7	100±.00004
30 min contact	NG	7	100±.00004
60 min contact	NG	7	100±.00004

Illinois Institute of Technology Research Institute (IITRI)

Kill rates for B. anthracis ANR-1 spores in a solution of NeoSan Labs® CBRNE

B. anthracis ANR-1	Average CFU/ml	Log Reduction	% Reduction
Control	6.42E+07	0	0.00
15 min contact	NG	7	100±.00004
30 min contact	NG	7	100±.00004
60 min contact	NG	7	100±.00004

Illinois Institute of Technology Research Institute (IITRI)

Kill rates for Y. pestis cells in a solution of NeoSan Labs® CBRNE

Y. pestis (ATCC 11953)	Average CFU/ml	Log Reduction	% Reduction
Control	1.33E+07	0	0.00
15 min contact	NG	7	100±.00004
30 min contact	NG	7	100±.00004
60 min contact	NG	7	100±.00004

Illinois Institute of Technology Research Institute (IITRI)

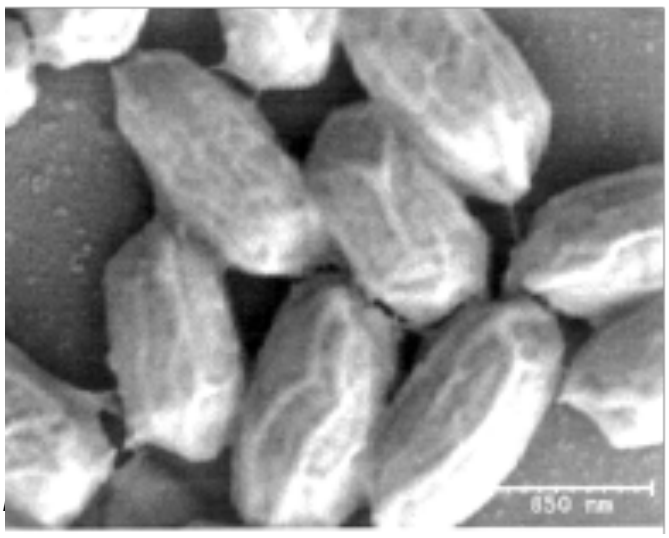
Kill rates for Bacillus Subtillus cells in a solution of NeoSan Labs® CBRNE in AOAC tests

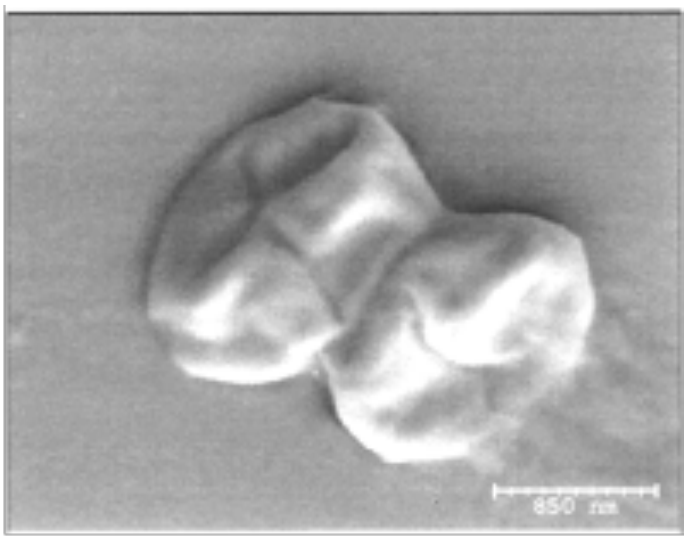
Bacillus Subtillus (ATCC19659)	Average CFU/ml	Log Reduction	% Reduction
Control	6.7E+07	0	0.00
15 min contact	NG	7	100±.00004
30 min contact	NG	7	100±.00004

Illinois Institute of Technology Research Institute (IITRI)

Standard autoclave equipment is considered effective in the treatment of biohazard material when it reaches log-4 (minimum). Spores such as Geobacillus stearothermophilus are used as indicator.

Anthrax spores before and after one hour of contact with the formula





DISINFECTION & STERILIZATION

Although the formula was developed primarily to neutralize chemical and biological warfare agents and toxic industrial chemicals, it can also be used for the disinfection and sterilization of other biological pathogens related to public health issues.

VIRICIDAL ACTIVITY

The formulation's disinfection mechanism against viruses is a result of the dual synergy between the surfactant's oxidizing properties. Peracetate is also produced and further acts as strong oxidizer. Rapid degradation of capsid proteins and viral RNA has been observed in a short contact time.

