

# Terrorism at Rise with the Chemicals Insight: Use of Chemical Warfare Agents an Issue of Global Concern

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## Abstract

Crime has led to a worldwide increase with a main weapon of offence including not only a physical object but show the incidences of involvement of chemicals also. Chemical warfare agents are one such example commonly employed by large group of people, mainly violent criminals who not only wants to create a terror or threat in the world but to cause war scale destruction. There are numerous of incidents reported from past showing the involvement of hazardous chemicals for committing crimes. Chemical Warfare Agents (CWA) are synthetic chemicals used in the warfare as weapons, which are highly toxic and lethal to the extent that can cause temporary incapacitation, permanent health damage and even death of the targets. Common examples of these agents are nerve agents, vesicants, incapacitating agents, blood agents, and riots control agents. These agents are variedly classified as per the above mentioned categories depending onto the effects and adverse effects they poses on human health and on society.

The rate of crime commission using these hazardous agents is very rapid, thus making it an issue of serious concern to take the measures to prevent the innocent individuals.

**Keywords:** Chemicals; Chemical Warfare Agents; Destruction; Hazardous; Weapons.

## INTRODUCTION

Crime has increased tremendously in the world day by day, with the major target either being a single individual or sometimes the entire population. The usual trends seen in the crime are generally murder, assaults, burglary, etc.

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committed using any particular weapon of offence but when the crime has occurred at a global level it targets the entire country. Such crimes has been put forth via chemicals commonly known as chemical warfare agents to cause devastation at a large scale. For example, the bombings occurred at the World Trade Centre, Oklahoma City's Federal Building, Nerve gas attacks in Japan etc. reveals the attacks of terrorism in different parts of the world. The history is full of such terrorist attacks (anthrax attack etc.), taken place by the widespread use of extremely hazardous chemicals termed as chemical warfare agents. The threat of chemical weapons has spread from the battlefield to cities and towns due to the threat of international terrorism.<sup>1</sup>

The FBI has defined terrorism as the unlawful

use of force or violence against persons or property to intimidate or coerce a government, civilian population, or any segment thereof, to furtherance of political or social objectives (FBI, 2003). The first large scale chemical terrorism incident occurred in the United States in 1982 (Cooke, 2002). Seven relatively young people in the Chicago, Illinois area collapsed suddenly and died after taking Tylenol capsules that had been laced with 65–100 mg cyanide per capsule.<sup>7</sup>

Chemical Warfare Agents (CWA) are synthetic chemicals used in the warfare as weapons, which are highly toxic and lethal to the extent that can cause temporary incapacitation, permanent health damage and even death of the targets. These are fast acting substances generally classified based on the harassing, incapacitating and lethal effects produced. Nowadays, the chemicals most commonly used for causing destruction at a large scale involves chlorine, mustard or nerve agents because of their invisible property, extreme potent and high toxic nature.<sup>5</sup>

These agents were synthesized for the first time during First World War, with the use of chlorine gas. Later, the discovery occurred at a fast pace that a variety of other gases such as sulphur, mustard etc. were also used for causing mass level destruction. During 1930's various military forces across the world were actively synthesizing Organophosphorus pesticides that can be used as nerve agents.<sup>7</sup>

The use of these CWAs is not a new thing as various incidents from the history reported (Iran-Iraq War in the 1980's, 1995 Tokyo subway attack) the attacks and casualties resulting from therein due to the use of these hazardous chemicals. The current conflicts between in Syria is also deemed to have seen the use of these chemicals in a number of incidents that have resulted in numerous deaths and long term health effects among the victims.<sup>3</sup>

There has been numerous of incidences indicating the use of chemical warfare agents not only in India but across the globe. For instance, Kim Jong Nam, a native of North Korea was killed in February by smearing the nerve agent VX on his face at Kuala Lumpur airport terminal, Malaysia. Similarly another incident witnessed the death and disfigurement of several individuals including children in Khan Sheikhoun town in the North-western Idlib Governorate in Syria by the attack of nerve agent in April which is similar to the chemical attack occurred in August 2013 in Ghouta that killed over a hundred people near Damascus, Syria's capital.

