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CONDITIONAL ENEMY'S MASS DESTRUCTION AND BURNING WEAPONS

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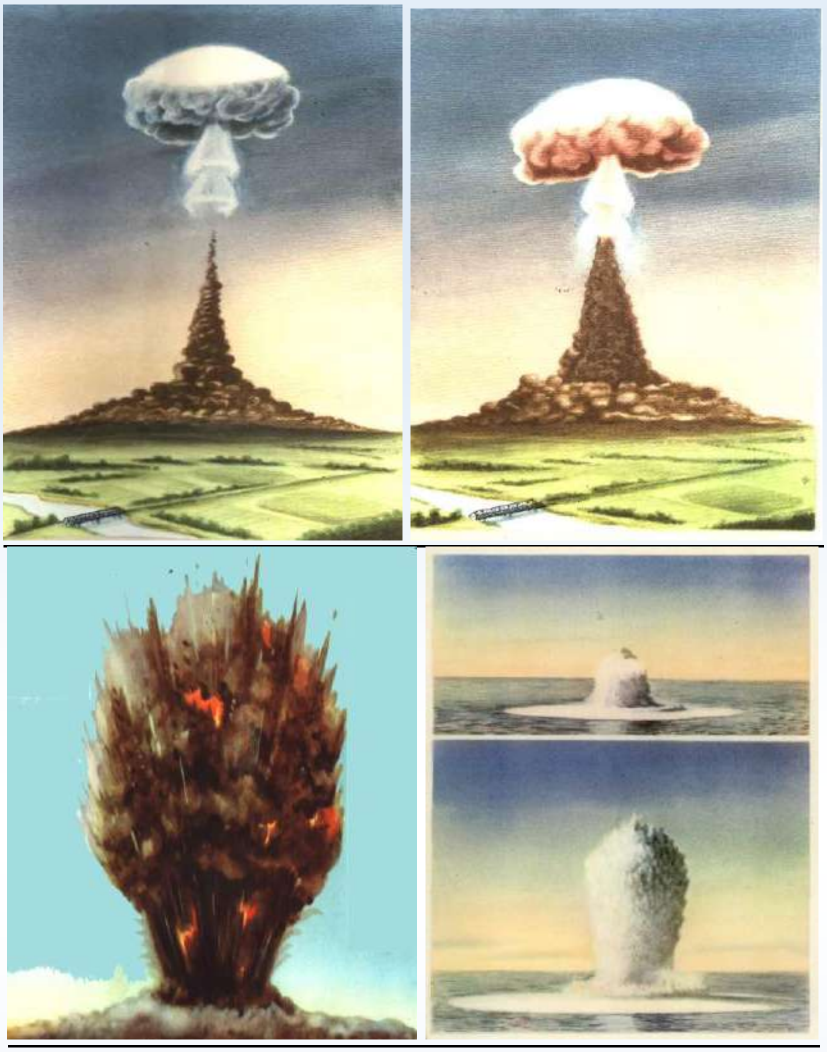
TEXTBOOK



Tashkent-2022

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FACULTY OF MILITARY EDUCATION

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CONDITIONAL ENEMY'S MASS DESTRUCTION AND BURNING WEAPONS

Tashkent State Pedagogical University, Faculty of Military Education
textbook for students

Tashkent-2022

The textbook was written by A.R. Xonimqulov, a senior lecturer in general military training at the Faculty of Military Education of Tashkent State Pedagogical University. M.M.Khurramov Student Faculty of Military Education of Tashkent State Pedagogical University Tashkent / 78 pages.

The textbook "Conditional Enemy Mass Destruction and Burning Weapons" is designed to provide students of the Faculty of Military Education with theoretical knowledge, practical and methodological skills.

This manual covers all of the chemical protection tasks outlined in combat regulations, manuals, and instructions.

This handbook provides information on weapons of mass destruction and firearms, their structure, damaging factors, methods and tools of use.

Protection from weapons of mass destruction in the textbook; radiation and chemical intelligence, radiometric, dosimetric, chemical control; meteorological observation; information on special processing methods and tools.

CHAPTER ONE

Conditional enemy weapon of mass destruction

Weapons of Mass Destruction (WMD) is a weapon of mass destruction that is used for mass destruction and destruction. Weapons of mass destruction include nuclear, chemical and biological weapons.

Nuclear weapons (NW) began to be developed at the end of World War II. The first nuclear weapons were dropped on the Japanese cities of Hiroshima and Nagasaki in August 1945. As a result, about 300,000 Japanese people were killed.

Chemical weapons (CW) were first used by German troops in World War I against Anglo-French troops in one of the western divisions (April 22, 1915). During World War II (1941-1945), the German Nazi Armed Forces synthesized and produced sufficient quantities of highly toxic organophosphorus and sarin. But with Germany defeated, their plan to use chemical weapons failed. After the end of World War II, chemical weapons improved.

Biological weapons - weapons filled with special biological means - weapons and means of targeting them.

They are designed to destroy farm animals, plants and people. Wars fought with the use of biological weapons are called biological wars. The damaging factor of a biological weapon is biological means. They are biological agents isolated for use in combat and can cause serious illness when ingested. These include: - disease-causing microorganisms; - microbial toxins (toxins that some microbes produce during their life).

The concept of nuclear weapons

The effect of a nuclear weapon is based on the use of energy released from the nucleus as a result of a nuclear reaction, that is, fission-fusion or the simultaneous occurrence of both. When the mass of pure isotopes of uranium 235 or plutonium 239 is large enough, it splits into smaller nuclei under the influence of neutrons released during the fission process, so that the chain reaction continues. If the weight of the fissile material is less than a certain value, the neutrons formed during the fission process do not have time to collide with other nuclei and leave the substance, while the chain reaction does not continue (natural uranium-238 is difficult to decompose. decomposes in secret). This value of the weight of the fissile material is called the critical weight. The critical weight of the uranium-235 isotope is 9 kg.

Weapons of mass destruction can be used in the form of missiles, planes, air bombs, artillery shells, mines, torpedoes, explosives and other types of weapons in line with current state of the art.

A nuclear weapon explodes as follows: a remote-controlled vehicle (remote explosive) is activated at a certain height, the explosive causes an explosion of gunpowder charges, the forces created by the explosion bring the uranium or plutonium hemispheres closer, and a critical weight is created. opportunity is created.

As a result of the fission of uranium and plutonium nuclei, the internal energy is released as explosion energy. To prevent the fissile from exploding spontaneously, they are broken down into several parts that weigh less than the critical weight of the fissile. When an explosive is to be detonated, the separated parts must be brought close together quickly so that a simple explosive - a powder charge - is placed around it.

Thermonuclear weapon (hydrogen bomb). The structure of a hydrogen bomb is no different from that of an atomic bomb, except that it contains a thermonuclear charge and natural uranium. The thermonuclear bomb explodes in three stages: decay-synthesis-decay.

The thermonuclear charge in a hydrogen bomb is deuterium and tritium, which are heavy and very heavy hydrogen. Deuterium and tritium are solidly compressed and liquid. Here, the atomic bomb serves as the detonator of the hydrogen bomb. When a hydrogen bomb explodes, a powerful thermonuclear reaction takes place, releasing a lot of energy (heat). Just as millions of tons of TNT explode, so much energy is released when a hydrogen bomb explodes. The hydrogen bomb has no critical weight. This means that the bomb can be unlimited in size, or an unlimited amount of hydrogen fuel can be added to the hydrogen bomb.

Neutron bomb. The neutron bomb belongs to the third generation of nuclear weapons. Explosive power is considered to be much weaker, where the explosion takes place in two stages, the decomposition-synthesis stage. When a neutron bomb explodes, the uranium or plutonium nuclear charges first undergo a chain reaction. Helium nuclei are then synthesized from hydrogen isotopes as a result of a thermonuclear reaction. The main part of the released energy is a stream of neutrons. When a neutron bomb explodes, 80% of the explosive energy is neutron and gamma radiation and the remaining 20% is other damaging factors.

When a neutron bomb explodes, it produces a weaker shock wave. In addition, the use of a device that acts as a detonator in a neutron bomb in a nuclear reaction can significantly reduce the critical weight by adding transplutonic elements to the fission substance. Therefore, when a neutron bomb explodes, the amount of radioactive dust is much lower. If atomic and neutron bombs have the same explosive power and the same distance from the center of the explosion, their effect on the object is as follows.

The dose of radiation produced when a neutron bomb explodes is 5-10 times greater than the dose when an atomic bomb explodes. People who were in the open when a neutron bomb exploded lost about four times as much capacity as when an atomic bomb exploded.

A nuclear reaction occurs as a result of an explosion, during which all the energy inside the nucleus is released within a few microseconds. A nuclear explosion differs from a normal explosion in that it eventually releases large amounts of highly concentrated energy and produces damaging factors that are not present in a normal explosion.

The amount of energy released when a nuclear weapon explodes is called the power of that weapon. The power of a nuclear weapon is expressed in terms of the

TNT equivalent, that is, the weight of the TNT charge. The explosive energy of a TNT charge is equal to the explosive energy of a nuclear weapon. Nuclear weapons are conventionally divided into the following calibers in terms of power:

- small-caliber-TNT equivalent of 1 thousand, up to 10,000 tons;
- Medium-caliber TNT equivalent of 10,000, up to 100,000 tons;
- large-caliber – TNT equivalent from 100,000 to 1 mln. tons;
- very large caliber-TNT equivalent of 1 million. more than a ton.

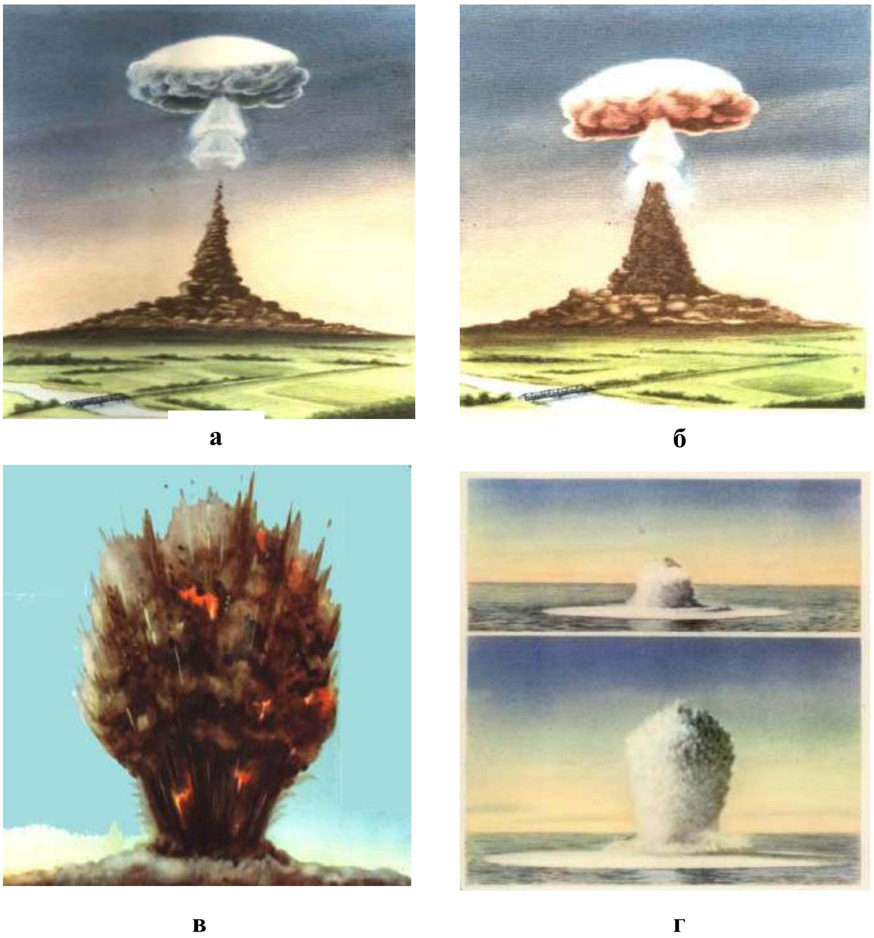
Methods of detonation of nuclear weapons, the development of the process of nuclear explosion and the formation of destructive factors

Depending on the location of the explosion center relative to the ground (water) level, it is divided into **air blast**, **ground explosion**, **underground explosion**, **surface explosion**, and **underwater explosion** (Figure 1). Each of these types of explosions has its own destructive effect on objects.

