

Briefing:

Chemical Weapons

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The advent of chemical weapons, originally in the forms of chlorine and mustard gasses, is often attributed to being a direct byproduct of the industrialized nature of World War I. The first major use of this technology occurred on April 22, 1915 by the German military at Leper, Belgium.¹ After witnessing the destructive capabilities of poison gas on entrenched soldiers, the European powers began to combine chemical weapons with long-range artillery, ultimately accounting for over one million casualties by the signing of the Treaty of Versailles.²

Chemical weapons were considered unique in comparison to conventional munitions and quickly became viewed as weapons of absolute terror for several reasons. First, exposure to poison gas led to protracted and painful symptoms, which often resulted in either death or permanent disability. Second, chemical weapons were wildly indiscriminate in their capacity to kill enemy or friendly forces, often dictated by a simple

shift in wind patterns. Chemical weapons also introduced a particularly dehumanizing aspect of modern warfare, both in their indiscriminate and largely anonymous capacity to perpetrate agonizing pain and death as well as the advent of protective gas masks worn by infantrymen that effectively hid their identities on the battlefield. Given these factors, chemical weapons have come to be one of the most abhorrent tools of modern warfare, and their use in the 20th century widely characterized as particularly barbaric.

The 1997 Chemical Weapons Convention (CWC) defines the most current interpretation of chemical weapons as “Any toxic chemical or its precursor that can cause death, injury, temporary incapacitation or sensory irritation through its chemical action.”³ The common types of chemicals covered by the Convention are denoted by the following categories:

- **Nerve agents** are lethal chemicals that affect, via respiration or skin contact, the transmission of impulses in the nervous system.⁴ When exposed to weapons-sized quantities of nerve agents, victims experience severe breathing difficulty or cessation of breathing, generalized muscular twitching, weakness or paralysis, convulsions, loss of consciousness, and often death within minutes of exposure.⁵ The most common forms of nerve agents are tabun, sarin, soman, and VX.
- **Blistering agents** are generally non-

lethal but often leave permanent damage to the skin and respiratory systems of those exposed to large quantities.⁶ When exposed to weapons-sized quantities of blistering agents, victims experience skin blistering, damage to the eyes, damage to the respiratory tract and mucous membranes, and injury to internal organs.⁷ Death, while uncommon, can occur from cell poisoning. The most known forms of blistering agents are mustard gas and Lewisite.

- **Choking agents** are lethal chemicals that predominantly affect the respiratory tract of those who are exposed. Choking agents cause the lungs to fill with fluid until the victim asphyxiates in a manner similar to drowning.⁸ Individuals who have inhaled these chemicals generally die within a few hours of inhalation.⁹ The most common forms of choking agents are chlorine and phosgene.
- **Blood agents** are fast acting and extremely lethal chemicals that, after inhalation, affect an individual by inhibiting the ability of blood cells to use and transfer oxygen.¹⁰ When exposed to weapons-sized quantities of blood agents, the victim experiences seizures, respiratory failure, and cardiac arrest.¹¹ The most common forms of blood agents are hydrogen cyanide, cyanogen chloride, and arsine.
- **Psychotomimetic agents** are unpredictable chemicals that are not regularly lethal and are designed to cause



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The Fund for Peace Publication

FFP : TTCVR1313 (Version 09A)

Circulation: PUBLIC

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mental and physical incapacitation.¹² In low doses, the effect of psychotomimetic agents mimics psychotic disorders, central nervous system disorders (loss of feeling, paralysis, rigidity), and an inability to make decisions. When exposed to weapons-sized quantities, victims experience deteriorated short-distance vision, distended pupils, dry mouth, palpitations, and increased body temperature of over 101°F (38°C), all occurring between one and forty-eight hours.¹³ These chemicals have incapacitation effects that can last one to three weeks.¹⁴ The most well known type

of psychotomimetic agent is 3-quinclidinylberzilate.

