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## THE EVOLUTION OF CHEMICAL WEAPONS USE: FROM WORLD WAR I TO CONTEMPORARY CONFLICTS

The World War I is called the «war of the chemists» because it was it that ushered in the era of the creation and use of weapons of mass destruction. The study of the historical experience of the use of chemical weapons as a military tool on the Western Front and the analysis of political discussions on their use demonstrated that the participating countries quickly abandoned the existing norms of international law and gradually switched to their active use.

Now, more than a hundred years later, chemical weapons are being used again. The use of chemical agents during the war in Syria and Russia's invasion of Ukraine proves that international law and conventions have not affected the permissibility of using weapons of mass destruction.

This ongoing use of chemical weapons underscores a critical failure in the enforcement of international norms and laws designed to prevent such atrocities. The lack of significant repercussions for violators of these norms reveals the limitations of international law in addressing the practical realities of modern warfare. The inability to hold perpetrators accountable further exacerbates the humanitarian consequences of chemical warfare, with thousands of victims suffering from long-term health effects and environmental damage.

*Keywords:* Hague Convention, gas attack, weapons of mass destruction, poisonous gases, World War I, chemical weapons, grand strategy.

***Introduction:*** Despite the existing international mechanisms for banning the production, storage and use of chemical weapons, we periodically hear about the use of chemicals, in particular now in the East of Ukraine by Moscow. This makes it relevant to refer to the history of the use of poisonous gases during the World War I, because it was then that they turned into a powerful tool in the military-political strategies of the warring countries, and the scale of use on the Western Front surpassed all previous eras.

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Military conflicts, in addition to many negative consequences, are often a catalyst for innovations arising from the implementation of scientific developments in the military sphere. The war creates a demand for new technologies that would not be provided in peaceful conditions. This was also the case during the World War I. In addition to the name "Great War", it was also nicknamed the "war of chemists", because it was then that the use of chemical weapons, which are now considered weapons of mass destruction, was initiated. Chemical warfare turned out to be another component of the war of attrition, and the new chemical weapons were expected to overcome the positional impasse after the stabilization of the front at the end of 1914.

The experience of using chemical weapons in the First World War and the threat of their repeated full-scale deployment and use haunted humanity throughout the "short twentieth century". Despite the existing mechanisms for banning the production, storage and use of chemical weapons, periodic excesses during chemical attacks in Syria in 2015-2017 and reports of the use of chemical substances of unknown origin by the Russian aggressor in the southeastern direction in 2022-2024, actualize the need to turn to the analysis of the conditions for the use of chemical weapons as a tool in the military-political calculations of the warring countries during the World War I to understand the modern potential of their use in the Russian-Ukrainian war.

**The appearance of chemical weapons on the Western Front in 1914 – 1916.** The issue of the use of chemical weapons during the World War I attracted the attention of many researchers. The scale of the use of chemical weapons and the formation of often polar points of view among researchers regarding the effectiveness and "humanity" of their use have led to lively academic discussions. A significant part of the works is generalized, and such authors as Adams (*p. 286*), Brown (*p. 375*), and Coleman (*p. 225*) consider the evolution of approaches to chemical weapons during the twentieth century. The World War I is often mentioned in them as the initial stage, when it gained ground as a military-political tool. Other authors, in particular Prentiss and Haber (*p. 430*), focus on the period of the World War I and analyze various aspects of its development and application. Some of them, namely A. Prentiss, justified its high effectiveness due to the combination of a low mortality rate and a combination of demoralizing and psychological

effects of the application. However, L. Haber emphasized that chemical weapons required complex preparatory work, high training of personnel in production and the military, was dependent on natural conditions and was oriented towards positional warfare.

Therefore, it did not live up to the expectations placed on it and its real value turned out to be low. Many authors, including Fitzgerald (*p. 611-625*) and Vanderbergen, focus on certain biographical, medical, psychological, international legal aspects related to the history of chemical weapons.