Another incident reported the death of former Russian spy and his daughter due to poisoning with the extremely hazardous nerve agent in 2018 at south west England, near the town of Salisbury in Amesbury. On July 8, 2018, a 44-year-old British woman was also died due to exposure to a highly toxic nerve agent in extremely high amount at the same place.<sup>5,6</sup>

In asymmetric warfare and terrorism, it is sometimes difficult to recognize or identify the enemy. Because terrorists may avail themselves of toxic industrial chemicals and materials that are transported and already stockpiled, a working knowledge of the chemistry of chemical warfare agents is no longer a necessity. It is important to recognize that the advances in biotechnology, nano technology, genetic engineering, neurobiology, computer sciences among others, may assist not only in the proliferation of traditional chemical warfare agents, but also stimulate the emergence of non-traditional agents as well. Advances have also occurred in the delivery systems of these agents.<sup>8</sup>

The rise of terrorism and the conditions of war has led to a great increase in the production of these harmful disastrous chemical weapons. For instance, the present day situation of War between India and China, China and Tanzania and many other countries may increase the chances of employing these harmful chemicals which leads to large scale destruction. Not only this the use of these harmful chemicals is becoming so prevalent in every war situation by many countries that in India recommendation are made by parliamentarians that "all kinds of war in future may be fought using NBC (Nuclear, Biological and Chemical) weapon systems" and an adequate budgetary provision needs to be earmarked for Research and Development efforts of the DRDO or the Defence Research and Development Organization in the field of NBC warfare for thereof.<sup>4</sup>

## TOXIC PROPERTIES

The susceptibility to the effects of these chemicals depends mainly on the dose and time of exposure and individual health circumstances. These CWAs exist mostly in the form of liquids or solid particles and usually disseminated in the environment as aerosols so as to make them spread in the form of a pure substance in solid or liquid form consisting of colloidal solid or liquid particles suspended in water or other solvents. These aerosol particles remains in the air for an indefinite period of time

and thereby make entry into the body of the target.<sup>8</sup>

## TYPES OF CHEMICAL WARFARE AGENTS

*These are of majorly five types*

- a. **Riot-Control Agents (RCAs):** These are the chemicals that rapidly cause irritation on exposure of all oronasal and conjunctiva mucosal tissues and respiratory tract. These agents typically cause disabling effects, temporary pain and discomfort. Examples Pepper spray and tear gas are the well known riot control agents used by military and law enforcement personnel. The active chemical present in pepper spray consists of oleoresin capsicum (OC), a mixture of naturally occurring substances extracted from capsicum plants like chili peppers, cayenne pepper, red peppers and jalapenos containing the main irritant capsaicin which is a colourless solid irritant. Similarly tear gas consists of ortho-chlorobenzylidene-malononitrile (CS), as the main component specifically affects the peripheral and sensory nerve endings of the mucous membranes and skin, causing irritation and intense pain. Irritation and burning sensation in the nose and mouth followed by salivation and excessive nasal discharge are also among the most common symptoms. Maximum effects occur within 20-60 seconds after exposure and can persist for 5-10 minutes.
- b. **Incapacitating agents:** These are the mind-altering chemicals also referred to as 'psychochemicals', causing mental disability, disorientation and make the target incapable of performing normal functioning. Dizziness, giddiness, sedation, respiratory depression, restlessness, mental confusion etc. are the most common symptoms appeared. The symptoms last from few hours to few days. Common example includes Fentanyl, lysergic acid diethylamide (LSD-25), and 3-quinuclidinyl benzilate (BZ).
- c. **Blood agents:** Blood agents are the most toxic gaseous chemicals containing cyanide as the main component which gets readily absorbed into the bloodstream via inhalation. These agents interfere with cellular respiration, and block the uptake of oxygen. This oxygen stoppage will make the cyanide compounds to proliferate rapidly and causing the body to suffocate and asphyxiate. Common examples of blood agents are hydrogen cyanide (HCN) and cyanogen chloride (CICN). The exposure time is almost 30 seconds resulting in loss of consciousness apnoea within 3-5 minutes, violent seizures and cessation in cardiac activity due to loss in respiration control. The continuous exposure for about 5 to 8 minutes will eventually leads to death.
- d. **Vesicants:** Vesicants are the chemicals also known as blister agents because of their ability to affect skin and tissues and thereby causing burns or blisters upon contact. These agents are not usually lethal until exposure occurs in higher doses, although a piercing pain is felt immediately after the contact. Common examples are mustards, lewisite and phosgene oxime etc. Out of these mustard is considered to be highly toxic and extremely poisonous with an LD50 of 7g/person to the skin, and exposure to as little as one gram via inhalation can cause death within 30 minutes.
- e. **Choking Agents:** These are other weapons of this category also referred to as respiratory agents, due to their ability to target mainly the respiratory tract, specifically nose, throat, and the lungs. These agents have the tendency to cause damage to the membranes between the air sac of lungs upon inhalation and thereby causing difficulty in breathing and ultimately lung damage. Due to the effects of these lethal chemicals the lung membranes gets filled with the fluid, leading to pulmonary edema and respiratory failure. Common examples of choking agents include phosgene ( $\text{COCl}_2$ ), diphosgene, chlorine ( $\text{Cl}_2$ ) and chloropicrin ( $-\text{CCl}_3\text{NO}_2$ )
- f. **Nerve Agents:** These are the most widely used chemicals for destruction purposes. These are chemically known as organophosphoric acid esters or organophosphorous compounds, which inhibit the activity of the enzyme responsible for normal muscle and glandular function i.e. acetylcholinesterase. The major effects will be on skeletal muscles, certain organs, and the central nervous system. These compounds are similar to, but much more deadly than, agricultural organophosphate pesticides. These nerve agents halts the functions of this acetylcholinesterase, resulting in an accumulation of acetylcholine at the nerve endings which will affect the nerve impulses from the nervous system resulting in an involuntary and uncoordinated muscle movements. Although Nerve Agents are hazardous through inhalation, skin and eye exposure, ingestion, and abraded skin (e.g.,