- **Riot agents**, also known as tear gas, are non-lethal chemicals designed to cause physical discomfort and eye closure in order to cause incapacitation.¹⁵ The most common symptoms of exposure are irritation of the eyes, mouth, throat, lungs, and skin.¹⁶ The most common forms of tear gas are chloroacetophenone and chlorobenzylidene malononitrile.

Examples of Chemical Weapons Use

The Iran-Iraq War

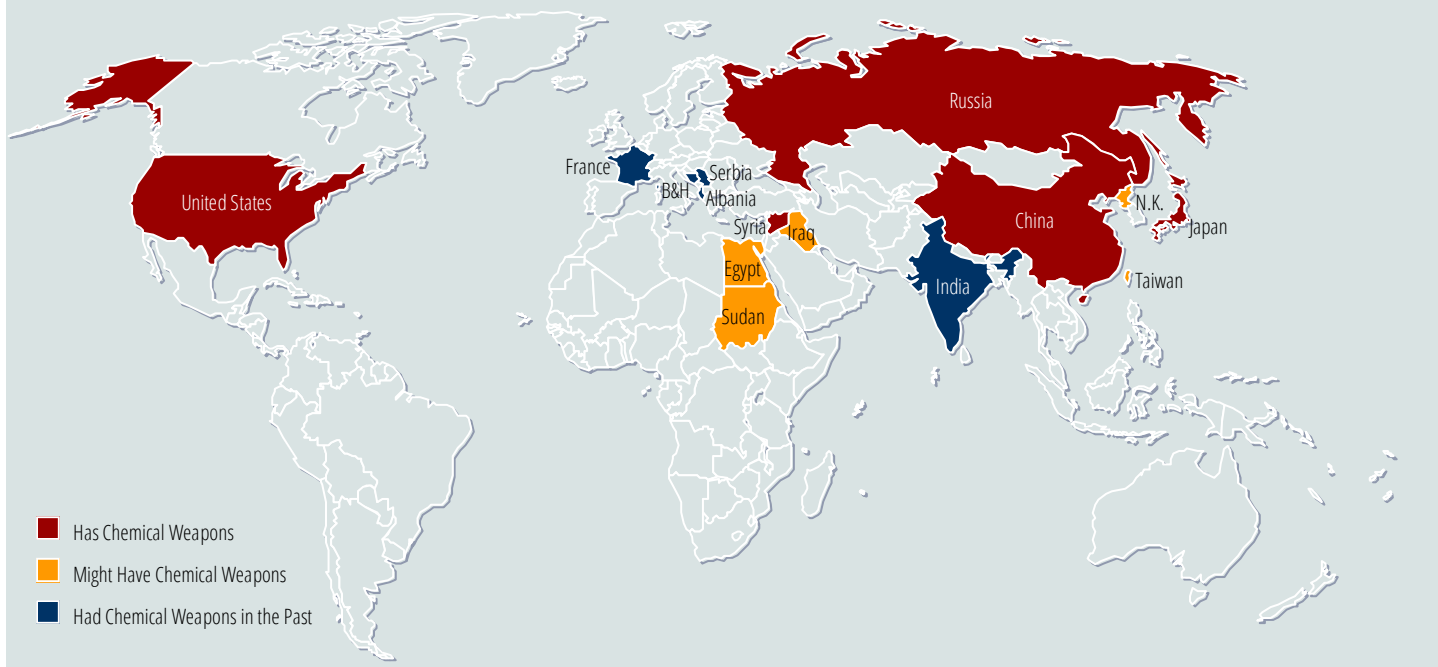
Perhaps the conflict most closely associated with the use of chemical weapons is the 1980-1988 Iran-Iraq War, which had the deadliest deployment of chemical weapons in modern warfare and catalyzed the development of the Chemical Weapons Convention. Due to complex motives likely stemming from religious fears, political ambitions, and military miscalculations, Saddam Hussein decided to breach the 1975 Algiers Agreement with Iran, which set the halfway point of the Shatt al-Arab waterway as the countries' common border.¹⁷ In 1980, the Iraqi government claimed Khuzestan, an oil-rich province in Southwestern Iran, and the entirety of the Shatt al-Arab waterway. In September of that year, Saddam Hussein ordered a three-front offensive against Iran. Despite early successes, the Iraqi military was forced to retreat in 1982 due to the superiority of the Iranian Air Force over the Iraqi Air Force and the Iranian clergy's consolidation of control over the military, Pasdaran (Revolutionary Guard), and Basij (People's Army) volunteers.¹⁸ Iran, wanting to reclaim captured territory, refused Iraqi overtures for peace and began an offensive into Iraq partially comprised of "human wave" attacks involving assaults by thousands of disorganized troops, designed to