A nuclear explosion in the air - an explosion occurs in the air, the circle of light does not touch the ground. An explosion in the air can be high or low.
In a nuclear explosion below, the rising dust column is connected to the blast cloud. The result is a mushroom cloud. In a high-altitude explosion in the air, the dust column does not contact the blast cloud. The point on the surface where an explosion occurs is called the epicenter of the explosion.

When there is a nuclear explosion in the air, it is caused by the scattering of light that dazzles the eye for a short time. Then a spherical circle of light appears. The temperature in it reaches several million degrees. The radiating circle serves as a source of light. The fiery balloon that rises above cools and turns into a cloud of dust. A strong current of air blows away a cloud of dust that rises from the ground. The higher the explosive power, the higher the cloud size, speed, and altitude. A nuclear explosion is caused by a sharp thud, similar to the sound produced by a thunderstorm. The blast cloud moves in the direction of the wind, loses its original shape and dissipates. Air strikes are used to destroy enemy troops, aircraft, defense structures, cities and industrial buildings. High-altitude nuclear explosions create a circle that emits light like a ball. It is much larger than a nuclear explosion in the Earth's atmosphere. As the radiant circle cools, it turns into a dusty spherical cloud in the atmosphere. A high-altitude explosion does not create a cloud of dust or pillars on the ground.

Figure 1. Types of nuclear charge explosions.
a-in the air; b- on the face; v-er; under g



As the blast height increases, the atmospheric layers become thinner, the impact of the shock wave decreases, and the transmitted radiation and light radiation increase. At high-altitude nuclear explosions, surface contamination with radioactive substances is not observed. High-altitude nuclear explosions are used to destroy enemy targets in the air and in space.

A surface nuclear explosion is an explosion in the air at low altitude where the light-emitting circle intersects with the earth's surface. In this case, the light-emitting circle is in the shape of a hemisphere. An explosion on the surface creates depth. Depth depends on the strength of the explosion and can reach several hundred meters. An explosion on the ground creates a strong mushroom-like cloud of dust and a column. As a result, the cloud releases large amounts of soil from the ground into the air, giving it a black color. Soil mixed with radioactive products of the explosion will cause the dust cloud to disperse faster. Radioactive damage is stronger in a surface explosion than in an air explosion.

Ground explosions are designed to destroy enemy troops, strong underground structures, and damage the environment with powerful radioactive substances.

An underground nuclear explosion is an underground nuclear explosion. In such an explosion, no radiating circle can be observed, such an explosion puts a lot of pressure on the ground, and the resulting shock wave generates vibrations similar to an earthquake. A large pit is formed at the site of the explosion, the size of which depends on the strength of the explosion and the type of soil. Large amounts of soil are sprayed with radioactive substances from the pit. The blast column reaches several hundred meters. An underground explosion does not form a mushroom cloud. Underground explosions are designed to destroy special underground devices and create a ditch in the mountains.

A nuclear explosion on the surface of the water is similar to an explosion on the ground.

An underwater nuclear explosion occurs underwater without a radiant circle. A mushroom cloud up to a kilometer high forms on the surface of the water. As the water recedes into the ground, a radioactive mist is formed. Later, a water cloud formed, from which radioactive rain fell.

When a nuclear weapon explodes, a lot of energy is released in an instant, so the temperature in the nuclear reaction zone reaches tens of millions of degrees, and the pressure rises to several billion atmospheres. When a nuclear weapon explodes, the flames begin to glow and the sky lights up in a dazzling way. The flame becomes more and more spherical in shape and rises rapidly at high speeds (this light can be seen more than 100 km away). It takes 1 to 15 seconds for a fireball to glow.

During a nuclear explosion, there is a sound like thunder, and then the balloon cools down and turns into a cloud of smoke rising. At the site of the explosion, upward air currents form, which circulate like a well and carry dust and sand from the ground into the sky. This dust-sand mixes with the explosives to form a mushroom-shaped cloud. Depending on the power of the explosion, the height of this cloud is 10-15 km. reaches

The point at the center of the fireball is the center of the explosion, and the surface of that point is the epicenter. The damaging properties of a nuclear charge are most pronounced at the center of an explosion. As it moves away from the center of the explosion, its power also decreases.

Destructive factors of nuclear weapons.

The damaging factors of a nuclear weapon are:

- blast wave or shock wave;
- light radiation;
- transient radiation;
- contamination of places with radioactive substances;
- electromagnetic pulses.

A shock wave consists of a zone of compressed air at a very high pressure that propagates in all directions from the center of the explosion at a speed greater than the speed of sound. The front boundary of the compressed air zone is called the shock wave front. The pressure difference between the maximum air pressure (Rf) and atmospheric pressure (Ro) in the compressed air zone is the high pressure (DRf) at the front of the shock wave.

Once the shock wave has passed, the pressure begins to drop rapidly, and after a while it drops below atmospheric pressure. It will return to its original state over time atmospheric pressure is restored. The pressure created by the shock wave is the compaction phase that lasts longer than the atmospheric pressure, and the depletion phase that lasts less than the atmospheric pressure.

The shock wave travels the first 1000 meters in 2 seconds, 2000 meters in 5 seconds, and 3000 meters in 8 seconds, during which time a person has time to hide when he sees a light beam in the sky and is protected from shock wave damage. The damaging force of a shock wave depends on the pressure generated during the compaction phase. In this case, the dilute phase has no effect, it only enhances the effect of the condensation phase.

Shock waves are a major damaging factor during a nuclear explosion, accounting for about 50 percent of the total explosion energy.

The shock wave damages personnel, military equipment, weapons, fortifications, military property and causes a lot of damage. Personnel may be directly or indirectly affected by the shock wave, ie objects falling from buildings, trees falling or falling, and so on.

The main cause of the damage is a sharp rise in air pressure due to the shock wave. People think of it as a shock, and the person feels the pressure of acceleration, which can cause them to fall or fall. Shock waves can cause a variety of mechanical injuries: rupture of blood vessels and tissues, fractures of bones, rupture of the eardrum, and others.

Shock wave damage is divided into 4 levels.

First degree - minor injury (Rf q 0.2-0.4 kgf2). These injuries are mainly associated with functional disorders: blurred vision, hearing loss, dizziness, speech disorders, and in some cases, closed brain damage. Injured servicemen lose their ability to perform combat missions.

Second-degree injuries (Rf q 0.5 kgsgsm2). These injuries usually involve damage to the internal organs (lungs). Moderate bleeding from the mouth, nose, and ears. In the musculoskeletal system, fractures and fractures of muscle joints, tendons, and bones are observed.

Third degree - severe injury (Rfq> 0.5 kgf2). These people have obvious signs of injury, and they may faint for an hour to a few days. Injuries account for 30% of deaths.

The fourth degree is a very serious injury (Rfq> 1 kgsgsm2). Injuries to such organs are manifested by dysfunction of vital organs - fainting, circulatory and respiratory disorders. Such injured die on the first day and night.

On the battlefield, various shelters, trenches, ditches, ditches and other hidden places are used to protect against shock waves. Shelters, ditches and trenches reduce the impact of shock waves by 3-10 times.

Light radiation is a stream of light emitted from a fiery balloon created by a nuclear explosion and eventually releasing a large amount of heat energy. About 35% of the total energy of a nuclear explosion is radiated by light. The light travels for 8-15 seconds, and the light travels only in the right direction. Any opaque barrier protects against the effects of light radiation (Figure 2).

Light radiation travels long distances in an instant, melting and burning various objects, burning unprotected skin of unprotected people and animals, damaging the eyes, and setting fires in forests and settlements.

The degree of damaging effect is determined by the light pulse, ie the amount of energy per 1 m2 of surface, and is measured in kilojoules per 1 m2 of surface. A light pulse of 100-200 kilojoulesm2 is called a first-degree burn, a light pulse of 200-400 kilojoulsm2 is called a second-degree burn, and a light pulse of more than 400 kilojoulesm 2 is called a third-degree burn.

The damage caused by substances to light depends on how hot they are. The heating of substances, in turn, depends on the following factors: the strength of the light pulse, the properties of substances, the coefficient of heat absorption, humidity, flammability of substances, black fabric absorbs more light than white. For example, black fabric absorbs 99% of light energy, khaki fabric absorbs 60% of light energy, and white fabric absorbs 25% of light energy.

Blinking of the eyes is observed when exposed to light (especially at night, as the pupil dilates). The blink of an eye is temporary. This is due to a decrease in the rhodopsin pigment (dark red) in the eye. If the light is exposed to the eye at close range, the retina burns and permanent blindness develops. That is why it is impossible to look at it when there is a sudden flash of light in the sky.

Figure 2. Light radiation of a nuclear explosion.