A separate block is made up of scientific research, such as Girard (*p. 225*), Heller (*p. 109*) and others who investigated national policies on chemical weapons in their various dimensions. But a comprehensive study of the place of chemical weapons in military-political strategies did not often attract the attention of researchers. In domestic historiography, this issue remains poorly researched and is focused rather on the study of the experience of using chemical weapons on the Eastern Front.

The outbreak of hostilities led to the actualization of the strategic military plans of the General Staffs, which were developed in advance. Among the high command there was an opinion everywhere that the war would be fast, and victory could be won by one or more general battles. Thus, Germany's strategic plan (Schlieffen plan) was focused on the consistent and rapid defeat of the armies of France and Russia. The bet "on a lightning war" in order to avoid a war on two fronts was also confirmed by the system of deploying forces in one strategic echelon, the deployment of strategic reserves was not expected. However, the developers of the plan miscalculated the possibility of defeating the French army in one general battle. The forces of the opponents were also underestimated (*Heller, p. 21*).

The French strategic plan ("plan No. 17") had an indecisive and dual character. France expected that the war would be short-lived, so it planned to use only the existing army in hostilities, without mobilization. The actions of the armies, according to the plan, completely depended on the nature of the enemy's actions, that is, on where and how he would deliver the main blow. Thus, the strategic initiative was given to the enemy, and their troops were doomed to passive defensive actions (*Heller, p. 22*).

Great Britain also developed strategies based on the expectation of a short war, where the needs of the front would be met at the expense

of accumulated mobilization reserves and the work of military enterprises. They planned, first of all, to maintain and strengthen her dominance at sea. For operations on land, it was planned to send only one small expeditionary army to France (*Heller, p. 23*).

The scientific basis for the development of chemical weapons is associated with the development of organic chemistry. The inventor of chemical weapons of mass destruction is considered to be the German scientist Fritz Haber (1867-1934), an outstanding scientist in the field of chemistry, director of the Institute of Physical Chemistry and Electrochemistry at the Kaiser Wilhelm Society. As a consultant to the Ministry of War, he was instructed to head a committee of scientists to create a poisonous irritating substance that would force enemy troops to leave the trenches. All developers were respected scientists, physicists and chemists, laureates of prestigious scientific prizes, including the Nobel (*Friedrich, Hoffmann, Renn, Schmaltz, Wolf, p. 11-12*).

Within a few months, Haber and his collaborators created a weapon using chlorine gas, which was put into production in January 1915. In addition to gases, the institute headed by Haber simultaneously developed gas masks and filters.

*Figure 1: "Father of chemical warfare". Fritz Haber*

It was the French who were the first to use chemical compounds as weapons during the World War I in October 1914 (the First Battle of Ypres). This substance was ethyl bromacetate - tear gas. None of the participants in the war believed that gas fell under the bans of the Hague Conventions. Ethyl bromoacetate quickly dissipated and did not cause any effect on the enemy. Poisonous substances were used at the operational level to inflict losses on enemy manpower, but due to low efficiency and rapid depletion of supplies, they could not affect the course of the battle, since tear gas at that time was mainly in the possession of French police (as a non-lethal weapon). There was a negligible number of people affected by gas (*Gilchrist, p. 7*). The first attempts to practically use toxic chemicals as weapons of mass destruction were ineffective. But even this allowed the Germans in the future to accuse the French of violating the norms of the Hague Conventions.

At this point, a more efficient way to use gases on the battlefield was proposed by Fritz Haber. The chemist believed that the use of shells with chlorine due to lack of time and the complexity of manufacturing suitable cartridges at that time was impractical, so he recommended using liquefied gas from special cylinders under favorable weather conditions. In addition, this method did not formally violate the Hague Conventions, as experts testified during the consideration of this issue (*Friedrich, Hoffmann, Renn, Schmaltz, Wolf, p. 90*).

The Second Battle of Ypres (April-May 1915) was largely conceived as a testing ground for poisonous gases. Under Haber's personal control, preparations were underway for a chemical attack on the Allied troops, 720 tons of chlorine were delivered. The unit, consisting mainly of student volunteers (the military was skeptical about chemical weapons, since these weapons reduced the value of their knowledge and skills), installed 150 gas-cylinder batteries on a six-kilometer section of the front, from which 168 tons of chlorine were poured in five minutes, as soon as a light easterly breeze blew towards the enemy (*Haber, p. 25*).