simultaneously distract and clear a path for armored units. It was at this time that Iraq began to show a willingness to utilize chemical weapons on the battlefield after successfully deploying riot agents against Iranian offensives to buy time for its retreating forces.¹⁹

Outnumbered and on the defensive, Saddam Hussein gave the order to use chemical weapons in the Summer of 1983 in Haj Umran.²⁰ Despite unfavorable wind patterns and a limited knowledge of its proper use, the Iraqi military fired mustard gas onto the battlefield, asphyxiating both Iranian and Iraqi soldiers. By the fall, Iraq was using mustard gas extensively. Once the proper use of chemical weapons was understood, the Iraqi military started to employ deadlier chemicals and, in 1984, it became the first state to use nerve agents (tabun) in warfare.²¹

For the next four years, the war progressed with heavy casualties and little international condemnation and, by 1988, the Iraqi military was using chemical agents, now including sarin, for offensive purposes to soften attack targets.²² Eventually, Saddam Hussein decided to expand his use of chemical weapons even further by using them on dissenting Kurdish populations. During the war, the Kurds in Northeastern

Current, Possible, and Former Holders of Chemical Weapons^a



Iraq supported the Iranian forces over the Iraqi dictator. This led to arguably the most infamous chemical weapons attack in recent history, the March 1988 bombardment of Halabjah. It is estimated that over the three days of assault, 5,000 to 8,000 people, including women and children, were murdered.²³ In August of 1988, a ceasefire was agreed upon with no punitive action beyond verbal and written condemnation taken against Saddam Hussein for his use of chemical weapons.

The Tokyo Subway Attack

The 1995 Sarin attack on Tokyo commuters marked the first well-documented use of a chemical weapon by a non-state actor. In 1984, a failed student turned practitioner of Tantric Buddhism, named Chizuo Matsumoto, transformed his yoga school and methodology into a cult called Aum Shinrikyo (Supreme Truth).²⁴ Changing his name to Shoko Asahara (Bright Light), Matsumoto began to attract religious followers, claiming that he had supernatural powers and drawing inspiration from elements of Buddhism, Hinduism, and Christianity. Followers of Asahara were required to forfeit assets to the cult and to

purchase medicines and so-called “religious” trinkets. Devotees were eventually instructed to live in compounds while subjected to indoctrination and harsh physical tests to prove themselves to Asahara.²⁵ The cult’s membership rapidly grew into the tens of thousands and the organization, through asset forfeiture and other businesses, amassed a fortune estimated to be as high as US\$1 billion.²⁶ The organization remained largely non-violent until it failed to get any of its 25 political candidates, including Asahara himself, elected to the Japanese parliament in 1989. After this point, the cult began to adopt a doomsday narrative and started to invest its wealth into developing a biological and chemical weapons program.

After experimenting with different agents, the organization settled on Sarin gas and, in 1993 constructed a US\$10 million plant called Satyan 7, located outside of Tokyo. After successfully testing the lethality of the Sarin on sheep at a compound in Australia, Aum Shinrikyo planned attacks on Japanese citizens, hoping to catalyze its prophecy of apocalyptic war.²⁷ On the morning of March 20, 1995, members of Aum boarded five subway trains with sarin-filled packages. As the trains moved to heavily populated

metro centers, the operatives, who had been administered an antidote hours earlier, punctured the plastic lining on the packages with umbrellas before departing the trains and fleeing in getaway vehicles. Soon after, passengers complained of foul smells on trains and some began to vomit, convulse, and cough. By the end of the ensuing chaos, 13 people were killed and thousands were injured.²⁸ The attack sent shockwaves throughout the country and led to a rapid crackdown on the cult, which has since seen a significant deterioration in funds and membership.