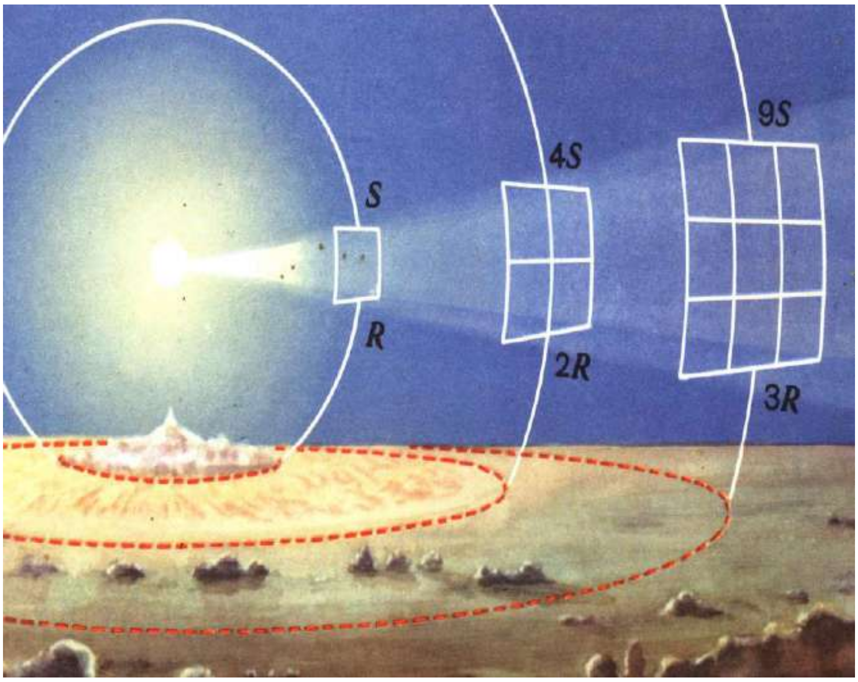


Table 1 shows the approximate range of effects of radiation exposure on humans, depending on the strength of the nuclear charge.

Table 1

Depending on the strength of the nuclear charge (when viewed from a distance of 25 km), the range of human radiation damage is approximately as follows (km).

Damage feature	TNT equivalent				
	1000 t.	20000 t.	1 mln.t.	5 mln.t.	10 mln.t.
3rd degree burns	0,6	2,4	12,8	24,0	32,2
2nd degree burns	0,8	2,9	14,4	28,8	43,2
1rst degree burns	1,1	4,2	22,4	36,4	51,3

Light radiation not only affects people, but also military weapons, equipment, rubber products, parts, sheaths, military equipment, and painted surfaces. As a result, they burn or burn into coal.

Transient radiation consists of a stream of invisible and imperceptible gamma rays and neutrons emitted in a nuclear explosion. It consumes about 5 percent of the energy of a nuclear explosion.

Fifteen to 20 seconds after a nuclear explosion, a nuclear and thermonuclear reaction produces a very strong stream of gamma rays, neutrons, and alpha- and beta-particles. However, transient radiation involves only a stream of gamma rays and neutrons, and alpha and beta particles have a low transmittance due to their short path through the air.

Alpha particles are made up of the nucleus of a helium atom and are made up of two protons and two neutrons. It has a double positive charge and a relatively large mass equal to 4 atomic units of mass. Alpha particles are formed by the decomposition of naturally occurring radioactive elements with an energy of about 2-11 MeV, a path of 10 cm in air, and a few tens of microns in tissues. At the end of its path, the alpha particles attach two electrons and turn into a helium atom.

Beta-particles are electrons or positrons. Each beta particle has a charge equal to one elementary electric charge. Its speed depends on its energy, which is 0.99 times the speed of light. Beta-particle energy ranges from 0.3 to 1.7 MeV. They travel 10-20 m in the air and up to 1 cm in the tissues. The permeability of beta particles is poorly developed. The top - significantly reduces the permeability, car windows or 1 mm thick metal barriers do not allow beta particles to pass through.

Gamma rays are streams of individual photons of light energy that travel in a straight line at the speed of light (300,000 km / s). A gamma photon has no charge and its mass is a very small fraction of its atomic mass. Photon energy ranges from a few tens of kiloelectron volts (KeV) to 2-3 megaelectron volts (MeV). This indicates that its conductivity is much higher. 1 MeV - 1 mln. Let us recall that 1 KeV is 1 thousand electron volts, 1 electron volt is the energy of an electron passing through an electric field with a potential difference of 1 volt.

The path of gamma rays in the air is hundreds of meters, so their transmittance is considered to be infinite. Its permeability is 50-100 times stronger than that of beta particles.

When a 20-kiloton atomic bomb is detonated in the air, the range of its transmitted radiation is as follows: up to 800 meters - 100% death (about 10,000 R dose); At 1.2 km - 75% of deaths (dose of about 1000 R); 2 km - causes grade I-II radiation sickness (50-200 R dose). When a one-megaton thermonuclear weapon explodes in the air, many people die within 3-4 km of the blast site due to the size of the fireball and the high neutron flux.

When a neutron bomb explodes, the transmitted radiation is very strong. If a neutron bomb equivalent to a thousand TNTs were detonated, its shock wave and light radiation would only damage a distance of 130-150 meters. The total amount of gamma neutron radiation is as follows: up to 30 Gr (3000 rad) at 1 km, 8.5 Gr (850 rad) at 1.2 km, 4 Gr (400 rad) at 1.6 km, Up to 2 km is 0.75 - 1 Gr (75-100 rad).

Shelters and structures are used to protect against transient radiation. The higher the density of the shield, the more gamma rays it retains. Therefore, the concept of “semi-attenuating layer” was introduced to find the thickness of the protective material. In this case, the thickness of this material should reduce the amount of transmitted radiation by 2 times (Table 2). The calculation of the thickness of objects is based on gamma rays.

Table 2

Semi-attenuating layer (K0,5), cm

Sources of damage	Density, g-sm^3	Semi-attenuating layer, cm	
		from gamma rays	From gamma divisions
Water	1,0	14-20	3-6
Tree	0,7	15-30	10-15
Soil, earth	1,6	10-14	11-14
Concrete	2,3	6-12	9-12
Armor coating	7,8	2-3	5-12
Lead	11,3	1,4-2	9-12
Steel	7,8	2,8-3	5-12
Snow	0,4	50	-

The following formula is used to determine the protective properties of shelters: Kh q 2Sg'K0,5, where: Kh - protective properties of shelters, S - thickness of the protective layer, K0,5 - semi-attenuating layer. It can be seen from this formula that if the protective substance consists of 2 layers of semi-attenuating layer, the radiation dose is reduced by 4 times, with 3 layers - by 8 times, and with 4 layers - by 16 times. For example, a shelter covered with 112 cm of soil reduces gamma rays by 256 times:

Kh q 2112r14q28q256 times

The protection coefficient (in gamma rays) of field shelters should be 250-1000, ie the shelters should be covered with soil 112-140 cm thick.

Transient radiation ionizes living tissue molecules, disrupts the body's vital functions, and causes various degrees of radiation sickness, sometimes fatal. When a person is exposed to 50 X-rays for a short period of time, there are no significant changes in the body. At present, radiation sickness is divided into mild, severe and very severe. Radiation sickness can be acute or chronic in severity and severity.

Radioactive contamination of places is caused by a nuclear explosion, which consumes about 10% of the energy of a nuclear explosion.

Large amounts of radioactive material formed as a result of a nuclear explosion follow the air flow and spread tens or hundreds of kilometers from the center of the explosion. The floods damage homes, water sources, agricultural products and more. Radioactive substances in the affected areas have a surface effect on humans and animals. These substances enter the body through food and water and act internally, resulting in varying degrees of radiation sickness in humans and animals.

The main causes of radioactive damage are radioactive isotopes or "particles" of decay, some substances become radioactive, and nuclear charges that have not yet decomposed as a result of a nuclear reaction.

Radioactive isotopes or decay particles from the decomposition of uranium and plutonium are the most dangerous sources of damage. It forms more than 200 isotopes of 35 chemical elements, with a half-life of a few seconds to several decades. Due to the decomposition of radioactive decay particles or radioactive isotopes, beta particles and gamma rays are released, which then turn into a stable substance.

The most common isotopes of fission particles are yttrium, tellurium, molybdenum, iodine, xenon, barium, lanthanum, strontium, cesium, and zirconium.

When a nuclear charge explodes, the dust that rises into the sky mixes with isotopes, the products of dust explosions. As a result, the mushroom-shaped cloud becomes radioactive. As a result of radioactive dust falling on the ground and other places, such places and objects are considered to be contaminated with radioactive substances. The half-lives of radioactive particles falling on the ground vary (Table 3).

Table 3

Semi-decomposition of some fission products circuits

Isotopes	Half-life cycles
Radiy-100	30 seconds
Yttrium-95	10 minutes
Indiy-119	18 minutes
Iodine-131	8 days
Barium-140	13 days
Strontium-89	51 days
Strontium-90	28 years
Cesium-137	26 years

The radioactive products of the explosion are radioisotopes with a relatively short half-life and a high percentage of rapidly disappearing. In the first hours after the explosion, the radiation level decreases rapidly (Table 4).

Table 4
Decreased radiation levels

From the explosion then elapsed	Radiation level, in%	Time after the explosion	Radiation level, in%
1hour	100	7 hours	10
2 hours	43	10 hours	6
3 hours	27	1 night and day	2
5 hours	15	2 night and day	

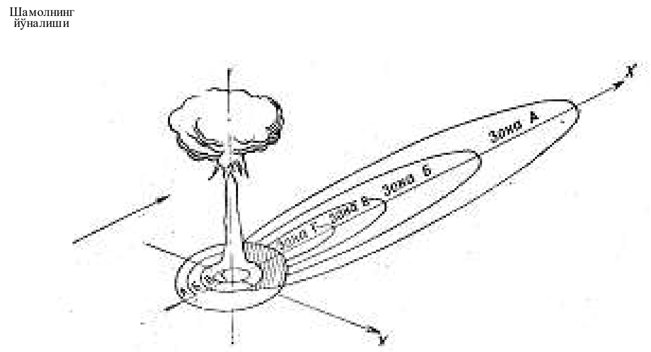
Radioactive isotopes are formed on the surface of various objects and soil under the influence of neutron fluxes. If the stream of neutrons penetrates deeper into the ground, isotopes are formed even in the deepest places.

Nuclear charges that have not yet disintegrated as a result of a nuclear reaction are composed of radioactive uranium and plutonium and emit alpha radiation. It should be noted that the activity of uranium and plutonium here is much lower than the activity of fission "particles". This is because the half-life of uranium and plutonium is long. Therefore, contamination of areas with uranium or plutonium is of little importance. It is dangerous when it enters the body through the gastrointestinal tract. Low-risk isotopes of various elements are also life-threatening substances in the affected areas. For example, iodine isotopes (J131 and J132) affect the human body for 3-4 weeks, as well as long-lived isotopes strontium-90 and cesium-137.

When an atomic bomb is detonated in the air, that atmosphere is not damaged by radioactive substances. This is because the fireball formed by the explosion is much higher than the ground. This creates a small mushroom cloud, which consists mainly of radioactive dust, and rises. As a result, the upper atmosphere and stratosphere are damaged. The resulting radioactive substances consist mainly of the long-lived isotopes strontium-90 and cesium-137. These isotopes come to the surface in many places over the years.

When a nuclear charge explodes on the ground, the surface layer of the earth's surface melts when the fireball touches the ground, and the soil mixed with the explosive products is scattered over long distances by a shock wave. The upward air current that forms at the site of the explosion swells like a well and carries dust, sand, and soil to the surface. It mixes with explosives to form a mushroom-shaped cloud. The resulting cloud moves slowly in the direction of the wind and spreads over long distances. As a result, radioactive substances fall into many places and cause damage. An elliptical elliptical radioactive "trace" remains where the cloud passes with the radioactive material. The farther away from a radioactive cloud trail, the lower the level of radiation and the less impact it has on the human body (Figure 3).