The blow fell on the twentieth French corps, over which a gray-green cloud unfolded, which began to slowly fill the trenches and stretched 600-900 meters deep. Believing that the Germans were preparing for an attack under the cover of a smoke screen, few understood what was really happening, and in the first ten minutes, two divisions were put out of action, which lost about one and a half

thousand dead. Despite heavy enemy shelling, the surviving French, many of whom lost their sight from chlorine burns, got out of the trenches and, abandoning their weapons, fled their positions, forming a one-and-a-half-kilometer gap in the front. With cotton bandages moistened with a solution of soda, the Germans went on the attack and occupied the villages of Langemark and Pilken, where they captured two thousand prisoners and 51 cannons. In total, about 100 thousand people from both sides became victims of the second battle for Ypres, which ended on May 25. However, the victory did not bring much success to the imperial army - the Germans advanced five kilometers to Ypres, but could not take it. An interesting fact was that the French command received information about the preparation of the attack a week before thanks to the prisoners, but ignored the warning, downplaying the potential danger.

*Figure 2: A German soldier inspects the French trenches near Ypres. April 1915*

The initial success was due to the lack of protective equipment against gases on the defensive side. This led to the death of a large number of poisoned people. A breach formed in the defense of the Entente, but the German side did not have time to take advantage of this opportunity due to lack of reserves. The breakthrough was achieved by Germany at the tactical level, it was not possible to expand the success further. In his memoirs, Falkenhayn emphasized that this operation also had the character of a cover during the transfer of troops to the East, so there were no significant reserves capable of developing success (*Falkenhayn, p. 84*).

**The transition to the in-depth use of chemical weapons in 1917 − 1918.** In 1917, the World War I provided an opportunity to involve the United States in the war. Initially, none of the European countries considered the United States as a participant in the struggle for resources, and therefore the proclamation of American neutrality on August 4, 1914 was received calmly. However, the further change in the nature of battles from "lightning" to "protracted" weakened traditional European leaders and brought the United States to a new world level. Significant human and financial losses, weakening of production and the need to find suppliers of military weapons sharply increased Europe's demand for American goods, which became an impetus for the extremely rapid economic rise of the state.

The rapid industrialization of the US economy provided the basis for the spread of American geopolitical ambitions. Before the World War I, America's economic power reached about 33% of global GNP (gross national product) and pushed Great Britain away from the position of the leading industrial country in the world.

Thus, in 1916, the total amount of US exports to the Entente countries amounted to $3.2 billion against $825 million in 1914. The Entente countries began mass purchases of American raw materials for the military industry, food and weapons, which contributed to the rise of the US economy. The profits of monopolies increased several times.

American sympathy for Britain, France, and other allies grew over the course of the war, aided by both the stalemate on the battlefield and the growing threat of German submarines. As the war escalated, growing concerns about a possible U.S. entry into the conflict and a general lack of military training prompted some in the U.S. government, industry, and academia to begin planning in various fields. But on April 6, 1917, in response to the resumption of unlimited submarine warfare, inciting Mexico, the United States entered the war. Therefore, it quickly became clear that the US military forces would have to deal with chemical weapons.

Fears of gas attacks against members of the American Expeditionary Force (AEF) heading to the European front initially focused research in the United States on defensive measures, with priority given to the development and production of gas masks, although general training was insufficient.