The Syrian Civil War

On March 15, 2011, citing the Arab Spring as precedent, activists in Syria called for “Day of Rage” protests across Syria against the dictatorship of Bashar al-Assad. Most protests focused on the lack of democratic institutions in the country and the preferential treatment that the Alawites (11% of the population), the Shi’a sect of Islam of President Assad and his family, receive over the majority Sunni population (74% of the population).²⁹ As demonstrations grew throughout the country, the Syrian army began to violently

crack down on the protestors using both conventional forces such as the infantry, tanks, and snipers, as well as going house-to-house in raids using government security agents. Protests continued to grow throughout the spring and members of the Syrian military began to defect, incentivizing Assad's forces to begin to shell Hama, the center of anti-regime demonstrations. Soon, with the rise of multiple armed resistance movements, the state descended into chaos and civil war among various, and often ill-defined, groups and government forces. At the same time, President Assad ramped up his onslaught on civilians, deciding to increase his use of deadly force in order to suppress the protesting population.

While the Syrian government had been accused of using multiple tactics and weapons of terror throughout the conflict, including the purported early use of poison

gas, the most serious and verified instance of a Syrian chemical weapons attack occurred on August 21, 2013. On this day, Syrian opposition activists allege that the largest chemical weapons attack in the country to date occurred in the Ghouta suburbs in Damascus. Reports stated that victims experienced convulsions, foaming at the mouth, blurry vision, and asphyxiation.³⁰ Videos, photos, and testimonies began to flood out of Syria, documenting the indiscriminate killing of men, women, and children. The UN and Organization for the Prohibition of Chemical Weapons, the implementing body of the 1997 Chemical Weapons Convention, were quickly dispatched to investigate but encountered sniper fire on the way to sites, preventing a thorough examination.³¹ Over the next few days, U.S. Secretary of State John Kerry alleged that shelling was used to cover up the attack and there was strong evidence to

suggest a chemical weapons attack had occurred in Damascus. In the following days, the U.S. declared that chemical weapons were in fact used, issuing reports which indicated it was confident that weapons had been employed by the regime, arguing that the opposition could not have forged that many videos and testimony.³² The U.S. report stated that 1,429 people had been killed.³³ On September 2, 2013, France declassified intelligence that concluded that sarin had been used. Since then, the world has been cast into a debate over how to deal with the Syrian regime, with some arguing for military strikes to destroy stockpiles, others arguing for an arms control deal that would involve Syria abandoning its chemical weapons, and yet others arguing that nothing should be done at all.

Existing Conventions and Groups Related to Chemical Weapons

1925 Geneva Convention

Following the use of chemical weapons in World War I, states feared the use of chemical weapons and the idea that they could be turned on civilian populations. Therefore, it was decided that an international law should be created to limit the ability of states to employ poison gas in future conflicts. At first, this was limited to Germany, which according to the Treaty of Versailles was prohibited from manufacturing or importing poison gas.³⁴ At the Geneva Conference for the Supervision of the International Traffic in Arms, the U.S., France, and Poland consolidated their independent ideas to ban the export of chemicals for military purposes and to ban the use of chemicals in war. The ensuing "Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare" was signed on June 17, 1925. It should be noted that this monumental piece of international legislation did not ban the stockpiling, production, or development of chemical weapons and some nations