Figure 3. A radioactive trace formed as a result of a nuclear charge explosion.



When a nuclear charge explodes underground, a large amount of soil is released into the air, creating a great depth. A zone of strong radioactive damage is formed in and around this depth. Dust from the ground blows along with the wind, damaging other areas, but the area of damage is much smaller than the area of damage caused by landmines.

When a nuclear charge explodes underwater, all the products of the explosion remain in the water, so the water at the site of the explosion is severely damaged. In addition, rising water is blown away by wind and falls as rain, damaging places and objects. Strong radioactivity of water is observed at the site of a nuclear explosion. The artificial radioactivity of the substances in the water can damage the water source.

The radioactive cloud formed at the center of the explosion moves in the direction of the wind, leaving a long elliptical radioactive "trace" in its passage. The width of the radioactive track is 10 times less than the length. If a 10-megaton thermonuclear bomb were detonated on the ground, it would form a zone of damage of 100 Rgs, 325 km long and 50 km wide. The length of the zone with a radiation level of 0.5 Rs is 100 km.

The time at which radioactive substances fall to the ground depends on the wind speed and is determined by the following formula.

t0 q RgV, where t0 is the time of landing of the radioactive substance, R is the distance from the center of the explosion (in km), V is the wind speed (in km / h).

Electromagnetic pulse and secondary damaging factors. The explosion of nuclear charges causes ionization of the air, and the electromagnetic field is created due to the high-velocity motion of the electrons formed. This results in an electromagnetic discharge and a current. Electromagnetic pulses from the atmosphere propagate like lightning, creating high-voltage currents in antennas, cables, power lines, and wires.

When a nuclear charge explodes on the ground or in the lower parts of the air, the damaging effect of an electromagnetic pulse is observed several kilometers from the center of the explosion. At high altitudes and in the air, a nuclear charge explodes, creating an electromagnetic field in the center of the explosion and at an altitude of 20 to 40 km above the ground. The voltage field is the damaging factor of the electromagnetic field generated. The strength of the voltage field depends on the strength of the detonated nuclear charge, the height of the explosion, the distance from the center of the explosion, and the nature of the environment.

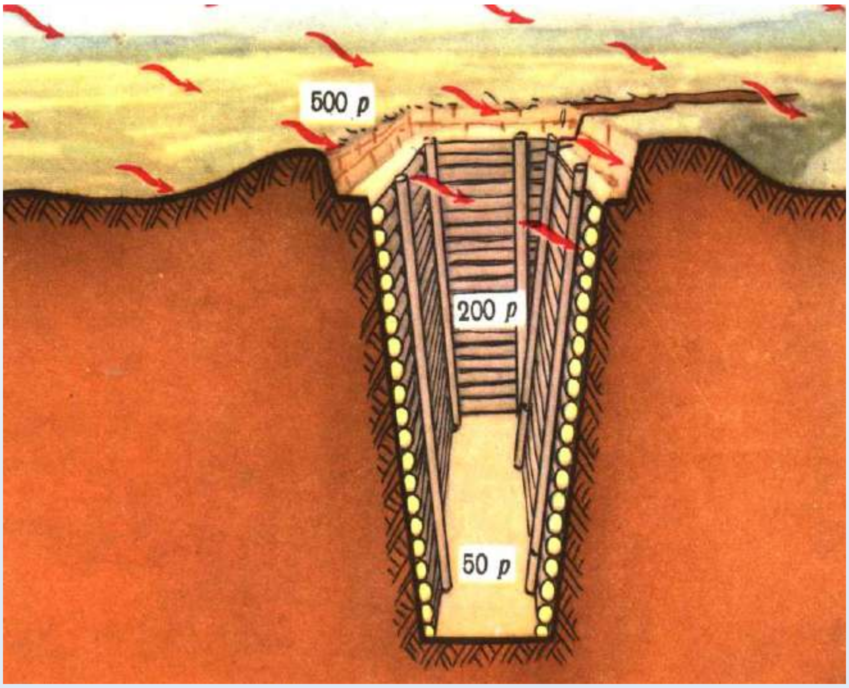
The resulting current disrupts the operation of circuit breakers, insulates radios, electrical appliances, etc., and damages electrical appliances, which can result in electric shock to people working with them.

Devices need to be shielded to protect them from electromagnetic pulses generated by a nuclear explosion. All external power lines must be double-stranded and well insulated.

Secondary damage caused by a nuclear explosion is caused by emissions of gases and highly toxic substances from fires in oil refineries and chemical plants. This causes mass burns and poisoning. The shock wave will damage hydraulic structures and dams. As a result, military units and residential areas will be flooded. And that leads to a lot of deaths.

In order to prevent such disturbances and destruction, protective engineering works should be carried out on the lands and enterprises where military units are located (Figure 4).

Figure 4. The attenuation property of the trench radioactive rays.



Combat radioactive substances

Combat radioactive substances are the second type of nuclear weapon based on the use of the biological effects of radioactive substances.

The difference between radioactive substances and radioactive substances formed by the explosion of nuclear warheads is that these substances can be prepared in a special way and mixed with smoke, liquids, dust, and even ordinary toxic substances. Combat radioactive substances are obtained in two ways. In the first method, radioactive substances are obtained as by-products in the production of plutonium, which is needed to make atomic bombs. In the second method, it is obtained by irradiating inactive chemical elements (sodium, silicon, etc.) with a stream of fast-moving neutrons in the same atomic boiler. As a result, radioactive isotopes of these elements are formed, which can be used as combat radioactive substances.

Radioactive shells, aerial bombs, artillery shells and mines are used to damage places, air, water sources, food and many other objects with radioactive substances.

Alpha, beta, and gamma radiation are the most damaging factors for combat radioactive substances. These rays have a strong effect on the body.

The radioactive substances do not have any odors or other symptoms, so they can be detected only with the help of special dosage instruments.

Radioactive shells, aerial bombs, artillery shells and mines are used to damage places, air, water sources, food and many other objects with radioactive substances.

Different levels of radiation sickness develop when a living organism is irradiated with a radioactive substance, such as a radioactive substance formed as a result of an atomic charge explosion, or when it enters the body through air, food, or water.

In addition to the advantages of combat radioactive substances, there are also disadvantages:

-decreases its activity over time due to its spontaneous decomposition. Therefore, large quantities of radioactive substances cannot be produced in peacetime;

-military radioactive substances are difficult to emit due to their strong gamma-ray emissions, making them difficult to store and protect;

- when it is necessary to use a radioactive substance, the weight of the means of application increases and the structure of the devices used to damage objects becomes more complicated.

Tactical classification of the sources of damage caused by a nuclear explosion

Areas damaged by a nuclear explosion are called hotspots. It is divided into the following zones, depending on the amount of excess pressure at the front of the front of the shock wave: the zone of destruction, the zone of strong collapse, the zone of moderate collapse and the zone of less collapse.

In a furnace damaged by a nuclear explosion, military personnel are exposed to the damaging factors of a nuclear weapon: shock waves, light radiation, and transient radiation all at once in high and high-energy form, resulting in mass sanitary losses. will be. They number in the hundreds and thousands. When a nuclear charge explodes on the ground (underground, above water, and under water), in addition to the above factors, the radioactive substances formed at the center of the explosion and the gamma rays emitted from the "trace" left by the cloud of radioactive substances in places. The amount and nature of the resulting sanitary losses will depend on many factors, including where the nuclear charge was detonated and its capacity: the nature of the combat operations in the military units; relief of places; weather conditions; timely use of protective equipment of military equipment and engineering structures; depends on the combat capability of the military units and many other factors.

Sanitary losses vary depending on the explosion of nuclear charges. For example, medium- and large-caliber (20-100-500 kilotons) nuclear warheads result in injuries and burns that result in injuries to many fighters, including those exposed to partial gamma-neutron radiation. Combined injuries are common among fighters when small and very small nuclear charges and neutron bombs explode. This can lead to more burns and injuries, or just radiation damage. Combined radiation damage can range from 10-20 percent to 20-30 percent of total injuries. Depending on the degree of injury and damage, it can be as follows: severe damage up to 30-40%, moderate damage up to 30%, and light damage up to 20% (Table 5).

Table 5

Type of injuries	Volume of injuries (as a percentage)
Injuries	3,5-4,9
Burns	5,7-7,8
Acute radiation sickness	3,1-4,7
Injury Q burns	54,5-59,1
Injury Q Acute radiation sickness	3,1-6,9
Burns Q Acute radiation sickness	4,9-7,9
Injury Q burns Q Acute radiation sickness	13,9-19,0

Thus, the damage caused by a nuclear explosion and the sanitary losses that occur in this furnace are as follows:

- there are many and sudden sanitary losses in the places of nuclear explosions;
- combined lesions are common, they are characterized by their severity;
- 50-60% of infected people need urgent medical attention.
- combined lesions are common, they are characterized by their severity;
- the skin and scalp of infected people are contaminated with radioactive substances, so such people need special sanitary treatment.

In addition, all victims remain in areas that have been severely damaged and in areas contaminated with radioactive substances. All of this calls for immediate assistance from the personnel of the disaster relief unit. As a result, they also get damaged. This makes it difficult to evacuate victims. First aid is provided at the site of the injury. In this case, the victims provide medical assistance to themselves or to each other. Assistance is also provided by paramedics or health instructors.

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Acute radiation sickness

Acute radiation sickness is a common disease of the body and is caused by exposure to radiation doses of 1 Gr (100 rad) or more. The degree of exposure to ionizing radiation depends on the amount of light that passes through the body. The unit of radiation for living tissue is gray, which is equal to 100 rad.

It is now accepted to divide the clinical manifestations and course of acute radiation sickness into four stages; light, medium, heavy and very heavy. A mild form of the disease occurs when 1-2 grams of radiation is taken. Very severe stages are observed when 2–4 Gr of intermediate stage, 4–6 Gr of severe stage, and more than 6 Gr of radiation are obtained. Radiation at a dose of 1–10 Gr mainly damages the bone marrow, so this type of acute radiation sickness is called a bone marrow disease. In addition to the blood-forming organs, the intestinal epithelium is damaged when a person is exposed to radiation at a dose of 20 Gr or more. Intestinal injuries may not cause significant changes in the blood-forming organs, but those who do die may die quickly.

Toxic and cerebral forms of acute radiation sickness develop when a person is exposed to very high doses of radiation, in which the irradiated person dies within a few hours, sometimes a day.

One of the hallmarks of acute radiation sickness is its periodicity. There are four periods: the initial period or the period of the body's initial reaction to radiation; latent period or period of clinical calm; the period of exacerbation or the period when all the symptoms of the disease appear; recovery period.

Early stages of the disease. The initial symptoms of the disease depend on the amount of radiation and appear accordingly. At low doses, the reaction is observed within 18 to 24 hours, at moderate doses - 4 to 10 hours, and at high doses - within 1 to 3 hours. Initial symptoms include malaise, drowsiness, nausea, and sometimes vomiting, low blood pressure, and fever. High levels of radiation can cause recurrence, which can lead to fatigue and loss of consciousness.