The Allies learned valuable lessons from their mistakes on the Somme. The Battle of Arras began on April 4, 1917. It was then the

first time a mortar was used on a large scale to support the Canadian attack on Vimy Ridge. This large-sized mortar, developed by Lieutenant V.H. Lievens (Lievens' projector), was capable of delivering a large number of chemical warfare agents (phosphorus gas) and became perhaps one of the greatest innovations in the field of offensive use of chemical weapons during the World War I (*Heller, p. 20*). The British understood that the Germans could not be destroyed by shells. But their prolonged bombardment exhausted and demoralized the enemy troops, trapping them in their dugouts without access to rations or supplies. At the beginning of the offensive, the greatest successes were achieved by the Canadian divisions, which captured the Vimy area. This success of the Canadians allowed the British to achieve successes at the tactical level, only in the south the allied forces could not achieve more. The British army was able to advance deep into the German defenses, but suffered heavy losses. Success could not be developed, and no breakthrough was achieved. Gases during the battle were used at the tactical level, and, judging by the statistics of losses, had a more demoralizing effect than physical. The use of phosphorus gas was carried out in the subsequent Battle of Messina.

In July 1917, realizing the loss of their technological superiority and, possibly, the ability to win the war, near the Belgian city of Ypres (the Third Battle of Ypres), the Germans used a new and most dangerous chemical gas of cutaneous action in order to disrupt the offensive of the Anglo-French troops aimed at destroying the bases of the German submarine fleet.

The French called the new substance "mustard gas" after the place of first use, and the British, due to its strong specific smell, called it "mustard gas".

On the night of July 12-13, 1917, during the battle near the city of Ypres, the German army fired shells at the positions of British troops with shells that did not explode, but rather burst, releasing gas with a pungent unpleasant odor into the air. During the first use of mustard gas against Allied troops, the Germans fired 50,000 chemical artillery shells. The offensive of the Anglo-French troops was disrupted. The breakthrough was achieved by the Entente at the tactical level, it was not possible to develop further success. Chemical weapons were used exclusively at the tactical and operational level for defensive purposes, helping to repel attacks.

However, mustard gas had specifics. It did not strike instantly immediately after inhalation, the poisonous substance gradually

accumulated in the body and the poisoning made itself felt after a few hours. Another unpleasant feature of mustard gas is its ability to penetrate into fabric, paper, building materials and even rubber, where it can retain its poisonous properties for a long time, especially in winter, at low ambient temperatures. These features made it possible to bypass the existing protective equipment, the damage to the territory persisted for a long time and had an enhanced effect. Now, not only the poisoning itself, but also the fear of gas poisoning, together with periodic aggressive gas attacks, kept soldiers on both fronts in suspense and could lead to anomie, gas fear, and in some cases mental breakdowns. Upon hearing reports that there was gas in the area, the soldiers experienced all the symptoms of gas poisoning, even though they were not actually gas poisoned. The basis of this was constant shelling with poison gases, a specific atmosphere that the enemy maintained daily on most of the front with its regulated fire. When it did not cause real losses, it maintained apprehension and panic, accelerated the onset of combat fatigue. "It was not so much the damage that the gas caused to the body, the effect of which has always been greatly overestimated in the popular imagination, but the damage it caused to the mind. This harmless-looking, almost invisible thing could "lie" for several days, hiding in low places and waiting for the careless. It was the true breath of the Devil."

Soldiers on all sides believed that gas warfare was not a proper weapon and was beyond humanity. Significant problems were created by the need to be in gas masks or respirators for a long time. "We look at each other like stupid frogs with bulging eyes. The mask makes you feel like half human. You are not capable of thinking. The air you breathe is cleaned of all but a few. A person does not live when he walks with a filter, he simply exists. It resembles a vegetable" (*Friedrich, Hoffmann, Renn, Schmaltz, Wolf, p. 163*).

In general, during the campaign of 1917, none of the belligerents achieved strategic achievements. However, the situation of the Central Powers deteriorated significantly - their forces were exhausted, anti-war sentiments and direct actions of the masses against the war intensified.

