

Chemists Create Foam To Fight Nerve Gases

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By MALCOLM W. BROWNE

By combining ingredients of hair-conditioning creams and toothpaste, Government chemists have created a foam that they say could neutralize many of the chemical poisons and disease-causing microbes that might be spread by terrorists in confined spaces.

Chemists at Sandia National Laboratories in Albuquerque, N.M., reported in recent papers that they had developed and tested a foam that in a matter of minutes rendered harmless a wide variety of chemical and biological agents, including nerve and mustard gases, and disease viruses and bacteria, including anthrax.

Dr. Maher E. Tadros of Sandia, who with Dr. Mark Tucker invented the foam, said in an interview that it would be especially effective in a building after a terrorist attack.

"A shot of nerve gas or anthrax bacillus on, say, the 22d floor of the Empire State Building, could be confined to the point of release and neutralized within an hour," Dr. Tadros said. Unlike other protective sprays, he said, the foam would leave no dangerous residue and would not harm most office materials.

Sandia's foam could be dispensed as a spray or fog in more open environments. The laboratory said it was working with the New York and Washington subway systems and several airports as places where foam dispensers might initially be deployed.

People whose skin was touched by even a droplet of nerve agent could not be saved by the foam, which would be useful only in decontaminating spaces or the outer surfaces of protective suits worn by rescue personnel. Nerve agents penetrate the skin and kill quickly.

The foam has already been tested at Sandia against harmless chemicals with compositions very similar to those of nerve and mustard gases, and has been tested against real nerve and mustard gases at the Illinois Institute of Technology Research in Chicago. In these tests, the Sandia laboratory reported, the chemical agents were reduced in quantity by one-half every 2 to 10 minutes. After one hour, the poisons were reduced to negligible amounts.

Tests of the foam against real anthrax microbes will be carried out soon by the Illinois institute, but meanwhile Sandia has conducted tests using harmless *Bacillus globigii*, a spore-forming bacterium very



Sandia National Laboratories

Dr. Maher E. Tadros with foam that can make chemical and biological weapons harmless.

similar to anthrax. After one hour of exposure to the foam, only one spore out of 10 million of the anthrax-like test bacteria remained alive.

The main ingredients of the foam are surface-active agents like the wetting agents in hair conditioners, and oxidizing agents of the kinds used in toothpaste, including mixtures of sodium bicarbonate and hydrogen peroxide. A foam is created by forcing a cocktail of these ingredients through a venturi nozzle that draws in air to form a myriad of tiny bubbles that support a stiff, long-lasting foam.

Ideally, Dr. Tadros said, foam dispensers could be combined with a building's sprinkler system.

The effect of the foam on the toxic agents like sarin, soman and tabun, among others, is to split the chemical bonds constituted in these substances by phosphates or sulfides, causing the poisonous molecules to fall apart into harmless fragments, the Sandia report said.

Sandia scientists said they had not yet explained the efficient destruction of bacterial spores by the foam. But they said the foam might work by breaching the protein walls that ordinarily protect spores, allowing oxidizing agents to enter and kill them.