Hidden period. The above clinical symptoms disappear after 3-4 days, the duration of this period lasts from 5 days to 14-21 days. The general condition of the patient improves, but changes in peripheral blood increase, lymphopenia develops, thrombocytopenia and leukopenia with a decrease in the number of reticulocytes increase.

The period when the disease is at its peak. Clinical symptoms develop rapidly and are severe. Rapid fatigue, subcutaneous hemorrhage, hair loss, necrosis of the oral mucosa, sore throat. In the severe form of radiation sickness, in addition to the above symptoms, severe wound-erosive enterocolitis develops, body temperature rises.

Grade 1 radiation sickness (mild) develops under a radiation dose of 1-2 Gr (100-200 r). After 3 to 5 hours, the affected person may experience nausea, vomiting, weakness, and headache. Appetite may be lost. There are almost no changes in the blood or bone marrow. The latent period can last up to 30 days. The disease is mild and the asthenic condition persists for 1 to 2 weeks.

Grade 2 radiation sickness (moderate) occurs when exposed to a radiation dose of 2–4 Gr (200–400 r). The first clinical symptoms of radiation appear two hours after irradiation and last for 1-2 days. Symptoms include general weakness, headache, dizziness, nausea, and recurrent vomiting. The latent period lasts up to 3 weeks.

During the onset of the disease, the person complains of feeling unwell, fever, and sometimes bleeding. This period lasts 2-3 weeks. Healing will be gradual.

Grade 3 radiation sickness (severe) is caused by exposure to 4-6 Gr (400-600 r) of radiation. 30-60 minutes after exposure to light, the victim vomits repeatedly, develops severe headaches, severe weakness, adynamism, and agitation. This period can last up to 3-4 days. The incubation period is 1-2 weeks. During the development of clinical symptoms, the general condition of the affected person deteriorates sharply, and cases of prolonged malaria, body tremors, and sweating develop. Bleeding under the skin and mucous membranes, bleeding from the nose, stomach and intestines. Hair loss, swelling of the oral mucosa, ulcerative necrotic stomatitis, gingivitis, tonsillitis, pneumonia, weight loss. The onset of the disease is 1.5 to 2.5 weeks.

Level 4 radiation sickness (severe) develops when exposed to an radiation dose greater than 6 Gr (600r). After 15 minutes, the onset of the disease is strong. The victim begins to vomit incessantly, develops adynamism, psychomotor agitation. The skin and mucous membranes become red and the body temperature rises. The first symptoms appear in 3-4 days. Death occurs by the end of the second week.

CHAPTER TWO

GENERAL DESCRIPTION OF THE CHEMICAL WEAPON

General classification of toxic substances

All toxins are classified differently depending on their effects, intended use, and other characteristics.

Toxicological, tactical and chemical classifications are widely used.

Toxicological (clinical) classification

Toxic substances are divided into the following similar groups depending on the clinical symptoms caused by exposure to toxic substances, the nature of the pathological process, medical care, treatment methods and generality of organizational work:

1. Toxic substances that have a paralyzing effect on the nerves: sarin, zoman, V-gases.
2. Toxins that can cause skin ulcers: mustard gas, nitrogen mustard gas, lewisite.
3. Toxic substances with psychochemical effects: diethylamide of lysergic acid (DLK), BZ (Bi-zet).
4. Toxic substances with active properties:
    a) Toxic substances affecting the upper respiratory tract and nasal mucosa (sternitis): adamsite, diphenylchloroacin, diphenylcyanarcin;
    b) Toxic substances affecting the conjunctiva (tear gas or lacrimators): bromobenzylcyanide, chloroacetophenone, Si-es (CS) and Si-ar (CR).
5. Toxic substances with general toxic effects: cyanic acid, chloric acid.
6. Toxic substances with choking effect: phosgene, diphosgene.

Military-tactical classification. Toxic substances are divided into two groups depending on the nature and effect:

- lethal poisons (toxic substances that paralyze nerves, cause skin ulcers, have general toxic and suffocating effects);
- the use of temporary decontamination poisons reduces the performance of military forces (psychochemical and toxic substances).

Toxic substances are divided into two main groups depending on their toxicity:

- toxic substances that rapidly reveal the clinical picture of poisoning;
- toxic substances that slowly develop the clinical picture of poisoning.

Rapidly acting toxins include sarin, zoman, V-gases, cyanic acid, chrysanthemums, as well as toxins that affect the mucous membranes of the eyes and upper respiratory tract.

When these substances are exposed to the body, the appearance of poisoning develops in a few minutes (organophosphorus poisons, cyanide acid) and death occurs in 1-10 minutes.

Slow-acting toxins include mustard gas and phosgene.

Clinical symptoms develop slowly when V-gases affect the skin.

When these substances affect the body, a latent period can be observed without any symptoms of poisoning.

This period can last from a few minutes (V-gases) to several hours (mustard, phosgene).

In the area where the chemical weapon is used, a source of chemical poisoning is formed, the size of which depends on the amount of poison (ZM) used, the type of ZM, the method of use and weather conditions.

Toxic substances are divided into resistant toxins and non-resistant toxins, depending on how long they can retain their toxic properties.

Resistant toxins are liquids that have a high boiling point (above 150 ° C).

It evaporates very slowly during use and lasts for a long time (from an hour to several nights, weekly in winter).

This group of toxins includes organophosphorus toxins (sarin, zoman, V-gases) and skin lesions (mustard, nitrogen mustard, lewisite).

It should be borne in mind that the resistance of the applied toxins depends not only on their physical and chemical properties, but also on the method of their use, weather conditions and topography.

If the temperature of the air and the ground rises to 100 C, the evaporation of toxins will double.

Evaporation also accelerates when the wind blows.

Toxins persist for 7-10 times longer in forests, trees, crops and ravines than in open areas.

Non-volatile toxins - these substances are also in liquid form and have a very low boiling point. Retains toxic properties in open areas for up to several minutes. Therefore, it is mainly used for air pollution. When these substances are used, they evaporate quickly and form a cloud of toxins, which move in the wind and sometimes reach 10-15 km. Roads include buildings, streets, courtyards, basements, cliffs, and other areas where wind is less likely to be affected. Substances in this group include phosgene, diphosgene, cyanide acid, chloric acid.
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It evaporates very slowly during use and lasts for a long time (from an hour to several nights, weekly in winter).
This group of toxins includes organophosphorus toxins (sarin, zoman, V-gases) and skin lesions (mustard, nitrogen mustard, lewisite).

Chemical classification

Toxic substances are divided into the following chemical groups:

- organophosphorus compounds - sarin, zoman, V-gases, binary organophosphorus toxic substances;
- haloidated sulfides, mustard gas and its analogues;
- Compounds containing arsenic - arsenic - lewisite, adamsite, diphenylchloroarcin, diphenylcyanarcin, etc .;
- haloidated carbonic acid derivatives - phosgene, diphosgene;
- nitriles - cyanic acid, chloric acid, CS;
- benzyl acid derivatives (benzylates) -BZ.

Physical and chemical properties

Toxic substances include substances that not only have high toxic properties, but also have a number of physical and chemical properties that allow them to be used as weapons of mass destruction.

Boiling and liquefying temperatures play a key role in the definition of a toxic substance.

The volatility of a poison depends on its boiling point. Most toxins are in the liquid state, which can be divided into low-boiling and high-boiling substances, depending on the boiling point of the liquid. Toxins that boil at low temperatures evaporate quickly and form high concentrations in the air, but they remain in place for a short time. Toxic substances that boil at high temperatures evaporate very slowly when used, and their toxicity is strong due to their long-term storage in places of use.

Volatility of the poison. This is the maximum amount of saturated toxins in the air at a given temperature and air pressure.

Saturation of the air with toxic fumes is possible only under special conditions, so their concentration in the air is much lower than that of volatile substances when used on the battlefield. Volatility is usually measured in milligrams (mg) per liter of air. The volatility of a toxic substance depends on its boiling point and the hardness of its vapors, so substances with a low boiling point (phosgene, cyanide acid) evaporate quickly, while substances boiling at high temperatures evaporate slowly. These indicators indicate the stability or instability of the toxin at the site of application.

The density of toxic fumes is determined by the ratio of one liter of steam or gas to one liter of air. For example, the density of phosgene vapor is 3.5. Low-density toxins and gases are rapidly released into the atmosphere, which prevents them from maintaining long-term combat concentrations on Earth. Therefore, cyanic acid (despite its strong toxic effect) is not widely used on the battlefield. During World War I and today, the concentration of toxins in the air is much higher than in the air.

Vapors of high-density toxins are stored for a long time in places where there is no wind, in pits, ravines, ditches, trenches and other places.

The specific gravity of liquid contaminants is important in assessing the degree of contamination of water bodies. Toxins with high relative weight are stored in the lower layers of water bodies for a long time.

Hydrolytic stability ensures that toxins are stored for a long time in wet areas and during rains.

In addition, the non-hydrolysis or resistance to hydrolysis reactions of toxic substances makes it difficult to degass contaminated sites, structures, military equipment and military property.

Modern highly toxic substances such as sarin and zoman have high hydrolytic stability.

It is important to determine the resistance to acids and alkalis in terms of degassing of contaminated areas and military property.

For example, sarin and zoman are well degassed with alkalis (novshadil alcohol, caustic soda).

Organophosphorus V-gases are more resistant to alkalis, so the degassing of these substances uses active chlorine-containing substances (calcium hypochlorite, chloramine, dichloramine, etc.).

Generally, most toxins are resistant to alkalis.

The specific gravity of liquid contaminants is important in assessing the degree of contamination of water bodies. Toxins with high relative weight are stored in the lower layers of water bodies for a long time.

Resistance to oxidizing and reducing agents is one of the most important properties of combat toxins.

Changes in the molecule of a toxic substance are manifested by a partial or complete loss of the toxic properties of the toxic substance. Therefore, the substances used in the degassing of toxic substances have strong oxidizing and restorative properties. Common deoxidizers with strong oxidizing properties include chlorinated lime, monochloramine, and dichloramines. In addition to the oxidation reaction, chlorination of other toxins occurs when these agents are used, resulting in the neutralization of the toxins.

Containers containing toxic substances should be less reactive to tanks, barrels, etc., as well as materials such as bombs, mines, shells, artillery shells, etc.

Enemy chemical attack tools

According to foreign media, the toxins will be delivered to the destination, primarily by air. Air bombs filled with various toxic substances are divided into explosive devices: those that explode under the influence of impact, and those that explode with remote-controlled devices. Chemical aerial bombs that explode under impact are designed to poison the atmosphere or certain areas and may contain phosgene, mustard gas, or zoman-type toxins. Aerial chemical bombs that explode under impact typically weigh between 100 kg and 1,000 kg.