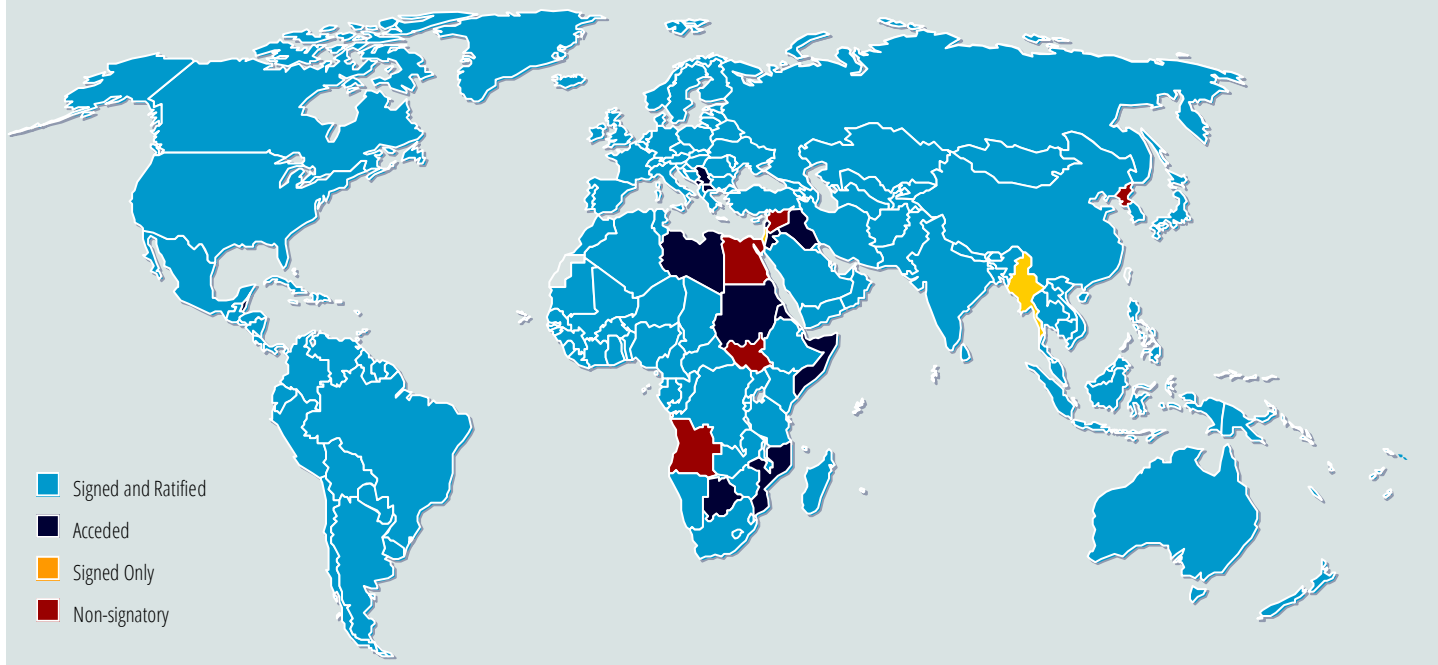
(notably France, the U.K., and the U.S.S.R.) proclaimed that they would abrogate the protocol if they were attacked with chemical and biological weapons first.³⁵ The protocol has 36 signatories and 138 States Parties.

The Australia Group

The Australia Group was established in 1985 by 15 states as a response to the use of chemical weapons in the Iran-Iraq War. The primary impetus for the formation of the group was that the use chemical weapons violated the 1925 Geneva Protocol and that some of the chemical materials used to construct the weapons had come through legitimate trade channels.³⁶ The Australia Group is a voluntary and informal export-control arrangement that is convened at an annual meeting in Paris. Currently 40 countries participate along with the European Commission. Members pledge to deny export license requests for items on specific chemical control lists if there is suspicion that they may be used for a chemical weapons program. Presently, there are 63 chemical weapons precursors

and five categories for licenses for the export of specific chemical weapons precursors, dual-use chemical manufacturing facilities and equipment and related technology and software, dual-use biological equipment and related technology and software, biological agents, plant pathogens, and animal pathogens.³⁷ Members of the group are accepted by consensus only. Countries that wish to join must have proven compliance with the Chemical and Biological Weapons Conventions and have national export control and enforcement mechanisms for all items on the control lists. Members must also decide if the new state is worth sharing security intelligence with, which has led to complaints that ascension is too strict.³⁸ To address concerns of terrorism, the group's parameters were expanded in 2002 to include "intangible means." This means that chemical and biological technology can be prohibited from being transferred via email, phone, or fax.³⁹