At the end of 1917, the seemingly hopeless situation of positional warfare initiated new forms of technical equipment, strategic techniques and tactics on the battlefield. Having ensured the stabilization of the situation in the East after the conclusion of the

Brest-Litovsk Agreement and trying to achieve its strategic goals, the German command on March 21 – April 4, 1918 carried out a major offensive operation in Picardy on the Western Front (Operation Michael, or "Spring Offensive") (*Friedrich, Hoffmann, Renn, Schmaltz, Wolf, p. 163*). Operation Michael was aimed at breaking through the operational level with the subsequent encirclement of the Entente troops. However, the desperate resistance of the British and French and the timely introduction of their reserves into battle made it possible to stop the German offensive and inflict significant losses in manpower. Without losing hope of defeating the Anglo-French troops, the German command expanded the use of chemical shells. If earlier we were talking about hundreds of thousands, now the count has gone to millions of gas shells during this battle. However, according to statistics, these projectiles did not play a decisive role in inflicting losses, but were used more to achieve a psychologically demoralizing effect. In some places, the Germans made significant progress, on May 30 they even approached Paris by 70 km. Despite the record success in the first weeks, the offensive could not be developed, and it stopped at the tactical level.

The first German gas attack on American forces took place in the Ansoville sector, where the Americans were attacked with searchlight bombs containing chloropicrin and phosgene. 225 people were injured. The losses were small compared to the gas losses already suffered by the European military, but this incident highlighted the unpreparedness of the Americans. The soldiers, ignoring orders and what they were taught, did not expect an attack: they took off their masks too early, which led to serious consequences (*Gilchrist, p. 84*).

In May 1918, American Colonel Amos Fries decided to achieve greater recognition of the gas and his efforts were crowned with success, and from June 1918, under the leadership of Major General William Siebert, a chemical service was created in the expeditionary force. This accelerated the US gas war program. Although the United States was new to the gas war, it acted quickly and actively used mustard gas in June 1918, when the country's mustard gas production was already 30 tons per day.

In agony, the German army made a desperate attempt at another offensive. During the Second Battle of the Marne in June 1918, French troops launched a counteroffensive and forced the enemy to retreat. The American Army and the Marine Corps played a key role

in repelling the German offensive. This was a turning point in the entire campaign of 1918, the Germans went on the defensive along the entire Western Front, having lost 800 thousand men in previous battles. Persons. The heavy defeat greatly undermined the morale of the Germans, who lost all hope of victory.

Now the Entente troops went on the offensive. The Argonne offensive of September-November 1918 was part of a strategic campaign during the autumn counteroffensive of the Entente. The goal was to break through the front and enter the operational space in the rear of the German defense line. Chemical weapons were used by the American Expeditionary Force on a global scale. It is known about the fact of the use of chemical filling in 20% of shells, which was fired by artillery. The result of the operation was an operational-level success, and despite significant losses of personnel, the Americans managed to achieve their goals. Despite the sharp increase in the number of victims (so by July 1917 the British army counted about 20,000 victims of gas attacks, and after that date it was already 160,000), chemical weapons continued to inflict minimal casualties on the enemy, intensifying the discussion about their "humanity" among military experts. The overall estimate of the ratio of dead to wounded during gas attacks showed significantly lower rates compared to traditional weapons. Therefore, for many military, such a mechanism of influencing the enemy's troops, which made it possible to knock out a significant part of the contingent for a long time, has become quite attractive.

After the rapid withdrawal of their allies from the war, Germany's position was complicated to the limit by growing internal contradictions. The revolution in Germany allowed the newly formed government to sign the Armistice of Compiègne on November 11, 1918. Chemical warfare also stopped, but the consequences of the emergence of new weapons and their use now accompanied military-political strategies in the following years.

**Conclusion of the use of chemical agents in WW1.** As a result of the study of the role of chemical weapons in the military-political strategies of the warring parties on the Western Front in the World War I, the following conclusions were made:

1. Chemical weapons developed as a powerful military tool precisely in the conditions of the World War I, on the eve of existing international agreements prohibited their use, albeit with some

loopholes. Therefore, in 1914, she was initially ignored. But the positional impasse into which the war entered at the end of 1914 led to the search for new means. Therefore, new initiatives, which did not come from the military and politicians, but rather from civilian specialists, led to the actualization of the issue of developing a new type of weapon. The development of science, the deepening of chemical research in the developed countries of the world led to the invention of new chemical substances, which, if used, could become weapons of mass destruction. Therefore, the creator of chemical weapons in the modern sense of this concept is rightly considered to be the German scientist Fritz Haber. In addition, the industrial level and scale of the chemical industry in Western countries created a stable foundation for the production and use of chemical weapons. The scientific and technical competition between Germany and the Entente countries in the search for new types of poisonous gases, means of their delivery, counteraction to its use on the battlefield led to the rapid evolution of this type of weapon in wartime.