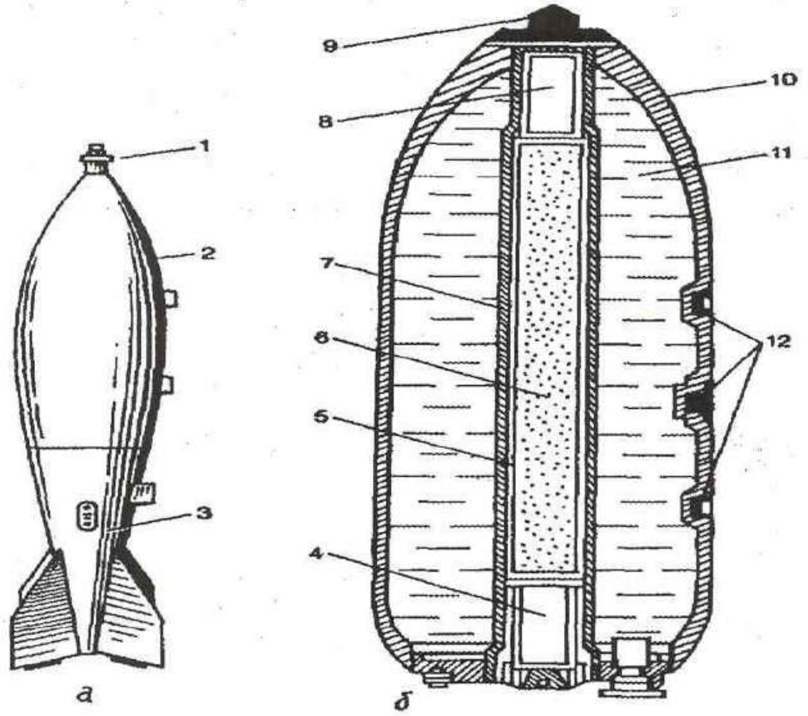
Toxins make up 50 percent of the bomb's weight (Figure 5).

Aviation chemical bombs used to damage an enemy's live force are detonated at a slightly higher distance from the ground.

These bombs will be filled with resistant poisons (zoman, mustard). Lightweight (3 kg or more) cluster aerospace chemical bombs may also be used. It consists of several small bombs, and at a certain height, the cassette opens and these small bombs scatter and damage large areas when they fall to the ground and explode.

Cassette bombs are filled with poisonous substances (CS, CR) that can be used against the accumulated forces of the enemy.

Figure 5. Chemical bomb MS-1 weighing 750 pounds: a-general view; b - cut appearance; 1-9 head explosive device; 2-10 shells; 3- stabilizer; 4-8 bushings; 5- cylinder made of corrugated cardboard; 6- explosive charge; 7 explosive charge cup; 11- poisonous substance; Hooks for hanging the 12th bomb.



Sprinklers (Fig. 6) are filled with liquid poisons, hung under the wings or fuselage of the aircraft and sprayed on the fortifications from a height of 300-500 meters.

Missile vehicles. Missiles are widely used in the event of a chemical attack.

The armed forces of foreign armies have guided and unguided missile vehicles to deliver chemical weapons to the desired location.

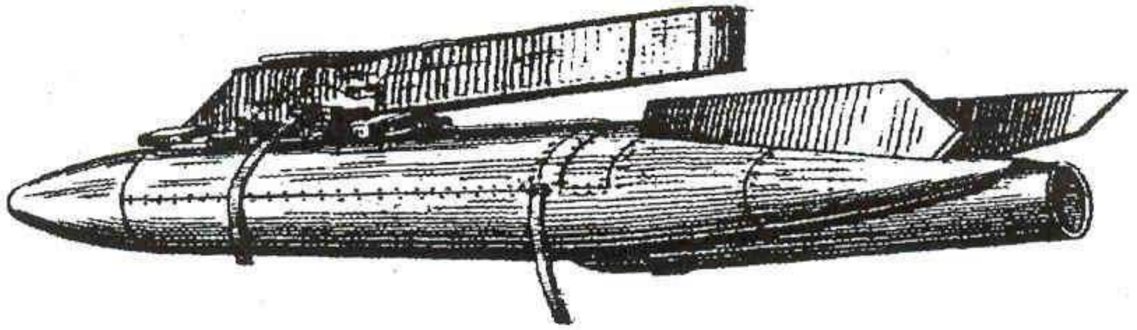
The range of unguided jet projectiles is 40 km.

The range of guided missiles is 5-140 km.

The combat part of these jet shells consists of a cassette, which consists of several spherical bombs that can be filled with sarin, zoman, etc. from poisonous substances (each spherical bomb weighs 0.6 kg). .

The combat chemical part of the missile automatically opens at an altitude of 1.5-3 km, and the spherical bombs spread to 1 km2, explode on the ground and damage a certain area.

Figure 6. TMU-28GV sprayer.



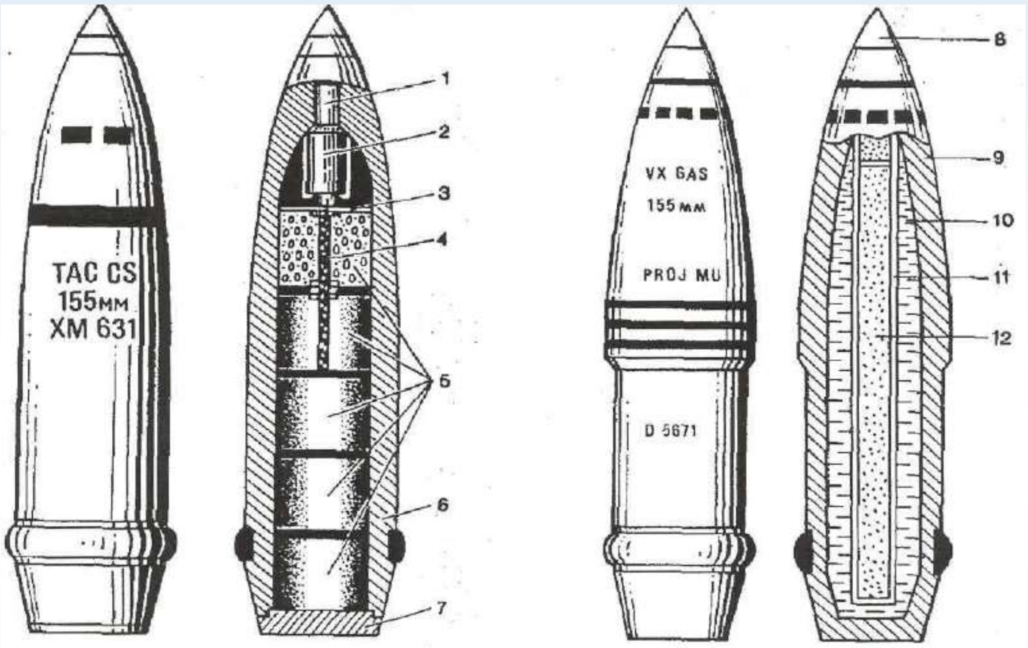
Jet mortars fired from multi-barrel devices are filled with sarin or V-gases from poisonous substances, which injure many areas and people, and the range of the devices is 2.7-11 km.

Artillery chemical shells and mines - (Figure 7).

Foreign armies currently have 105, 155, 175, 203.2mm cannons and howitzers designed to fire.

These shells are filled with V-gases, sarin, expelled mustard gas and CS (Si-es) toxins. The range of howitzers is 16-18 km, the range of cannons is 32 km.

Figure 7. 115 mm chemical artillery shells: 1 and 8 explosives; 2- powder charge; 3-diaphragm; 4- perforated reed; 5- checker of poisonous substances; 6.9 shell; 7- the lower part of the shell; 10 poisons; 11 explosive charge top cup; 12- explosive charge.



In addition, chemical mines for 106.7 mm mortars were produced, with a range of 5.5 km.

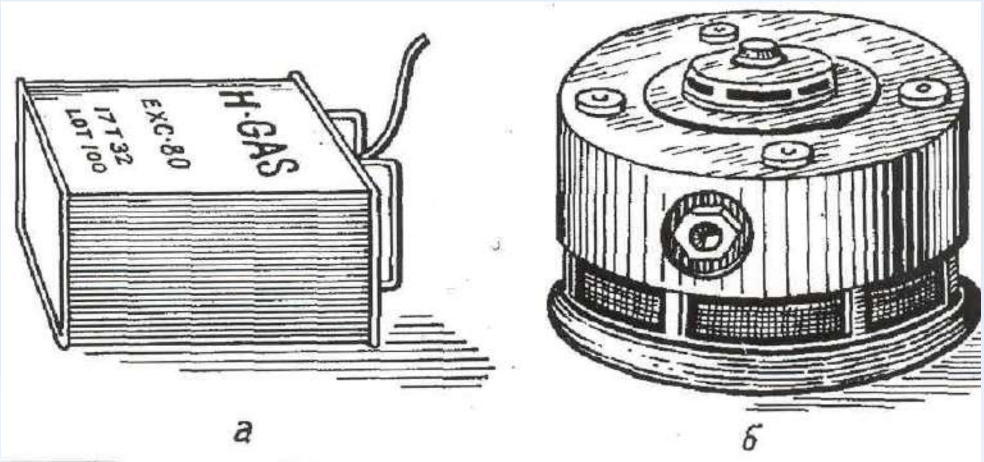
Chemical explosives (Figure 8) are used to damage enemy living forces, areas, as well as barriers and roads.

M1, M23, AVS-M23 bombs are currently stored in foreign armies. These bombs will be filled with V-gases, sarin and other toxins. The blast damaged an area of about 12.5 square meters or more. A detonating cord is used to blow them up.

Aerosol generators are used to pollute the air. Si-es, Si-ar, Bi-zet, chloroacetophenone, adamsite and others are used as aerosols. Aerosol generators are mounted on cars that spray poison on both sides and back as they move.

Chemical hand grenades and smoke grenades are filled with toxic substances. They are mainly used to disperse demonstrators and protesters.

Figure 8. Chemical explosives: a - MI type explosives; v - M23 model fugas.



Damage to toxic substances weather and location effects

Air, soil and low-lying areas have a major impact on air and ground contamination. Air and soil temperatures affect the shelf life of soil-resistant toxins. At low temperatures (winter), mustard evaporates very slowly and can be stored in the soil until spring. In summer, mustard evaporates several times faster and is stored in the soil for only a few hours, and even less in Central Asia.

In cancer, droplets of resistant toxins on the ground evaporate quickly. In heat, the time of absorption of the toxic substance to the ground decreases, and the concentration in the air increases. When the weather is cloudy, when there is no rain, when there is a light wind, the toxins are stored longer.

Uneven heating and cooling of the air and soil cause the air to spread rapidly when the toxin is mixed. This makes it difficult for the enemy to generate high concentrations of toxins in a particular area.

On clear days, when the sun is shining, the toxins rise from the ground and spread rapidly. At night, the air does not mix, which allows the enemy to use unbearable poisons. Toxic air travels very slowly at night and stays long in streams, windless places, ditches, trenches. Wind significantly reduces the concentration of toxic substances in the air. Strong winds increase the evaporation of the toxin from the ground, which helps the earth get rid of the toxin faster.

The properties of the soil, the soil and the plants also affect the concentration of toxins.

