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Chemical Warfare is Different from the Use of Conventional Weapons

Dr. Anil Kumar

Dept. of Chemistry, D.A.V. [P.G.] College, Dehradun, India

ABSTRACT: Chemical warfare (CW) involves using the toxic properties of chemical substances as weapons. This type of warfare is distinct from nuclear warfare, biological warfare and radiological warfare, which together make up CBRN, the military acronym for chemical, biological, radiological, and nuclear (warfare or weapons), all of which are considered "weapons of mass destruction" (WMDs), a term that contrasts with conventional weapons.

The use of chemical weapons is prohibited under customary international humanitarian law.[1]

KEYWORDS: chemical,warfare,weapons,destruction,prohibited

I. INTRODUCTION

The offensive use of living organisms (such as anthrax) is considered biological warfare rather than chemical warfare; however, the use of nonliving toxic products produced by living organisms (e.g. toxins such as botulinum toxin, ricin, and saxitoxin) is considered chemical warfare under the provisions of the Chemical Weapons Convention (CWC). Under this convention, any toxic chemical, regardless of its origin, is considered a chemical weapon unless it is used for purposes that are not prohibited (an important legal definition known as the General Purpose Criterion).[2]

About 70 different chemicals have been used or were stockpiled as chemical warfare agents during the 20th century. The entire class, known as Lethal Unitary Chemical Agents and Munitions, has been scheduled for elimination by the CWC.[3]

Under the convention, chemicals that are toxic enough to be used as chemical weapons, or that may be used to manufacture such chemicals, are divided into three groups according to their purpose and treatment:

- Schedule 1 – Have few, if any, legitimate uses. These may only be produced or used for research, medical, pharmaceutical or protective purposes (i.e. testing of chemical weapons sensors and protective clothing). Examples include nerve agents, ricin, lewisite and mustard gas. Any production over 100 grams (3.5 oz) must be reported to the Organisation for the Prohibition of Chemical Weapons (OPCW) and a country can have a stockpile of no more than one tonne of these chemicals.[1,2,3]
- Schedule 2 – Have no large-scale industrial uses, but may have legitimate small-scale uses. Examples include dimethyl methylphosphonate, a precursor to sarin also used as a flame retardant, and thiodiglycol, a precursor chemical used in the manufacture of mustard gas but also widely used as a solvent in inks.
- Schedule 3 – Have legitimate large-scale industrial uses. Examples include phosgene and chloropicrin. Both have been used as chemical weapons but phosgene is an important precursor in the manufacture of plastics, and chloropicrin is used as a fumigant. The OPCW must be notified of, and may inspect, any plant producing more than 30 tons per year.

Chemical weapons are divided into three categories:[4]

- Category 1 - based on Schedule 1 substances
- Category 2 - based on non-Schedule 1 substances
- Category 3 - devices and equipment designed to use chemical weapons, without the substances themselves

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II. DISCUSSION

Simple chemical weapons were used sporadically throughout antiquity and into the Industrial Age.[5] It was not until the 19th century that the modern conception of chemical warfare emerged, as various scientists and nations proposed the use of asphyxiating or poisonous gasses.

Multiple international treaties were passed banning chemical weapons based upon the alarm of nations and scientists. This however did not prevent the extensive use of chemical weapons in World War I. The development of chlorine gas, among others, was used by both sides to try to break the stalemate of trench warfare. Though largely ineffective over the long run, it decidedly changed the nature of the war. In many cases the gasses used did not kill, but instead horribly maimed, injured, or disfigured casualties. Some 1.3 million gas casualties were recorded, which may have included up to 260,000 civilian casualties.[6][7][8]

The interwar years saw the occasional use of chemical weapons, mainly to put down rebellions.[9] In Nazi Germany, much research went into developing new chemical weapons, such as potent nerve agents.[10] However, chemical weapons saw little battlefield use in World War II. Both sides were prepared to use such weapons, but the Allied Powers never did, and the Axis used them only very sparingly. The reason for the lack of use by the Nazis, despite the considerable efforts that had gone into developing new varieties, might have been a lack of technical ability or fears that the Allies would retaliate with their own chemical weapons. Those fears were not unfounded: the Allies made comprehensive plans for defensive and retaliatory use of chemical weapons, and stockpiled large quantities.[11][12] Japanese forces, as part of the Axis, used them more widely, though only against their Asian enemies, as they also feared that using it on Western powers would result in retaliation. Chemical weapons were frequently used against the Kuomintang and Chinese communist troops, the People's Liberation Army.[13] However, the Nazis did extensively use poison gas against civilians, mostly the genocide of European Jews, in The Holocaust. Vast quantities of Zyklon B gas and carbon monoxide were used in the gas chambers of Nazi extermination camps, resulting in the overwhelming majority of some three million deaths. This remains the deadliest use of poison gas in history.[14][15][16][17]

The post-war era has seen limited, though devastating, use of chemical weapons. During the Vietnam War, between 1962 and 1971, the United States military sprayed nearly 20,000,000 U.S. gallons (76,000 m^3) of various chemicals – the "rainbow herbicides" and defoliants – in Vietnam, eastern Laos, and parts of Cambodia as part of Operation Ranch Hand, reaching its peak from 1967 to 1969.[18] Some 100,000 Iranian troops were casualties of Iraqi chemical weapons during the Iran–Iraq War.[19][20][21] Iraq used mustard gas and nerve agents against its own civilians in the 1988 Halabja chemical attack.[22] The Cuban intervention in Angola saw limited use of organophosphates.[23] Terrorist groups have also used chemical weapons, notably in the Tokyo subway sarin attack and the Matsumoto incident.[24][25] See also chemical terrorism.