2. Analysis of sources shows that considerations regarding chemical weapons (chlorine and other gases) were made by both sides of the conflict. The first examples of the use of non-lethal gases in 1914 allowed the warring countries to manipulate the issue of its possible use as a mechanism of self-defense against the actions of the other party and circumvent the restrictions imposed by existing norms of international law. The first results of chemical attacks were not very effective, because there was a misunderstanding of the potential capabilities of poisonous gases on the battlefield. Therefore, for a long time in 1915-1916, despite the offensive doctrines of both sides of the conflict, chemical weapons were used exclusively at the tactical level to support infantry attacks as an auxiliary tool. The use of poisonous gases did not provide a strategic advantage for overcoming the positional stalemate in the war.

Germany's peculiarity in the "gas race" was that it had a technological advantage that made it possible to introduce new gases earlier. The Entente countries were forced to engage in their own developments to counter the Germans and therefore were constantly in the role of catching up. But after 1917, due to the appearance of "mustard gas", the situation gradually changed. The parties are clearly aware of the importance of chemical weapons, their devastating psychological consequences, which made it possible to combine physical and mental

aspects for the increased demoralization of the enemy's forces. Therefore, during the campaigns of 1918, chemical weapons clearly occupy a significant place in production calculations, in the military calculations of the parties at the strategic level. Even at the level of the grand strategy of the political elite, its perception as a "humane weapon" is often formed, which is characterized by lower losses compared to more traditional means of destruction. Thus, at the end of the war, chemical weapons had a significant impact at all levels of strategic analysis, becoming a standard military tool.

3. A comparison of military-political strategies demonstrates that at first, the military, and sometimes politicians, did not accept the use of gases on the battlefield, relying more on traditional weapons, and therefore chemical weapons were assigned only auxiliary roles during offensive operations. After its first full-scale use in 1915, political, ethical, or legal debate was virtually non-existent in Germany and France. Only a small part of their military did not accept such innovations. In the United Kingdom, the internal debate was more powerful, as it was later in the United States, but stopped after a few months. And although the position of generals G. Kitchener, or J. Pershing was more than skeptical, nevertheless, they contributed to expanding the scope of its application. Therefore, since 1917, all parties have adapted chemical weapons for their own military-political strategies, and they have constantly increased their place in these calculations. In addition, at the end of the war, gas clearly symbolized the symbiosis of scientific research and military affairs, influencing different strategic levels. And the results of use formed two polar points of view. One of them described the gas as a barbaric, indiscriminate weapon of mass destruction. Another emphasis is on its effectiveness and "humanity". These debates influenced attitudes towards it, but for the most part, the second one rather prevailed, moreover, both among the military and among politicians and civilian specialists. Therefore, chemical weapons became one of the symbols of the war of a new, "total" industrial type and remained an important component of military-political strategies after the end of the war.

4. In the course of the study of the use of gases during the World War I, three periods were distinguished: preparatory - from August 1, 1914 to April 1915. At this stage, some representatives of the parties pay attention to the potential of chemical weapons, there are the first cases of their use during hostilities, but mainly in a non-lethal form

and on a limited scale. The second period, from April 1915 to July 1917, can be considered the initial one, since all parties switched to its full-scale use, but faced specific conditions, limitations in industrial capabilities, and means of delivery. It was a time when a rapid scientific and technological rivalry began, Germany and the Entente countries were looking for new chemical compounds as countermeasures. Entering the war in the United States only accelerated such a scientific and industrial competition. Therefore, chemical weapons are gaining a significant place in military-political calculations. The third stage can be called full-scale, and it was associated with mustard gas, which made it possible to maximize the benefits of the use of chemical weapons. Production and scale of use are significantly increasing, and the number of affected people is increasing. Nevertheless, chemical weapons did not have time to actually fully reveal their potential as weapons of mass destruction because the war was over. But a huge psychological effect remained, turning it into one of the symbols of war and an instrument of deterrence strategies and information pressure with a demoralizing effect on the civilian population.