The formulation's mechanisms of action on viral systems include a primary effect on the lipid envelope, the subsequent degradation of viral capsid proteins, protein denaturation, dissociation of enzymes, and interaction with lipids. These mechanisms impact both enveloped and non-enveloped viruses. Surfactant or quaternary ammonium compounds (QAC) present in the formulation are comprised of both hydrophilic and lipophilic portions.

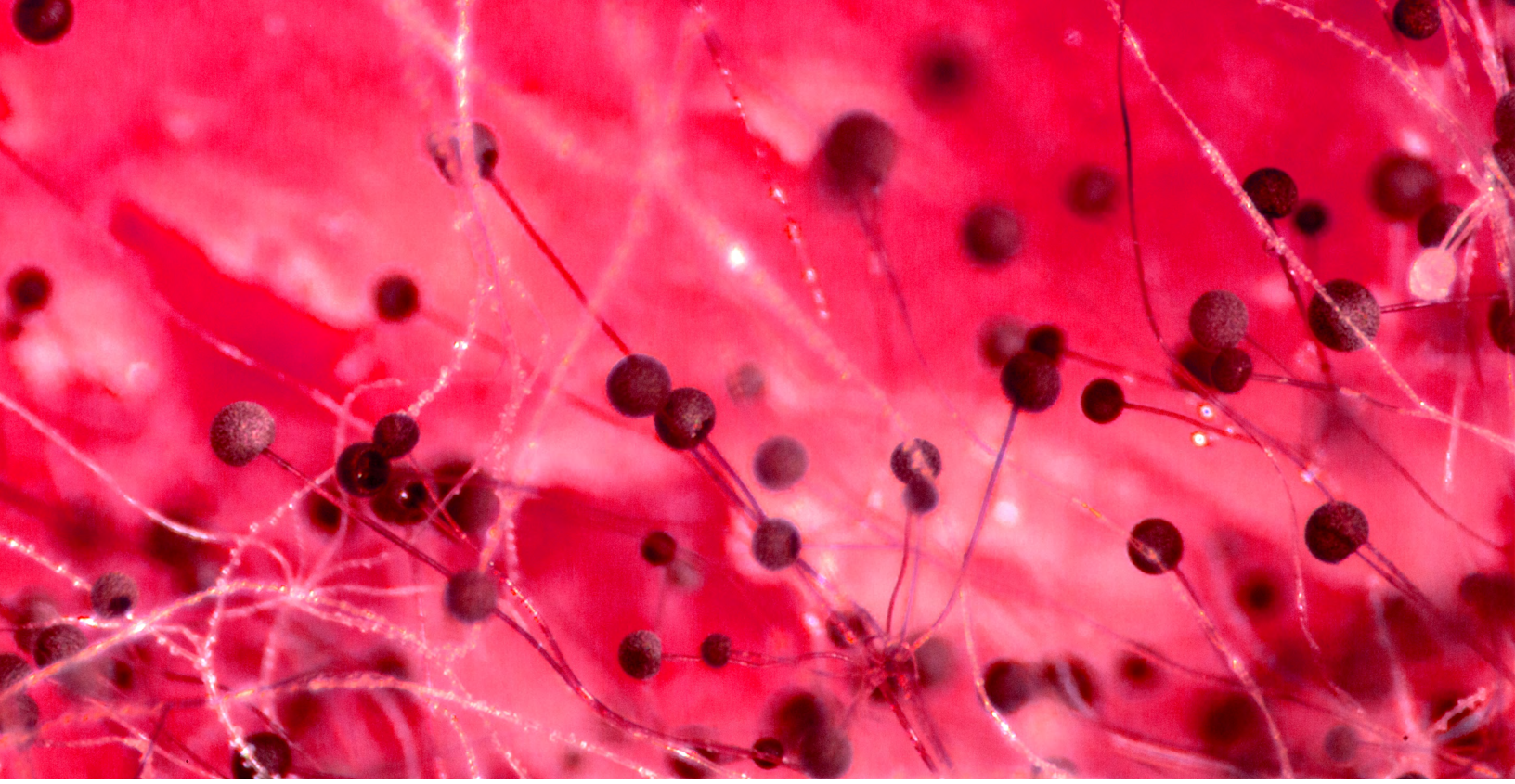
The hydrogen peroxide in the formulation generates free hydroxyl radicals that can break DNA and RNA structures, attack membrane lipids, and disrupt the virus's capsid structure and other essential cellular components.