In the 21st century, Ba'athist regime in Syria has pursued a strategy of deploying chemical warfare against civilian populations, resulting in numerous deadly chemical attacks during the Syrian civil war.[26] The Syrian government has used sarin, chlorine, and mustard gas in the Syrian civil war – mostly against civilians.[27][28]

III. RESULTS

Although crude chemical warfare has been employed in many parts of the world for thousands of years,[29] "modern" chemical warfare began during World War I – see Chemical weapons in World War I.

Initially, only well-known commercially available chemicals and their variants were used. These included chlorine and phosgene gas. The methods used to disperse these agents during battle were relatively unrefined and inefficient. Even so, casualties could be heavy, due to the mainly static troop positions which were characteristic features of trench warfare.[20,21,22]

Germany, the first side to employ chemical warfare on the battlefield,[30] simply opened canisters of chlorine upwind of the opposing side and let the prevailing winds do the dissemination. Soon after, the French modified artillery munitions to contain phosgene – a much more effective method that became the principal means of delivery.[31]

Since the development of modern chemical warfare in World War I, nations have pursued research and development on chemical weapons that falls into four major categories: new and more deadly agents; more efficient methods of delivering agents to the target (dissemination); more reliable means of defense against chemical weapons; and more sensitive and accurate means of detecting chemical agents.[17,18,19]

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The chemical used in warfare is called a chemical warfare agent (CWA). About 70 different chemicals have been used or stockpiled as chemical warfare agents during the 20th and 21st centuries. These agents may be in liquid, gas or solid form. Liquid agents that evaporate quickly are said to be volatile or have a high vapor pressure. Many chemical agents are volatile organic compounds so they can be dispersed over a large region quickly.[

The earliest target of chemical warfare agent research was not toxicity, but development of agents that can affect a target through the skin and clothing, rendering protective gas masks useless. In July 1917, the Germans employed sulfur mustard. Mustard agents easily penetrate leather and fabric to inflict painful burns on the skin.

Chemical warfare agents are divided into lethal and incapacitating categories. A substance is classified as incapacitating if less than 1/100 of the lethal dose causes incapacitation, e.g., through nausea or visual problems. The distinction between lethal and incapacitating substances is not fixed, but relies on a statistical average called the LD_{50}.

Chemical warfare agents can be classified according to their persistency, a measure of the length of time that a chemical agent remains effective after dissemination. Chemical agents are classified as persistent or nonpersistent.

Agents classified as nonpersistent lose effectiveness after only a few minutes or hours or even only a few seconds. Purely gaseous agents such as chlorine are nonpersistent, as are highly volatile agents such as sarin. Tactically, nonpersistent agents are very useful against targets that are to be taken over and controlled very quickly.[12,13,15]

Apart from the agent used, the delivery mode is very important. To achieve a nonpersistent deployment, the agent is dispersed into very small droplets comparable with the mist produced by an aerosol can. In this form not only the gaseous part of the agent (around 50%) but also the fine aerosol can be inhaled or absorbed through pores in the skin.

Modern doctrine requires very high concentrations almost instantly in order to be effective (one breath should contain a lethal dose of the agent). To achieve this, the primary weapons used would be rocket artillery or bombs and large ballistic missiles with cluster warheads. The contamination in the target area is only low or not existent and after four hours sarin or similar agents are not detectable anymore[9,10,11]

By contrast, persistent agents tend to remain in the environment for as long as several weeks, complicating decontamination. Defense against persistent agents requires shielding for extended periods of time. Nonvolatile liquid agents, such as blister agents and the oily VX nerve agent, do not easily evaporate into a gas, and therefore present primarily a contact hazard.

The droplet size used for persistent delivery goes up to 1 mm increasing the falling speed and therefore about 80% of the deployed agent reaches the ground, resulting in heavy contamination. Deployment of persistent agents is intended to constrain enemy operations by denying access to contaminated areas.

Possible targets include enemy flank positions (averting possible counterattacks), artillery regiments, command posts or supply lines. Because it is not necessary to deliver large quantities of the agent in a short period of time, a wide variety of weapons systems can be used.

A special form of persistent agents are thickened agents. These comprise a common agent mixed with thickeners to provide gelatinous, sticky agents. Primary targets for this kind of use include airfields, due to the increased persistency and difficulty of decontaminating affected areas.

IV. CONCLUSIONS

In June 1997, India declared that it had a stockpile of 1044 tons of sulphur mustard in its possession. India's declaration of its stockpile came after its entry into the Chemical Weapons Convention, that created the Organisation for the Prohibition of Chemical Weapons, and on January 14, 1993, India became one of the original signatories to the Chemical Weapons Convention. By 2005, from among six nations that had declared their possession of chemical weapons, India was the only country to meet its deadline for chemical weapons destruction and for inspection of its facilities by the Organisation for the Prohibition of Chemical Weapons.[27,28,29] By 2006, India had destroyed more than 75 percent of its chemical weapons and material stockpile and was granted an extension to complete a 100 percent destruction of its stocks by April 2009. On May 14, 2009, India informed the United Nations that it has completely destroyed its stockpile of chemical weapons.[29]

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