The experience of the use of chemical weapons demonstrates that aggressor states are able to reject existing international treaties and norms of international law in case of military-political necessity. Therefore, it is possible to foresee an increase in the likelihood of Russia's use of chemical weapons on the battlefield and the use of such cases, including as psychological and information operations, to increase pressure on the leadership and Ukrainian society. military to the use of chemical weapons remains relevant and needs attention.

**The experience of the Russian-Ukrainian war on the evolving nature of chemical warfare.** During the period of time during the Russian-Ukrainian war, 1084 cases of the use of ammunition containing hazardous chemicals by the enemy were recorded and documented, which is 281 cases less than in the second quarter of 2024. The decrease in the number of uses of munitions containing chemicals in September 2024 is probably due to a decrease in the average daily temperature, since at high temperatures their damaging effect is higher. The enemy dropped ammunition with dangerous chemicals (K-51 grenades, RG-VO grenades and unspecified types of ammunition) at the positions of our troops from UAVs. Usually, the enemy dropped ammunition containing a dangerous chemical in

parallel with other ammunition or first drops ammunition containing a dangerous chemical substance and immediately after them conventional ammunition. The purpose of the drops of ammunition containing a dangerous chemical substance was to force the defenders of our firing positions to leave the shelter and push them into the open area in order to increase the effect of damage by dangerous ammunition.

For the period from February 2023 to September 2024, 4228 applications of hazardous chemicals were recorded.

Mostly Russians use chloroacetophenone. Formally, they are not chemical weapons. This is a chemical warfare agent of irritating action. In the Chemical Weapons Convention, chloroacetophenone is defined as a chemical agent for rioting. It is a chemical capable of quickly causing sensory irritation or physical disorders in the human body, which disappear shortly after the end of the action. But the use of these gases during hostilities is a crime. This is a violation of the Chemical Weapons Convention, the international chemical weapons treaty within the framework of the United Nations (*Halak, 1656*).

On February 27, 2024, at 9:13 PM, information was received that an unknown chemical substance had been used against Ukrainian defense forces in the area where they were carrying out tasks.

During a combat mission, a probable RG-VO 862-7-23 munition containing an unknown chemical substance was dropped from an enemy quadcopter onto the unit of the Ukrainian defense forces company commander.

The company commander did not have time to give the "Gas" command to the personnel in time, so the servicemen did not put on their respiratory protection equipment in time, as a result of which some of them were injured on the face and open areas of the body. The unknown chemical substance also got on their uniforms.

This led to direct contact with chemical substances, which could have caused acute poisoning and, in some cases, death. The chemical poisoning of the personnel could have significantly reduced the unit's combat capability. Neglecting CBRN protection measures can lead to panic and disorganization among personnel. This can complicate or make it impossible to complete a combat mission.

After assessing the situation, it became clear that this was an irritant chemical substance, so the company commander was immediately given instructions that in case of the substance getting on

open areas of the body, it should be washed (wiped) with an alkaline solution (soda dissolved in water), and the uniforms should be replaced, if possible.

At 11:43 PM, a message was received: "Thank you very much, your advice helped, the guys are alive and unharmed" (*Halak, 167*).

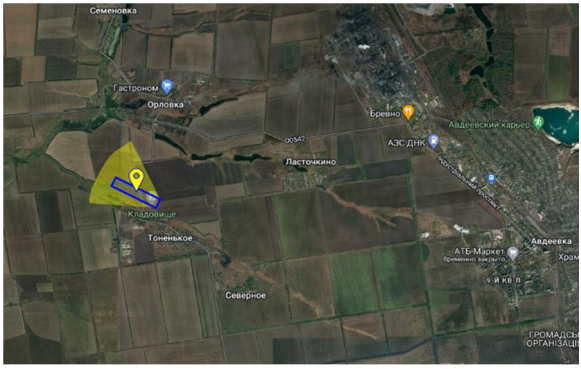


*Figure 3: Probable direction of chemical dispersion*

The use of chemical weapons during the World War I and the Russian-Ukrainian war has a number of significant differences at the tactical and operational levels, given technological progress, international norms and the context of all conflicts.

