



Technology Information Summary

TECHNOLOGY CATEGORY	TECHNOLOGY TARGETS	INFORMATION SOURCE
<input type="checkbox"/> Detection <input checked="" type="checkbox"/> Decontamination <input type="checkbox"/> Sampling	<input checked="" type="checkbox"/> Biological Agents <input checked="" type="checkbox"/> Chemical Agents (including FGAs) <input checked="" type="checkbox"/> Other (Fentanyl, Meth, TICs, etc.) <input type="checkbox"/> Radiological Agents	<input checked="" type="checkbox"/> Vendor Supplied Information <input checked="" type="checkbox"/> Third Party Test Data <input checked="" type="checkbox"/> Other Sources

OVERVIEW OF TECHNOLOGY

Artemis DF-200 is an aqueous-based decontaminant that can rapidly neutralize highly toxic chemical and biological materials. The formulation 1) is effective for killing pathogenic organisms including vegetative and spore-forming bacteria, viruses, and fungi, 2) is effective for neutralizing highly toxic chemicals including chemical warfare agents, toxic industrial chemicals, drugs of abuse (i.e., Fentanyl and Methamphetamine), and others, 3) utilizes very mild ingredients that gives it very low toxicity and corrosivity properties, and 4) can be deployed as a foam, liquid spray, or fog on a wide variety of materials and surfaces. The formulation is licensed by Artemis BIO-SOLUTIONS, LLC from Sandia National Laboratories where it was developed through funding provided by the US Government to decontaminate chemical and biological warfare agents for military and homeland security applications. The DF-200 formulation, which has been extensively evaluated at numerous government and private facilities and in many field applications – outperforming formulations that contain much harsher chemicals. Artemis DF-200 is identical to the DF-200 formulation developed at Sandia National Laboratories.

PERFORMANCE

- Designed to neutralize the effects of chemical warfare (CW) agents GA, GB, GD, GF, HD, VX, and FGAs, biological warfare (BW) agents such as *Bacillus anthracis* (i.e., anthrax), *Yersinia pestis* (i.e., plague), toxic industrial chemicals (TICs), as well as other toxic materials such as Fentanyl and Methamphetamine.
- Effective on a broad spectrum of materials including metal, painted metal, carpet, tile, glass, varnished and unvarnished wood, plastics, and more.

DEPLOYMENT

- Can be deployed using small-scale, medium-scale, or large-scale foamers, sprayers or foggers.
- 1 gallon of Artemis DF-200 can decontaminate up to 400 square feet of surface area.
- Artemis DF-200 is packaged in three pre-measured liquid components which are mixed 49% Part 1, 49% Part 2 and 2% Part 3 together for use.
- Ready to use within seconds after mixing the three parts together. Can be used for up to six hours after mixing the three parts together.
- Five-year shelf life. Should be stored from 25°F to 110°F.





PRODUCT DESCRIPTION

PRODUCT DESCRIPTION: Artemis DF-200 is an aqueous-based decontaminant that can rapidly neutralize highly toxic chemical and biological materials. The formulation 1) is effective for killing pathogenic organisms including vegetative and spore-forming bacteria, viruses, and fungi, 2) is effective for neutralizing highly toxic chemicals such as chemical warfare agents (e.g., GA, GB, GD, GF, HD, VX, and FGAs), 3) utilizes very mild ingredients that gives it very low toxicity and corrosivity properties, and 4) can be deployed as a foam, liquid spray, or fog on a wide variety of materials and surfaces. The formulation is licensed by Artemis BIO-SOLUTIONS, LLC from Sandia National Laboratories where it was originally developed to decontaminate chemical and biological warfare agents for military and homeland security applications. Artemis DF-200 is identical to Sandia DF-200 and contains surfactants (i.e., detergents), mild solvents, inorganic salts, a low concentration of hydrogen peroxide (~3.5%), a hydrogen peroxide activator, and water. The surfactants in Artemis DF-200 solubilize toxic chemicals bringing them into contact with the multiple reactive species for neutralization. The surfactants also soften the cell walls of biological pathogens which allows the activated peroxide to penetrate to the interior for complete kill. This unique combination of mild ingredients works synergistically to neutralize highly toxic chemicals and to kill persistent biological pathogens which has been demonstrated in testing at numerous government and private facilities and in many field applications – outperforming formulations that contain much harsher chemicals.