Parties to the Chemical Weapons Convention



1997 Chemical Weapons Convention (CWC)

In the aftermath of the use of chemical weapons during the Iran-Iraq War and the thawing of relations between the U.S. and the former Soviet Union, work began on creating a comprehensive treaty designed to prohibit chemical weapons and their production. After protracted debate and many revisions, a draft convention was approved and submitted to the Conference on Disarmament of August 1992 and was adopted in September. Soon after, it was passed on to the United Nations General Assembly. The Convention was opened for signature on January 13, 1993 and obtained 130 signatures within the first two days. Due to the large number of signatories, a further meeting was held that established the

Organization for the Prohibition of Chemical Weapons, an international body charged with implementing and overseeing the convention. The Chemical Weapons Convention eventually entered into force on April 29, 1997, 180 days after the 65th ratification. Today, Israel and Myanmar have signed, but not ratified, the Convention while Angola, Egypt, North Korea, South Sudan, and Syria have neither signed nor ratified it.⁴⁰

The Chemical Weapons Convention is more comprehensive than the 1925 Geneva Protocol and contains some of the following key provisions:⁴¹

- Member states are prohibited from using chemical weapons or engaging in military

preparations to use chemical weapons.

- Member states are prohibited from acquiring, stockpiling, retaining, or exporting chemical weapons both directly and indirectly.
- Member states must eliminate all stockpiles and factories of both territorial and extraterritorial weapons.
- Member states may request a challenge inspection in another state party.
- Member states must provide protection and/or assistance if another member state is attacked or threatened with chemical weapons.
- Member states have the right to impose sanctions and penalties on states that violate the convention.

Challenges in Curbing the Proliferation of Chemical Weapons

Difficulty in Destroying Chemical Weapons

The process of destroying chemical weapons is complicated and can be prohibitively expensive. According to the U.S. Department of Defense, there are three major steps required to eliminate a

chemical weapon. The first involves disassembling the weapon or vat into its components: the agent, the explosive, and the storage container.⁴² The next step involves placing the explosives and storage accessories in specialized furnaces.⁴³ The chemical agent is either broken down

through incineration, neutralization (hydrolysis), or microbial degradation.⁴⁴ Finally, the residue gasses are scrubbed and leftover materials are buried.⁴⁵ Ultimately, due to the fact that the CWC has provisions for time extensions in the removal process, the international community acknowledged

that the decommissioning process can, in reality, take over ten years to complete.

The destruction of chemical weapons becomes an even more demanding process when cost is accounted for. It has been estimated that in order to destroy chemical weapons or vats, it would require US\$1 million dollars to eliminate one ton of an agent.⁴⁶ Furthermore, a state must spend money to construct facilities capable of storing both the weapons and the technology as well as to transport them. In many instances, states are unwilling or unable to be burdened by the cost meaning that the process requires financial and technical assistance from another state, usually the United States or Russia. For example, a current proposal for the disposal

of Syrian chemical weapons stocks suggests shipping the arms to Russia for destruction.⁴⁷

Dual-Use Technologies

One of the problems in curbing the proliferation of weapons of mass destruction is that many of the components used in their creation can serve in peaceful and commercial endeavors. For example, phosgene, the chemical that was one of the first to be used in warfare, is also a key component in creating the polycarbonates used to make harmless products like DVDs.^{48,49} Therefore, it is often hard to discern whether or not chemical purchases or production are a violation of the CWC until weapons are created. It is impossible

to monitor every state that purchases or obtains these chemicals and there is no scientific process to measure intent.

While the passage of the Chemical Weapons Convention was a monumental step forward in the movement to eradicate these terror weapons, the most difficult process has yet to be accomplished. The recent deployment of chemical weapons in Syria has once again elevated the debate over how to effectively deal with states (and non-state actors) who utilize such weapons of mass destruction, bringing up both legalistic and moralistic arguments that will undoubtedly continue for the foreseeable future.

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