

DECON • TECT

TECHNICAL BRIEF: WHY MIXING MATTERS

BACKGROUND

The history of decontamination can be traced back to World War I when chemical warfare was first introduced on a large scale. As years have passed and threats have changed, so has the hazardous decontamination industry. It has become increasingly important that the next generation of decontamination capabilities provide revolutionary advancements to more effectively neutralize chemical threats with faster reaction times.

Though we have come a long way from degassing trucks, which were among the first decontamination apparatuses introduced in the early 1900's, one thing remains true:

Decontamination chemistries need to be thoroughly mixed to yield 100% efficacy¹. This is true of all decontamination solutions – Dahlgren Decon, DF200, and even traditional bleach-based products – because mixing truly activates each products' active ingredients.

Why Mixing Matters

The practice of mixing components together to yield an effective end product is not unique to hazardous materials decontamination.

Think of mixing cement. The water to cement ratio largely determines the strength and durability of the concrete when poured properly.

Think of baking a cake. The order in which you combine the ingredients – eggs, margarine, flour, etc. – determines the quality of the end product.

Mixing matters.

When it comes to decontamination, for example, the active ingredient in DF200 is hydrogen peroxide (Part A). This component is known to be very corrosive at full concentration. Without proper mixing, DF200 would degrade any material it was applied to rather than effectively decontaminating them with minimal degradation.

Similarly, Dahlgren Decon uses peracetic acid (PAA) as its active ingredient. Part A of the formulation is a powerful surfactant microemulsion. Additional parts B1 and B2 include a pH buffer and a solid form of PAA, respectively. Once mixed, the end formulation yields a concentration of 4.8% PAA in-situ within one minute.

Moreover, mixing a decontaminant such as Dahlgren Decon does not just generate a liquid solution that is easier to apply, mixing activates the active ingredient (PES-Solid). Broad spectrum oxidants, such as bleach, hydrogen peroxide, or peracetic acid, are activated upon dilution. Mixing on-site and immediately prior to use assures the active ingredient is applied in its most active state and concentration.

Mixing doesn't just apply to "customized" decontamination solutions. Even common bleach products need to be brought to the proper concentration to reduce corrosiveness and enhance efficacy. This is why the end user is instructed to blend water with bleach in order to create an effective less-corrosive decontamination solution.

Not Worth the Risk

Bleach is an inexpensive cleaner, however the risks associated with flawed preparation, ineffective application and insufficient contact time far outweigh the cost and ease of purchase. Combine this with the potential that off-the-shelf bleach products may be dated, stored or transported improperly to adequately assess the risk.

Purchasing a pre-packaged decontamination solution in a pressurized spraying device indicates you have substandard chemistry. Modern systems have chemistries that should not be pre-mixed.

This is not to say that sprayers are an ineffective decontamination vehicle. However, pressurized pre-packaged systems may have harsh and corrosive properties when deployed. State of the art decontamination solutions are designed to be mixed to allow maximum-strength chemistry to be used.

Key Takeaway

Decontamination is more than rinsing, scrubbing and rinsing. Effective decontamination solutions are carefully designed and balanced systems. It behooves responders to examine their present decontamination approach, employ best practices and better prepare to ensure effective decontamination. Effective decontamination chemistries were designed to be mixed for full efficacy.

¹ Sandia National Laboratory (DF200) and the U.S. Navy (Dahlgren Decon) acknowledge decontamination solutions need to be mixed on-site prior to application to ensure maximum effectiveness