DF-200 (both from Sandia National Laboratories and from commercial sources such as Artemis BIO-SOLUTIONS) has been extensively used in real-world applications. Most notably, it was deployed by US CENTCOM in Iraq and Afghanistan during the armed conflicts in those countries following 9/11. It has also been used in biological clean-up efforts, by National Guard CSTs for decontamination of PPE, for fentanyl neutralization by first responders and clean-up services, for methamphetamine remediation, and for many other applications.

INTENDED USERS: Military, National Guard, First Responders, Homeland Security, and other security forces. Clean-up and restoration services and agencies.

APPLICATIONS: Decontamination of vehicles, indoor and outdoor building materials, outdoor surface materials, personal protective equipment, and more.

SOP'S, SDS'S, AND USER MANUALS: These materials are available upon request by contacting sales@eds-ny.com or (631) 563-2744.



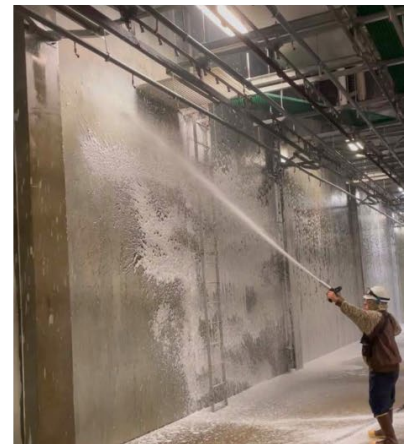


ARTEMIS DF-200

ACCESSORIES/COMPONENTS: Small, medium, and large-scale deployment equipment is available by contacting sales@eds-ny.com or (631) 563-2744. An example of a large-scale deployment device for Artemis DF-200 is the Artemis Foam Cannon. A performance summary for this deployment equipment is shown below:



Artemis Foam Cannon Technical Specifications	
Artemis DF-200 Capacity	100 gallons
Operating Pressure	90 psi
Standard Operating Range	100 feet
Optional Extended Operating Range	300 feet
Foam Deployment Range	~70 feet
Estimated Fill Time	2 minutes
Run Time Until Empty	15 minutes
Foam Coverage per Full Tank	~400,000 sf



APPLICATION RATE: 1- gallon of Artemis DF-200 can effectively decontaminate up to 400 square feet of surface area.

STORAGE: Should be stored in an enclosed area, away from sunlight, with temperatures between 25°F and 110°F.

SHELF LIFE: 5-year shelf life when stored under the recommended conditions.

HEALTH/SAFETY/ENVIRONMENTAL: Artemis DF-200 is safe to use. Chemical protective clothing and protective eye goggles should be worn during deployment to prevent skin and eye exposure which can cause irritation but not long-term damage. Artemis DF-200 is considered to be inherently biodegradable. In most cases, it can be discharged to the sewer system, but local regulations may apply.

TRAINING: Minimal training is required to deploy the Artemis DF-200 product. Training is available upon request by contacting sales@eds-ny.com.

TECHNICAL SUPPORT: Technical support is available by contacting sales@eds-ny.com.



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PERFORMANCE SUMMARY

The following data shows the performance of Artemis DF-200 against chemical warfare agents, biological warfare agents, and other toxic materials. The data that is shown below was generated from both the Sandia DF-200 formulation and the Artemis DF-200 product. Artemis DF-200 is identical to Sandia DF-200.

Recommended Contact Times:

Agent	Contact Time (Minutes)	Neutralization Mechanism
Nerve Agents (G)	1-10	Hydrolysis
Nerve Agents (V)	10-15	Breakage of P-S Bond
Vesicants (HD)	10-15	Oxidation
Anthrax Spores	10-15	Killed Organisms
Bacteria, Viruses, Fungi	1-10	Killed Organisms

Application Rate: 1 gallon of DF-200 Liquid per 400 square feet of contaminated surface
Challenge Level (CW): 1 g of agent per square meter.
Challenge Level (BW): 10⁷ organisms per square centimeter.

