Teaching Military Chemistry to Future Leaders at West Point

By Major Andrew Novitske

On today's battlefield, Soldiers are faced with an ever-increasing array of potentially lethal chemicals. There is always the possibility that an Iraqi chemical round may find its way into the hands of an insurgent and be used in an improvised explosive device.

However, the threat may not be a chemical weapon at all; it may just be a plain, old industrial chemical.

When in Iraq, my unit encountered a farmer who used benzene to clean engine parts. If this farmer had known about the carcinogenic properties of benzene, he may have used another solvent to shine the parts and make them grime-free. In addition, my unit in Iraq was tasked to decontaminate part of a fertilizer plant that had been abandoned, but the machines were still on and making a portion of the product. In one area of the plant, there was a pool of standing solution that needed to be neutralized and cleaned up. These examples show that, now more than ever, a basic understanding of chemistry is critical. Young leaders are in a constantly evolving operational environment where they need to be skilled in chemistry to make sound and timely analytical decisions.

As part of the core curriculum at the U.S. Military Academy (USMA), West Point, New York, each cadet must take at least one year of general chemistry from the Department of Chemistry and Life Science. The department's mission is to "develop in cadets: a firm foundation in physical science, investigative techniques, and problem-solving skills essential to their understanding and awareness of the relationships between science and society." One way the department accomplishes this mission is through an event called the Military Chemistry (MILCHEM) Lecture. The objective of the MILCHEM Lecture is to fuse what cadets have learned in the classroom with what is happening with real military units in current operational environments around the world.

The lecture is held in early December, during the week just before the Army-Navy football game. It is meant to be a fun and exciting time that gets the cadets fired up for the game and teaches them about relevant, real-world applications of chemistry. Many demonstrations use Navy paraphernalia as cannon fodder. For example, the combustive properties of nitrocellulose (also known as gun cotton) are demonstrated by cutting a piece shaped like a goat (the U.S. Navy mascot) and

A member of the 1st CST explains how chemical detection equipment works.

setting it ablaze. The MILCHEM Lecture also gets the cadets out of the classroom and into an environment where they can hear other department instructors talk about the aspects of chemistry that appeal to them. A wide range of topics such as chemical detection, armor-piercing munitions, the science of reactive materials, liquid state body armor, hemostasis, and the science behind WoundStat[1] were explored during the last MILCHEM Lecture.

Because of my affiliation with the Chemical Corps, the chemical detection portion of the lecture was near and dear to my heart. That portion was developed by Captain Nathanial Watson (a field artillery officer), Dr. Cynthia Woodbridge (a physical chemist), and me. I was pleased to have the opportunity to show the plebe cadets that the chemistry they used throughout the semester was linked closely with what the Chemical Corps does on the battlefield every day.

During the chemical detection segment, we identified various types of detection equipment and corresponding platforms used by the Army and discussed the types of substances that could be detected by each piece of equipment. For tactical operations, we described the Stryker Nuclear, Biological, and Chemical Reconnaissance Vehicle (NBCRV); for domestic operations, we described the Mobile Analytical Laboratory System (MALS), which is used by our Nation's civil support teams (CSTs). Then, Chemical Soldiers from the 2d CST, Massachusetts, staged a typical detection and monitoring mission. They entered the lecture hall wearing protective gear, while a narrator detailed every move and discussed the chemical principles that were taking place inside the different pieces of equipment. For example, the concept of different types of ultraviolet radiation used to excite molecules in the photoionization detector was discussed. Animated slides showed radiation striking a molecule inside the machine, exciting the molecule and forcing it to eject an electron. The electrons were then monitored to help determine if certain types of radiation were present.

Soldiers from the 2d CST show cadets the proper techniques to identify chemical agents on the battlefield.

NBCRV and MALS vehicles on display in front of Bartlett Hall, West Point, New York

At the end of the lecture, cadets had the opportunity to get a close look at the equipment. An actual Stryker NBCRV from the U.S. Army Tank-Automotive and Armaments Command and a MALS were staged outside the lecture hall for cadets to explore. The 1st CST, New York, also set up static displays of chemical detection equipment, and cadets were able to see the equipment and get some hands-on experience with it.

The effort put forth by the staff and faculty of USMA; the U.S. Army Tank-Automotive and Armaments Command; 1st CST; 2d CST; Joint Project Manager–Nuclear, Biological, and Chemical; and U.S. Army Chemical, Biological, Radiological, and Nuclear School ensured that the MILCHEM Lecture was an educational and enjoyable learning event for the cadets.

Endnote:

[1]WoundStat is a hemostatic agent produced by TraumaCure, Inc. The Department of Defense recommends that all service members carry WoundStat for life-threatening bleeding.

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