Toxic air in canyons lasts longer and is more toxic to humans. Low-altitude areas prevent the spread of toxic air. Poisonous air in thick trees and gardens can last for hours. Irrigated lands and shrubs reduce the evaporation of the toxin, and the toxin is stored longer in the open than in the open. Toxins evaporate faster when they come into contact with moist and porous soils, and do not last long in rocky soils.

If the enemy tries to use chemical weapons in Central Asia, it will be affected by temperature, soil, low altitude, calm weather and vegetation.

In summer, the soil temperature rises to 40-60 0C. Therefore, toxins can persist for several minutes. As the rate of evaporation increases at the top of the contaminant site, the concentration of persistent toxic fumes decreases. In the case of convective airflow (convection is the rise of a warm, light air stream in the earth's crust), the combat concentration of the toxin is never high. This is because vapors and aerosols of persistent toxins rise rapidly and merge with the air stream. As a result, the poisoned air can spread for 3-4 km.

In the case of inversion, the air flow in the earth's crust is colder and heavier than in the upper layers. This condition is observed at night, early in the morning, and on clear winter days. In this case, the air flow is distributed over the surface of the earth's crust, so when the toxic substance is applied, it is observed that it spreads over long distances (20-40 km) at high concentrations of vapor.

In the case of isotherm, the temperature of the air layer on the surface of 20-30 meters is the same, there is no upward movement of air. This happens in the morning, in the evening and on cloudy days. The resulting cloud of toxins can be blown up to 12 km by the wind.

Resistant and non-resistant toxins are less harmful in Central Asian climates. Some toxins may not work at all during the day during the summer. Due to the high temperature of the soil in the summer, in some cases it is not necessary to decontaminate the area where the contaminant fell. Under these conditions, toxins in vehicles and other objects can degrade naturally (spontaneously) very quickly. Thus, there is no need to expend effort and resources to eliminate the consequences of the chemical attack.

Finally, the impact of chemical weapons depends on the organization of protection, the adequacy of protective equipment, the timely detection and prompt reporting of toxins, the ability of the armed forces and the population to provide medical care, and more.

More than 10 to 30 percent of military personnel are injured where poisons are used. Where clouds of toxic substances are present, the figure is 8-12%.

Losses at this rate are largely due to the failure of the defenses and the extent to which the fighters use the defenses.

Toxicological effects of toxic substances

The efficacy of each synthesized toxin is tested primarily in animals in experimental laboratories. Only on the basis of pathophysiological, biochemical, morphological, clinical and other experiments conducted on the basis of highly modern studies in animals, military theoretical toxicology studies the mechanism of action of toxins, pathogenesis of poisoning, antidote treatment and prevention of poisoning. turns out. In addition, these experiments determine the local and general effects of the substance on animals, its good absorption through the respiratory tract, gastrointestinal tract, undamaged skin and mucous membranes, and the degree of its toxicity.

Toxic substances are chemical compounds that are present in the atmosphere in various aggregate states (vapor, gas, aerosol, liquid droplets) and have the ability to kill people and animals at the point of fall.

Toxins must meet a number of tactical and toxic requirements, as knowledge of the basic properties of the toxin allows for the timely and correct implementation of protective measures in the event of a chemical attack. The toxicity of the toxins must be so strong that they can cause severe and even fatal poisoning in a short period of time, even if they enter the body in very small amounts.

Poison is a highly toxic substance that enters the body, albeit in small amounts, and disrupts or kills its normal function.

Poisoning is the disruption of normal physiological processes in the body as a result of exposure to a toxin. Poisoning depends on the amount of toxins that enter the body, the general condition of the body, and how the toxins enter the body.

Toxicity is the ability of chemical toxins to disrupt the life of an organism. Toxicity of toxins depends on their physical and chemical properties and structure.

One of the main factors determining the effects of poisoning is how much or in what concentration they affect the body. The concept of poison is always associated with the dose and concentration of the substance.

A dose is a quantity of a substance expressed in units of weight and expressed in mggkg.

The concentration of a toxic substance is the amount per unit volume. Concentration is expressed in liters (mggl), (gg'l), (gg'm3), grams or milligrams. The degree of contamination of water and air is thus determined.

The amount of a toxin per unit area is called the toxicity density. One square meter of toxic substance is expressed in grams (ggm2).

This is how the level of contamination of fields, places, roads and equipment is expressed.

In military toxicology, the following concepts are used to determine the level of toxicity of toxic substances:

- Permissible concentration and dose - no changes in the human body, even if the toxin is exposed for a long time;
- threshold dose or concentration - with mild clinical symptoms, decreased ability to work and combat readiness;
- average detoxification dose and concentration-50% of people and servicemen lose their ability to work and fight, and are characterized by signs I□□, IC50. Here I is the first letter of the English word Incapacitating, meaning incompetent;
- an lethal dose and concentration - 50% of poisoned people die and are characterized by CL50, DL50;
- absolute lethal dose or concentration - it kills 90-100% of the victims and is characterized by CL100, DL100.

The pathogenesis of a toxin depends on the biotransformation of the toxin in the body.

If a small amount of a toxin is excreted over a period of time, it will gradually accumulate in the body. As a result, the potency and duration of exposure to the toxin increases, resulting in accumulation. There are two types of accumulation:

1. Material accumulation - in which the toxin accumulates in the body in its pure form.

2. Functional accumulation - the toxin accumulates in the body.

Although the toxin accumulates in the tissues, it does not cause irreversible changes in them, but has a strong effect on its function.

Therefore, the dose and concentration of toxins entering the body are crucial.

Toxic substances in the body ways to go down

Toxins can enter the body in a variety of ways, including through the respiratory tract, gastrointestinal tract, skin, mucous membranes, and wounds (Figure 9).

Depending on the method of application of toxic substances, their physical, chemical and toxicological properties.

Some of these substances enter the body through the respiratory tract, while others enter through other routes.

Toxic substances often enter the respiratory tract in the form of vapors and aerosols. The toxin that enters the airways is trapped in the mucous membranes and is partially absorbed into the blood through the alveoli of the lungs. If the alveoli of the lungs are spread, its surface area spreads to an area of about 90-100 m2, so it is the first in the clinic of respiratory poisoning, which means that the clinic of poisoning develops rapidly.

When certain toxins enter the body, they can have a local effect on the mucous membranes of the respiratory tract and intrareceptors in the lung tissue. When exposed to a reflector, it has a general effect on the body. The lungs are a reflexogenic zone rich in nerve endings.

Inhalation poisoning is called inhalation poisoning, which is very dangerous. Gas masks are used to protect the respiratory tract from toxins.

It is also important that toxins enter the body through the gastrointestinal tract. When inhaled, the toxins trapped in the mucous membranes are mixed with saliva and swallowed when they enter the oral cavity. Gastrointestinal poisoning is usually caused by inadvertent consumption of contaminated water or food.

Toxins that enter the gastrointestinal tract are mainly absorbed in the intestine.

Toxins that are well soluble in lipids are well absorbed in the mouth and gastrointestinal tract. Absorption of lipid-soluble and insoluble toxins into the blood from the intestinal mucosa due to slow diffusion or easy diffusion. Water-soluble toxins are absorbed in the colon.

Figure 9. Ways of entry of toxins into the body.

Toxins that are absorbed from the gastrointestinal tract enter the blood and lymph vessels and spread throughout the body and tissues. Toxins enter the liver before entering the large circulatory system, where some of them are neutralized by the liver's microsomalenzymes. Toxins that are not absorbed into the bloodstream are excreted in the feces.

Another important route for toxins to enter the body is through the skin. There are three ways of crossing: through the epidermis, through the hair follicles and through the sebaceous glands. Toxins that are well soluble in lipids (organophosphorus toxins, mustard gas, lewisite, etc.) are rapidly absorbed by the body through the skin. When a person's skin is red and sweaty, the absorption of toxins is much easier.

In addition, the rapid absorption of water and its solubility in water play an important role in the toxic effects of toxins entering the body through the skin layer. Toxins that pass through the skin can enter the large circulatory system without entering the liver. Special protective equipment is used to protect the skin from toxins.

In addition, toxins can enter the body through wounds and injured surfaces in the skin layer. Poisoning does not occur quickly in the presence of bleeding wounds, because the blood flowing through the wounds partially washes away the toxins. If the injured person is also poisoned by toxins or radioactive substances, they are called **combined poisonings.**

Treatment of poisoning and prevention of poisoning

The main measures to be taken to prevent the use of weapons of mass destruction by the enemy are:

- Personnel will be informed in a timely manner that the enemy is preparing to use weapons of mass destruction and that there is a risk of attack. The purpose of this operation is the timely destruction of attack aircraft, missiles, special equipment and others. These activities are carried out by the military command:

- engineering (fortification) measures are taken to protect the situation occupied by military units, cities and other settlements from weapons of mass destruction;
- continuous introduction of radiation, chemical and biological conditions;
- attempts to avoid the effects of mass weapons;
-organize and conduct medical care for poisoned people at the site of chemical poisoning and during the evacuation of patients;
- The consequences of the enemy's use of weapons of mass destruction will be eliminated in time.

In the event of a chemical poisoning, people should seek immediate medical attention.

First aid is provided to servicemen using personal medical kits (AI-2), personal packages (IPP-8, IPP-9, IPP-10) for themselves and each other, as well as by paramedics and sanitary instructors, civil defense conducted by sanitary posts and sanitary squads. Pre-hospital care is then provided at the Battalion Medical Center (BTP), the Special Medical Unit (ATO), the Military Garrison Medical Hospital (GTG), and the Central Military Clinical Hospital (CMCH).

Etiological, pathogenetic, symptomatic, and specific treatments are used to treat general poisoning.

Etiological treatment is aimed at preventing or eliminating the etiological factors that cause disease or poisoning in the body, and includes the following measures:

-immediate respiratory and skin protection;
- Toxins on the skin should be degassed immediately, the poisoned top should be replaced if possible;
- Prompt removal of gastrointestinal toxins from the stomach (gastric lavage with a probe), administration of adsorbents (activated charcoal);
- antidote to poisons;
- use of other means and methods (accelerated diuresis, hemodialysis, peritoneal dialysis, hemosorption, lymphosorption, blood transfusion, etc.) to neutralize toxins entering the body. It is important to remember that if the toxin is not completely eliminated from the body or its entry into the body is not stopped, the treatment will not be useful.

Toxins that can paralyze the nerves

Toxins that have the effect of paralyzing the nerves are currently the most potent and rapidly lethal of all toxins.

Among the chemical weapons in the armies of foreign armies, the main chemical weapons are sarin, zoman and V-gases.

In 1939, in-depth research in Germany led to the synthesis of a poison called "trilon-46" or "trilon-144", which has more toxic properties than the taboo poison, and later this poison was called "sarin" as a military code. In late 1944, the toxin zoman was synthesized.

Since 1939, research has been carried out in England on the synthesis of toxic substances on phosphoric acid derivatives, and in 1944-45 the synthesis of the toxic substance diisopropyl fluorphosphate was achieved. This substance was adopted by the military as a chemical weapon.