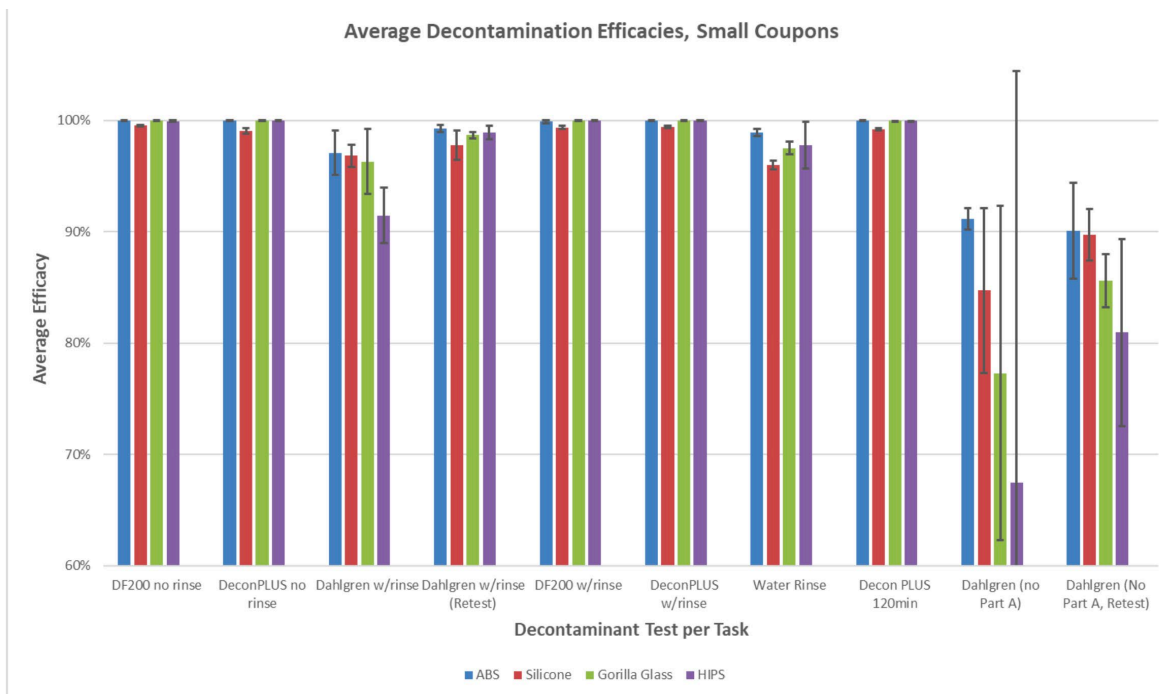
Chemical Agent Neutralization:

Decontaminant	GD			VX			HD		
	1 min.	30 min.	60 min.	1 min.	30 min.	60 min.	1 min.	30 min.	60 min.
DS2	100	-	100	100	-	100	100	-	100
DF-200 (Sandia Decon Foam)	100	100	100	99	100	100	97	100	100

Percent decon of live agents in reactor studies at the Edgewood Chemical and Biological Center (ECBC). The challenge ratio was 50:1. Complete destruction of GD within 1 minute, VX within 10 minutes, and HD within 30 minutes. US Department of Defense test data.



Fourth Generation Chemical Warfare Agent (FGA) Neutralization:



Neutralization of the Fourth Generation Agent, A-234, on test coupons representing sensitive equipment materials by various decontaminants. Sandia DF-200 outperformed other decontaminants such as Dahlgren Decon and Decon PLUS. Tests conducted under the direction of the US Environmental Protection Agency. See report reference below.