breaks in the skin or penetration of skin by debris).

*Nerve agents are broadly classified into two types:*

- **G Series:** are organophosphate esters containing fluorine or cyanide compounds first manufactured by Germans as insecticides. These chemicals sooner recognised as potential chemical warfare agents with a 'faintly fruity' or 'spicy odour'. In 1936 the first nerve agent i.e. 'Tabun' was synthesised. This discovery was followed by Sarin in 1939 and Soman in 1944, the other well known and highly potent nerve agents. The lesser known Cyclosarin (GF) was discovered in 1949. These agents have lethal concentration of 1 ppm over 10 min of exposure. Common examples of well known nerve agents are Tabun (GA), Sarin (GB), Soman (GD), and Cyclosarin (GF). "G" series Nerve Agents are hazardous through inhalation, skin and eye exposure, ingestion, and abraded skin (e.g., breaks in the skin or penetration of skin by debris).<sup>3,5,7</sup>

### General Chemical Structure

$R-P(O)(X)-OR'$  or  $R_2N-P(O)(CN)-OR'$  or  $R-P(S)(X)-OR'$

- **V series:** are the compounds which contain sulphur as their main ingredient. These agents were first synthesized during 1950s in United Kingdom by the Scientists working on the esters of Organophosphorus pesticides group. These agents have a low volatility and high persistence hence remain on clothes and other surfaces for a long time after application. These are of different types-VX (Oethyl-S-[2(diisopropylamino)ethyl] methylphosphonothioate), VE (O-ethyl-S-(2-diethylaminoethyl)- ethylphosphonothioate), VG (O,Odiethyl-S-(2-diethylaminoethyl)-phosphorothioate), VM (O-Ethyl S-(2- (diethylamino)ethyl)methylphosphorothioate) and VR S-[2-(diethylamino)ethyl] O hydrogen methylphosphonothioate. Out of these VX is considered as the most lethal and toxic agent compared to the others and is hard to detect physically due to its odourless and tasteless properties and their percutaneous exposure. These V-agents series are more

potent as than G-series due to their higher stability, greater resistance to detoxification and ability to easily penetrate skin.<sup>3,5,7</sup>

### General Chemical Structure

$R-P(O)(OR')-SCH_2CH_2NR_2$

### Suggestive Measures to Counteract

The rate of crime commission using these hazardous agents is very rapid, thus making it an issue of serious concern to take the measures to prevent the innocent individuals. Detection of hazardous chemicals and now chemical weapons is a requirement for first responders of all sorts.

During the 88th session of the Executive Council of the Organization for Prevention of Chemical Weapons (OPCW), Ambassador and Permanent Representative of India to OPCW, Venu Rajamony stated that the use of these hazardous and toxic chemicals is contrary to the provisions made by Chemical Weapons Convention (CWC) and their use is violating the set legal norms. These weapons shows a complete disregard of humanity and a total threat to human population therefore, considered as a matter of great concern and hence, required implementation of effective methods and measures which eliminate all possibilities of any future use of chemical weapons and uphold the global norm against use of chemical weapons. Policies must be made so that if these are released the entire world will not be effected.<sup>6</sup>

### CONCLUSION

The threat of use of these hazardous chemicals during the war is considered to be a global matter of concern as these substances not only poses harm to humanity and human beings but they have the potential to destroy entire world. Therefore the release of these dangerous weapons in the environment should be monitored at a regular pace by designing and implementing strict legal policies and norms.

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