



Anti-Chemical Warfare

Chemical warfare agents, as defined by the United National Chemical Weapons Convention, are "any chemical which, through its chemical effect on living processes, may cause death, temporary loss of performance, or permanent injury to people and animals". Chemical warfare agents can belong to many different groups such as vesicants, blood agents, and nerve gases. Vesicants include mustard gases, which cause blistering of skin, eyes, and lungs. Hydrogen cyanide is an example of a blood agent, which when inhaled causes death by preventing normal utilization of oxygen. Nerve gases such as sarin eventually cause loss of motor control and death due to the inhibition of the enzyme that prevents the build up of acetylcholine, and acetyl cholinesterase. Due to the variety of chemical warfare agents and their modes of dispersal different types of detectors have been developed.

Chemical agent detectors made of paper were created about 20 years ago. These detectors are useful because they allow the detection and identification of airborne chemical warfare agents. The paper is impregnated with different dyes sensitive to specific families of liquid chemical warfare agents. It is then attached to clothing or equipment for rapid and easy detection of contamination. When airborne droplets from the chemical agent contact the paper a colour change takes place which identifies the agent.

The dyes used enable the detection of three types of chemical agents; H-type (mustard gas), V-type (nerve gas toxic when inhaled), and G-type (nerve gas toxic when absorbed by the skin). Each dye turns a different colour (red, yellow, or green) and is not masked by the colour of the paper.

Unfortunately, the dyes used for the detection of the two types of nerve gases (yellow and green) have been found to be mutagenic. As a result, the Canadian Department of National Defense has developed three new dyes to detect the chemical agents. Before the dyes can be used they must fit the following criteria: insolubility in water, solubility in the chemical agent and must be a solid during the paper drying process. Other chemical agents may be present on the battlefield; therefore, it is desirable that the dye used is also insoluble in liquids such as petroleum products, antifreeze solutions, and alcohol solutions. Most importantly, the dyes must be non-mutagenic and give the correct strong colour upon reaction with the chemical agent droplets.

Another type of chemical agent detector is a CAM (chemical agent monitor) which was used by the Canadian Forces during the Persian Gulf War. CAMs are hand held detectors that are used for real-time monitoring of mustard and nerve vapours in chemically contaminated environments. The CAMs detects the chemical agent by drawing air across a heated silicon membrane which preferentially allows chemical warfare agents to pass through into the analysis area. However, these detectors can not give advance warning to an off-site chemical incident. Consequently, the Defense Research Establishment Suffield (DRES), in Medicine Hat, Alberta, developed the

CADS (chemical agent detection systems). The CADS are CAMs linked by cable over distances to a central computer. This system allows for early detection of chemical warfare agents and consequently, sounds an alarm to warn the people. This system was also developed for the Canadian Forces in the Persian Gulf War.

Paper detectors, CAMs, and CADS help with the detection of chemical agents but fast and efficient methods for decontamination are needed if the agents come into contact with the skin as nerve agents can cause death in five minutes if sufficient quantities are absorbed by the skin. Consequently, DRES has developed a lotion which is fast acting, easy to apply and remove but effective in destroying chemical warfare agents.