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One hundred and one years after a milestone: Modern chemical weapons and World War I

Diego Vilches[a], **Germán Alburquerque**[b], **Rodrigo Ramirez-Tagle**[c,*]

[a] *Magíster en Historia, Pontificia Universidad Católica de Chile, Chile*
[b] *Universidad Bernardo O'Higgins, Observatorio Regional de Paz y Seguridad, Santiago, Chile*
[c] *Universidad Bernardo O'Higgins, Laboratorio de Bionanotecnologia, Santiago, Chile*

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Abstract While chemical weapons have been used since the beginning of armed struggles, either for their flammable or toxic properties, it was only during World War I when what is known as ''modern'' chemical warfare began. July 28 marks the one hundred and one anniversary of the beginning of what is also known as ''The Great War''. This conflict created enormous consequences for society at the time, marking a before and after in the history of mankind, as well as being the genesis of modern chemical warfare.

PALABRAS CLAVE
Guerra química moderna;
Primera Guerra Mundial;
Armas químicas

Ciento un años después de un hito: las armas químicas y la Primera Guerra Mundial

Resumen Si bien desde los inicios de las contiendas armadas se utilizaron armas químicas, ya sea por sus propiedades inflamables o tóxicas, fue recién durante la Primera Guerra Mundial cuando se dio inicio a lo que se conoce como guerra química ''moderna''. El 28 de julio de 2014 se cumplieron ciento un años del comienzo de la que también es conocida como la ''la Gran Guerra''. Este conflicto generó enormes consecuencias para la sociedad de su época, marcando un antes y un después en la historia de la humanidad, además de ser la génesis de la guerra química moderna.

* Corresponding author.
E-mail address: rodrigoramireztagle@gmail.com (R. Ramirez-Tagle).
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Short historical review

The oldest reported case of a chemical substance being used as a weapon due to its toxic properties occurred in the year 256 BC, during the siege of the Persian city Dura Europos (modern Syria), where they used a mixture of tar and sulfur to produce sulfur oxides and thus take control of the city (Patel, 2010).

While previous reports of chemical substances being used in combat are recognized, generally they were used for their flammable, rather than their toxic properties. Such is the case, for example, of flamethrowers used in the year 424 BC during the Peloponnesian War, or the Greek fire developed in the year 668 BC (Partington, 1990).

It was only in the XVI century when the use of toxic properties of some chemical substances for military purposes was documented. During the Franco-Dutch War they began to use explosive and incendiary devices containing belladonna alkaloids, among other toxic compounds. The effects that the chemical weapons had in the battlefields prompted Germany and France to sign the Strasbourg Agreement on August 27, 1675; the first documented international agreement that prohibited the use of ''perfidious and odious'' toxic devices (Smart, 1996).

Two hundred years later, in 1874, given the concern about chemical weapons, the Brussels Convention was signed, on the law and customs of war. This prohibited the use of poison or poison weapons, and the use of projectile weapons or materials that cause unnecessary suffering. Subsequently, on July 29, 1899, the Second Hague Declaration was signed, leading to the first international ban on the use of projectiles whose sole purpose was to spread asphyxiating or deleterious gases. This prohibition was also included in the Fourth Hague Convention on October 18, 1907, which prohibited the use of toxins or toxic weapons.

World War I

The ''Great War'' marked the beginning of a new era of military history, not only because of the use of trenches, machine guns, the production and the use of tanks, the use of artillery of an unprecedented scale or the introduction of military aviation and submarines, but also for the massive and systemic industrial scale use of chemical weapons for the first time in history (Paige, 2009). Chemical weapons certainly affected those who fought in forests and trenches, both physically and mentally, dramatically undermining their confidence and fighting spirit, but also terrorized the civilian population to the point where the gas mask (essential in the battle field) became a symbol that embodies the legacy of violence and mass destruction that was World War I (Grazel, 2014; Jünger, 1998).

While it is believed that Germany was the first to use chemical warfare agents, it was actually France who, in August 1914, launched bromine ethyl acetate (Fig. 1) tear gas grenades. Meanwhile, the Germans, aware of the allies' interests in developing chemical weapons, also did the same by strongly developing their chemical industry (especially the dye industry), achieving an ideal situation for offensive chemical development.

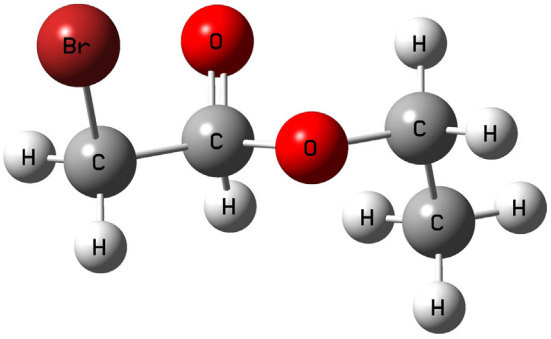

Figure 1 Representation of bromine ethyl acetate.

Thus Fritz Haber, professor at the Kaiser Wilhelm Institute of Physics in Berlin (awarded the Nobel Prize in Chemistry in 1918 for the catalytic synthesis of ammonia from hydrogen and atmospheric nitrogen under high temperature and pressure), directed German operations in the field, where the strategy of creating toxic clouds using commercial cylinders of chlorine gas as a dispersion system was attributed to him. Moreover, it is postulated that Haber selected chlorine gas because it was readily available in the dye industry and it also qualified for military use because it had and an immediate effect, was volatile, and could also become lethal.

It was on the Western Front where we could see the remarkable capacity of chemical weapons to terrorize the enemy and make their troops temporarily lose their minds. The first large-scale attack with chlorine gas occurred on April 22, 1915 in the Second Battle of Ypres, Belgium. There, the Germans, hoping the wind was blowing toward the French side to avoid causing damage to their own troops, released 150 tons of chlorine that spread panic among the enemy ranks. The terrified troops fled from the huge yellow cloud creating an opening of four miles in the French first forward line, which represented a significant advancement for the Germans (Jones, 2014). The operational advantage of toxic attacks was confirmed, to give one example, three years later in 1918 when during the first five hours of the Battle of Kaiserchlacht (the last great successful German offensive and known by the English as The Great Retreat of March), the German infantry general, Erich Ludendorff, combined ''surprise firing with gas'', achieving ''the dislocation and paralysis'' of the British troops. While the 6th and 51st English divisions were ''seen to be pushed toward the rearguard''. The V Corps, ''severely gassed but not directly attacked'', had to ''move back four thousand yards to an intermediate line'' (Gray, 1994).

Just weeks after they recognized the potential of chemical weapons in Ypres, the British and French began to plan a chemical retaliation, which became a triple strategy, as they needed to develop protective devices for their troops, weapons containing toxic gas and dispersion systems that would cross enemy lines. The day after the Germans used chlorine, the allies developed a rudimentary protective mask and in September 1915 they managed to launch their own chemical attack, using chlorine gas in Loos, Belgium (History of Chemical Warfare. Medical Aspects of Chemical Warfare, 2008). Ernst Jünger, the renowned German writer that fought in the Great War, recalls that the ''unpleasant'' and ''frequent'' attacks with gas mines were carried out