Decon	Material	Sample Type	Mean	STDEV	RSD	Efficacy
			[mg]	[mg]	[%]	[%]
DF-200	ABS	Positive Controls	2.2	0.037	1.7	99.98 ± 0.01
		Test Coupons	0.00040	0.00015	39	
	Silicone	Positive Controls	2.2	0.070	3.2	99.53 ± 0.05
		Test Coupons	0.010	0.0010	10	
	Gorilla Glass	Positive Controls	2.2	0.014	0.64	99.99 ± 0.01
		Test Coupons	0.00023	0.00012	51	
HIPS	Positive Controls	2.2	0.067	3.1	99.94 ± 0.04	
	Test Coupons	0.0013	0.00082	65		

Neutralization of the Fourth Generation Agent, A-234, by Sandia DF-200 on test coupons representing sensitive equipment materials. Tests conducted under the direction of the US Environmental Protection Agency. See report reference below.





Biological Agent Neutralization (*Bacillus anthracis* spores):

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

Kill of *Bacillus anthracis* spores (i.e., the causative agent of anthrax) in Sandia DF-200. Tests conducted by the US Department of Defense. Note: Artemis DF-200 is not registered as a sporicide by the US Environmental Protection Agency.

Neutralization of Toxic Industrial Chemicals (TICs):

TIC	Residual Measured In:	% Decontaminated		
		1 Minute	15 Minutes	60 Minutes
Malathion	Liquid	89	95	Below Detection
Hydrogen Cyanide	Headspace	96	95	96
Sodium Cyanide	Liquid	93	98	>99
Butyl Isocyanate	Liquid	99	Below Detection	Below Detection
Carbon Disulfide	Liquid	>99	>99	Below Detection
Phosgene	Headspace	98	>99	>99
Capsaicin	Liquid	Below Detection	Below Detection	Below Detection
Anhydrous Ammonia	Headspace	>99	>99	>99

TIC neutralization by DF-200. The challenge ratio was 200:1 for most TICs on a weight/volume basis [except: HCN (1:1); anhydrous ammonia (~2:1); butyl isocyanate (250:1)]. Results were determined by GC and GC/MS. Tests were conducted at Sandia National Laboratories.

Fentanyl Neutralization:

Test	Spike Mass (mg)	Artemis DF-200 Volume (ml)	Decon Time (Minutes)	% Destruction (Average of 3 Samples)
Fentanyl Liquid	0.5	5	15	99.98
Fentanyl Liquid	0.5	5	30	99.98
Fentanyl Liquid	0.5	5	60	99.98
Fentanyl Solid	5	50	15	99.98
Fentanyl Solid	5	50	30	99.97

Neutralization of Fentanyl Citrate by Artemis DF-200. Tests conducted by MRI Global (see report reference below).





Methamphetamine Neutralization:

Test	Spike Mass (mg)	Artemis DF-200 Volume (ml)	Decon Time (Minutes)	% Destruction (Average of 3 Samples)
Methamphetamine Liquid	0.5	5	60	99.1
Methamphetamine Liquid	0.5	5	120	99.4
Methamphetamine Solid	5	50	15	98.1
Methamphetamine Solid	5	50	30	98.7

Neutralization of Methamphetamine Hydrochloride by Artemis DF-200. Tests conducted by MRI Global (see report reference below).

Sandia DF-200 is considered to be effective for the neutralization of Ricin by the US Department of Defense but this data has not been made available. Because Artemis DF-200 is identical to Sandia DF-200, it is expected to achieve the same neutralization results.

COST INFORMATION

Please contact sales@eds-ny.com or (631) 563-2744 for the latest sales information, packaging options, and costs.

REFERENCES AND ADDITIONAL INFORMATION

MRIGlobal, Decon Force 100 Drugs of Abuse Decontamination Efficacy: Final Report, MRIGlobal Project No. 311921, February 9, 2024.

US Environmental Protection Agency, Decontamination Options for Sensitive Equipment-related Materials Contaminated with a Fourth Generation Agent (FGA), EPA/600/R-22/164, September 2022.

US Patent and Trademark Office, Formulations for neutralization of chemical and biological toxants, US Patent 6,566,574, May 2002.



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