World War I (1914–1918)

At the tactical level:

1. during the World War I, chemical weapons were used on a large scale for the first time, mainly in the form of destructive gases such as chlorine, phosgene, mustard gas. The gas attack became a tactical element that was used to disrupt the front line or to delay the enemy's advance.

2. Gas was used to enhance the effect of artillery shelling or during offensives. These were mainly gas attacks that tried to break the enemy's stability, create panic and weaken the defenses.

3. Chemical attacks were not always very successful, the latter gases were difficult to control. They could cause serious consequences for their own troops due to wind changes or lack of efficiency.

At the operational level:

1. Chemical attacks were used in certain areas, but their use was limited, after which they did not bring quick results, and there were also technical problems with the front of storage and use of chemicals.

2. Although chemical weapons had a psychological effect on the soldier, their effect on the course of the war was limited. The creation of more complex personal protective equipment for the skin and respiratory organs made it possible to damage the effectiveness of a chemical attack.

Russo-Ukrainian War (2014 – present)

At the tactical level:

1. compared to the World War I, the use of chemical weapons in Ukraine is much more technologically advanced. Information on the use of nerve agents (for example, Novichok) and other toxic substances confirms the expansion of the arsenal.

2. Chemical attacks have become rare, but have a purposeful use to demoralize the enemy, create chaos and threaten the civilian population. Also, it is known about the use of chemical weapons in certain areas of the front for punishment or intimidation.

3. While chemical weapons may be effective, their use remains risky due to the International Court of Justice, as well as the development of modern defenses and the rapid identification of an attack.

At the operational level:

1. Compared to the World War I, chemical weapons are likely to be used in limited cases in the conflict in Ukraine, with their deployment immediately triggering international reactions, sanctions, and the recognition of aggression.

2. Since international organizations such as the UN actively monitor the use of chemical weapons, the use of such weapons has serious political consequences, including sanctions and diplomatic pressure. Comparing the use of chemical weapons during World War I, chemical weapons were groundbreaking, but their effectiveness was limited by technical difficulties and unexpected consequences.

In Ukraine, due to the development of the latest chemical compounds, the effectiveness of the attack can be much higher, but their infrequent use indicates caution due to the possibility of global consequences.

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## ЕВОЛЮЦІЯ ВИКОРИСТАННЯ ХІМІЧНОЇ ЗБРОЇ: ВІД ПЕРШОЇ СВІТОВОЇ ВІЙНИ ДО СУЧАСНИХ КОНФЛІКТІВ

Першу світову війну називають «війною хіміків», оскільки саме вона започаткувала епоху створення та застосування зброї масового ураження. Вивчення історичного досвіду застосування хімічної зброї як військового засобу на Західному фронті та аналіз політичних дискусій щодо її застосування показали, що країни-учасниці швидко відмовилися від існуючих норм міжнародного права та поступово перейшли до їх активного застосування.

Тепер, більше ніж через сто років, хімічна зброя знову використовується. Використання хімічних речовин під час війни в Сирії та вторгнення росії в Україну доводить, що міжнародне право та конвенції не вплинули на допустимість застосування зброї масового ураження.

Тривале використання хімічної зброї підкреслює критичний провал у забезпеченні виконання міжнародних норм і законів, спрямованих на запобігання таким звірствам. Відсутність значних наслідків для порушників цих норм свідчить про обмеженість міжнародного права щодо практичних реалій сучасної війни. Неможливість притягнути винних до відповідальності ще більше посилює гуманітарні наслідки хімічної війни, коли тисячі жертв страждають від довгострокових наслідків для здоров'я та шкоди довкіллю.

*Ключові слова:* Гаазька конвенція, газова атака, зброя масового ураження, отруйні гази, Перша світова війна, хімічна зброя, гранд-стратегія.