The formulation demonstrated complete inactivation of Influenza A, Influenza B, and Norovirus following a 10-minute exposure time. Bovine Coronavirus (BVC) viral agents were completely inactivated in less than 3 minutes.

ANTIBACTERIAL ACTIVITY

The formulation disinfection mechanism against bacteria is similar to virucidal disinfection. Surfactant physically denatures the bacterial protein armor. Oxidizing agents attack the genetic material (DNA) and hydrolyzing agents attack vital bacteria contents and functions.

Disinfection of a large number of different bacteria (gram+ and gram–) have been achieved within a 10-minute contact time.



ANTITOXIN ACTIVITY

The formulation's dual synergy between the surfactant's oxidizing properties has been demonstrated to be fungicidal and fungistatic.

The formulation has been proven to neutralize mold, mold spores, and mycotoxins, a toxic secondary metabolite produced by molds. One mold species may produce many different mycotoxins, and the same mycotoxin may be produced by several species.

Aflatoxin Mycotoxin Neutralization

Aflatoxin Mycotoxin	Toxin Amount	Log Reduction	% Reduction
Control	15 ng	0	0.00
15 min contact	NG	7	100
30 min contact	NG	7	100

Sandia National Laboratories

NeoSan Labs® CBRNE has been demonstrated to provide disinfection efficacy on porous and non-porous surfaces, including galvanized steel, butyl rubber, polypropylene, concrete, acoustic ceiling tile, commercial carpet, fabric-covered office partition panels, smooth latex, painted wallboard, painted metal, glass, sand, and wood.

No biological or chemical agent remains in its original state after being in contact with the formulation.

Radiological & Nuclear Particles

Most of the chemical qualities of NeoSan Labs® CBRNE (chemical reactions, solubilizing, stickiness, and penetration) are useful to remove solid particles from different surfaces.

In 2015, the Technical Radiation Protection Unit at the University Autonomous of Barcelona, Spain (UTPR-UAB) was contracted to conduct tests on radioactive isotopes. UTPR-UAB tested NeoSan Labs® CBRNE liquid and powder for its efficacy on radiological decontamination. A variety of materials were contaminated using three different radioactive isotopes: Americium-241 (alpha radiation), Strontium-90 (beta radiation) and Caesium-137 (beta and gamma radiation).

The decontamination efficacy was evaluated after 30 minute contact time after cleaning the samples with water.

Efficacy (%) in the decontamination of NeoSan Labs® CBRNE in liquid format applied as spray

	Ceramic	Steel	CARC	Glass	Butyl
241Am (α)	98.89 ± 0.04	68.08 ± 0.03(*)	84.76 ± 0.06	93.75 ± 0.10	65.70 ± 0.05
90Sr (β)	94.51 ± 0.14	80.65 ± 0.02(*)	83.30 ± 0.02	98.76 ± 0.02	77.56 ± 0.02
137Cs (β-γ)	92.98 ± 0.07	96.45 ± 0.03	99.18 ± 0.03	100.00 ± 0.05	100.00 ± 0.04

UTPR-UAB

Efficacy (%) in the decontamination of NeoSan Labs® CBRNE in liquid format applied as foam

	Ceramic	Steel	CARC	Glass	Butyl
241Am (α)	97.37 ± 0.05	10.49 ± 0.07 (*)	93.61 ± 0.06	91.60 ± 0.09	41.64 ± 0.06
90Sr (β)	94.51 ± 0.14	80.65 ± 0.02 (*)	83.30 ± 0.02	98.76 ± 0.02	77.56 ± 0.02
137Cs (β-γ)	92.98 ± 0.07	96.45 ± 0.03	99.18 ± 0.03	100.00 ± 0.05	100.00 ± 0.04

UTPR-UAB

Efficacy (%) in the decontamination of NeoSan Labs® CBRNE in powder format applied as spray

	Ceramic	CARC	Butyl
241Am (α)	100.00 ± 0.06	79.20 ± 0.06	93.88 ± 0.05
90Sr (β)	100.00 ± 0.03	77.14 ± 0.04	72.12 ± 0.02
37Cs (β-γ)	100.00 ± 0.06	100.00 ± 0.06	99.38 ± 0.04

UTPR-UAB

Cleaner & Detergent

In addition to the NeoSan Labs® CBRNE's active ingredients, quaternary amines and hydrogen peroxide, the formulation also contains a water-solution cationic polymer to increase bulk viscosity of the solution, and fatty alcohols to increase surface viscosity. The formulation can be produced as "sticky liquid or foam," where glue-like additives are used to increase adhesion. The formulation's surfactants enhance the capability to penetrate porous surfaces, due to reducing surface tension.

Based on tests performed by ITEL (Spanish Technical Institute of Cleaning), the product has proven to be highly effective in the disintegration of dirt and removing solid particles from different surfaces. It has been tested and introduced in cleaning and disinfection applications.

NeoSan Labs® CBRNE was tested as a laundry detergent by ITEL with more than 3.000 wash cycles using a wide variety of fabrics: wool, cotton, polyester, acrylic, fabrics with resins and elastomer fibers, printed fabrics, fabrics with plastic and metal complements and EMPA band. ITEL study determined NeoSan Labs® CBRNE effectively removes stains, odors, and disinfects laundry.

- No color alteration
- No textile peeling, fiber stacking or entanglement
- No harmful, dangerous, or toxic residue
- Effective in shorter cycles, with reduced water, at lower temperatures (30–40°C)

Laboratory tests verified the effectiveness of NeoSan Labs® CBRNE to disinfect inoculated fabric. ATS LABS validated that it as a disinfectant on washing process by Standard Test Method for Evaluation of Laundry Additives-Disinfectants using Pseudomonas aeruginosa following a single use.

The U.S. Environmental Protection Agency (EPA) conducted a study to determine NeoSan Labs® CBRNE's efficacy on decontaminating Personal Protective Equipment (PPE) and related materials, contaminated with toxic industrial chemicals and chemical agent surrogates. The study included chemicals consisting of precursors nitrobenzene and phenol, pesticides, including carabyl, chlordane, and malathion, and two chemical warfare surrogates, malathion (VX agent surrogate) and 2-chloroehtyl ethyl sulfide or 2-CEES (HD agent surrogate). The test was conducted on materials frequently used in PPE, including Butyl, Neoprene, Nitrile, Polyethylene, Acrylic, Stainless Steel and Viton. After the toxicants had 30 minutes contact time with the PPE material, NeoSan Labs® CBRNE was applied. As a liquid it was allowed a 2-minute decontamination time, as a foam 5 minutes. The study demonstrated neutralization of chemical toxins across all materials.

Fire Suppressant

Although the formulation's effectiveness against a broad spectrum of CBRNE agents is well established, the ability of producing a stable and dense foam enables the use as both a decontaminant and effective fire suppressant.

NeoSan Labs® CBRNE produces an aqueous film-forming foam (AFFF), without PFOS (Perfluorooctane Sulfonate) or PFOA (Perfluorooctanoic Acid). PFOS and PFOA are foam forming contaminants and part of the PFAS family. They are commonly used by firefighters to extinguish fuel fires.

The NeoSan Labs® CBRNE foam has been successfully tested to suppress and control Class A fires (fires involving ordinary combustibles such as wood, paper, and trash) and Class B fires (fires involving flammable and combustible liquids such as gasoline, solvent, and grease). In Class B fires (fires involving energized electrical equipment),

NeoSan Labs CBRNE is ideal for civilian and military applications, and the protection of Nuclear Weapons facilities. It requires minimal logistical support, provides a single solution for CW and BW agents, and offers rapid deployment. Run-off of fluids have no lasting environmental impact and minimal health or collateral damage.

Class A Fires—Ordinary Combustibles Such As Wood, Paper & Trash

NeoSan Labs CBRNE was tested on wood cribs made of fir lumber, ignited using commercial grade heptane. All tests were successful according to ASTM Standards D442-92. The cribs burned for 8 minutes prior to being extinguished with NeoSan Labs CBRNE at a 1–2% concentration.

Class B Fires—Fires Involving Energized Electrical Equipment

When the formulation is applied with a conventional compressed air extinguisher, it produces a foam capable of extinguishing chemical fires. As opposed to conventional foams used for fire suppression, NeoSan Labs CBRNE reacts to the material or chemical it contacts. If it is mixed with different combustibles (gasoline and diesel), even if they are burning, the foam is still present in the mixture. NeoSan Labs CBRNE has the ability to trap gas/vapors produced by methanol (alcohol) and ammonia, inhibiting the flammable vapors and trapping the ammonia vapors in the foam.

The foam is dense, stable, and lasts for over 3 hours, even when applied on vertical and underside surfaces. The density of the foam can be regulated depending on the type of equipment used. High viscosity and adhesion to porous and nonporous surfaces was demonstrated. The foams tested were produced by CAFS (compressed air foam systems) and conventional compressed air extinguishers with diluted and non-diluted NeoSan Labs® CBRNE formulation.

NeoSan Labs® CBRNE fuel fire test using conventional compressed air extinguisher.