To date, more than 12,000 organophosphorus compounds have been synthesized and are widely used in agriculture and industry. For example, metaphos, methyl nitrophos, carbophos, sidal, fazalon, sayfos, etc. are used in agriculture as insecticides and acrids. It is widely used in industry in flotation of ores, polymerization, production of plasticizers, production of non-combustible plastics and other fields.

The poison, called **Zarin** military code, was first synthesized in 1939 by G. Schrader (Germany).

Chemically pure sarin is a colorless liquid, odorless, sometimes with a faint fruity odor, boiling point

1470 C (decomposes at high temperature), freezing point 30-500 C. The technical product is brown. Volatile at 13 ° C at 200 ° C, not very stable, can be stored for up to 10 hours in summer. It has a specific gravity of 140.1, a density of 1,094 (heavier than water) and a density of vapor of 4.86, which is heavier than air. Zarin is highly soluble in organic solvents - hydrogen, alcohol, acetone, chloroform, carbon tetrachloride, benzene, ether, toluene and others. Moderately soluble in water. It hydrolyzes well and forms toxic hydrogen fluoride acid. Used as a vapor and aerosol.

Zarin hydrolyzes rapidly in an alkaline environment and when heated. It is decomposed with alkalis and ammonia and degassed with solutions of this substance. 5% alkaline solution, 25% ammonia solution and other solutions are used for degassing.

Zoman is a colorless liquid with a slight camphor odor, boiling point 2000 C, freezing point -700 C. Specific gravity 182, vapor density 6.3 relative to air, ie heavier than air, water relative density 1,013. It is a persistent toxin and can be stored overnight. Lipids are highly soluble in fats and organic solutions. Moderately soluble in water. It hydrolyzes very slowly in water, and can be retained in water bodies for up to about a month. Used as a vapor and aerosol. absorption into porous materials, rubber and painted surfaces is well developed. Like sarin, it is degassed with alkalis and ammonia.

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In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Gastrointestinal poisoning occurs only when poisoned water or food is consumed. Clinical signs appear in a minute or a few hours.

Toxic doses. Organophosphorus toxins are highly toxic and can cause rapid death.

As mentioned above, the effects of these substances on humans depend on their concentration in the air, dose, duration of exposure, route of entry into the body and the timely use of protective equipment. The toxicity of these substances is shown in Table 6.

Prolonged inhalation with very low concentrations of organophosphorus toxins in the air (0.0001 - 0.001 mggl) can lead to severe poisoning. For example, inhalation of sarin at a concentration of 0.001 mg in the air for 15 minutes can cause severe poisoning. According to foreign military experts, the concentration of 0.1-0.2 g of the poison per 1 m2 of the atmosphere can cause death. If 5-10 mg of V-gas gets on the skin, severe poisoning can occur.

Table 6

Toxicity of organophosphorus substances

Toxic substance name	Respiratory toxicity, concentration in air, minute exposure.				Drops, LD_{50}	
	Absolutely killing (CL_{100})	Avarage killing (CL_{50})	Temporary disengagement (IC_{50})	Miosis caller	Skin mggkg	Head-body mggkg
Zarin.	0,1	0,07	0,055	0,002	5	25
Zoman	0,075	0,05	0,25	0,0001	0,7	5
V-gases	0,007	0,001			0,05-0,1	4-5

The main task of first aid for poisoned people should be to stop the entry of toxins into the body, the immediate use of antidotes, to improve the functioning of the respiratory and cardiovascular systems, and to quickly remove the poisoned from the toxic atmosphere.

The scope of first aid includes:

- In case of poisoning, victims should wear a gas mask, which can be used quickly, if the poisonous substance is in the form of liquid - drops on the skin, the face of the poisoned person should be degassed with individual anti-chemical packs (IPP-8) before wearing the mask;

- Anti-organophosphorus toxins (afin, budaksim) are injected intramuscularly using a syringe-tube;
- Toxic substances in the form of liquid droplets on the skin, on the scalp, are immediately degassed using a separate anti-chemical package, first on the skin, then on the scalp;
- Poisoned people should be evacuated immediately from the source of chemical poisoning, and severely poisoned people should be evacuated first. Vomiting during poisoning during evacuation can lead to asphyxia and tongue retention, so be aware of their condition at all times. If respiration is abruptly reduced or stopped, inhale in a toxic atmosphere by hand, in a non-toxic atmosphere using a respirator, or by mouth-to-mouth breathing.

Figure 10. Mutual (mutual) medical care.

First aid. Self-care, mutual (mutual), medical care provided by nurses, health instructors:

- Wearing a gas mask, if the poison is in the face, the face is covered with a personal anti-chemical package (IPP-8, IPP-9, IPP-10);
- Partial sanitation is provided with the help of an individual package (IPP-8, IPP-10) on exposed areas of the human body and on top of each other touching it;
- anti-poison is injected immediately (one syringe-tube) into the muscle using a syringe-tube (Fig. 10);
- Protected people are given artificial respiration (by hand at the site of poisoning);
- Poisoned people are immediately removed from the furnace.

It has a soothing effect on the skin toxic substances

Toxins that can cause skin ulcers include mustard gas, mustard nitrogen, and lewisite.

Like organophosphorus, mustard gas can cause severe poisoning through the respiratory tract, gastrointestinal tract, skin, mucous membranes, and wound surfaces. The fact that mustard belongs to the group of toxins that have the effect of causing skin ulcers is due to the fact that it causes blisters on the skin and damages the skin layers. In addition, it has the ability to have a general (resorptive) effect on the body. Therefore, it is better to call these types of poisons substances that have a resorptive effect.

Mustard was used as a poison on the night of June 12-13, 1917 by German troops against Anglo-French troops on the banks of the Yupra River (Belgium), hence its name. Mustard was widely used by Italian troops in Ethiopia in 1936. In World War II (1943) the Japanese used it in China.

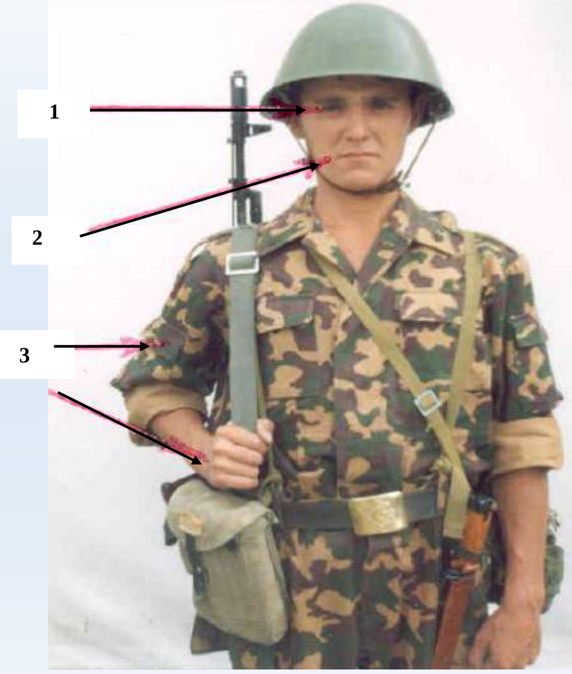
Chemically pure mustard is a colorless oily liquid with a faint odor, while untreated technical mustard is a dark brown, oily liquid with a garlic or mustard odor. The boiling point is 217-2190 C, so it evaporates very slowly and is one of the most persistent toxins. The freezing point of pure mustard is 13.9-14.40 C, and that of technical mustard is 4-120 C. Its vapor density relative to air is 5.5 and its volatility is 0.9 mcgm3 at 200 ° C. It is 1.3 times heavier than water and has a solubility of 0.07% at 100 ° C. Soluble in organic solvents - alcohol, acetone, chloroform, benzene, ether, toluene and others. It is also soluble in some toxins and has the ability to dissolve them. Absorbs well on porous materials, rubber and painted surfaces.

Mustard is slowly hydrolyzed in water to form hydrochloric acid and non-toxic thiodoglycol. If the mustard is boiled in water and stored in an alkaline environment, its hydrolysis will increase. Because mustard is heavier than water, it forms a special depot when it falls into water bodies, dissolves slowly, and the toxicity of the water body persists for a very long time.

Mustard can be degassed with active chlorine preservatives: chlorinated lime, chloramine, dichloramines, calcium hypochlorite and others. In this process, the atoms released by the active chlorine preservatives in the water are oxidized by oxygen, resulting in the formation of a non-toxic substance - sulfoxide. Reacts with salts of mineral acids (Na2S, NaI) and phenolates (C6H5ONa) to form non-toxic compounds. Chlorination of mustard in an anhydrous environment produces non-toxic polychlorides, including hexachloride. Currently, foreign armies contain oxygenated mustard gas, which is 3.5 times more toxic and stable than mustard gas. It is also possible to use mustard mixture as a backup recipe (driven and oxygenated mustard mixtures 3: 2). There is also "one and a half mustard", which is 5 times more toxic than expelled mustard. According to foreign military experts, mustard gas and its compounds and compounds are less volatile, so they can be used in aerosol form using various vacuum cleaners and aerosol generators.

Nitrogen mustard (trichlorothryethylamine) is a structure-like mustard-like toxin. It is more stable than mustard gas, differs less in physical and chemical properties, and is degassed with active chlorine preservatives.

Figure 11. Ways in which mustard gets into the human body



Toxic doses. Mustard gas can enter the body through the respiratory tract, digestive tract, skin and mucous membranes, as well as through burns and injuries (Figure 11). It does not cause any discomfort when ingested, the poisoning develops slowly, and the latent period can last from an hour to several days.

Mustard liquid - in the form of a drop of 0.1 mggsm2 forms a blister on the skin, and at a concentration of 70 mggqg, mustard is lethal. Inhalation of mustard vapor at a concentration of 0.007 mg in 50-60 minutes can cause severe poisoning. If inhaled at a concentration of 0.07 mg of mustard gas, death occurs after 30 minutes (see Table 7). Mustard vapors at a concentration of 0.15 mggl cause death after 15 minutes of exposure, and concentrations of 0.3 - 0.35 mggl after one minute.

Table 7

Effects of mustard vapors on humans

concentration, mggl.	exposure	Effect
0,0005	10-25 minutes	Slightly itchy eyes and skin.
0,001	1-2 hours	No major changes.
0,001	8-10 hours	May be out of line.
0,0065	1 hour	There is severe damage to the lungs.
0,07	30 hours	It leads to death.

Figure 12. Eye poisoning from mustard.

The mustard vapor concentration of 0.001 mg is very harmful to the eyes. The more volatile the toxins, the more their vapors are released into the air and the greater the risk of poisoning.

The rate at which mustard passes through the skin depends on the ambient temperature and humidity. Mustard is very effective on warm, moist skin. For example, twice the concentration of mustard, which is needed to damage the skin of the wrists, is enough to damage the skin of the genitals. Eye poisoning from mustard gas is especially dangerous, as it often results in loss of vision (Figure 12-13).

Lewisite. Lewisite-chlorovinyl chloride contains trivalent arsenic. The American scientist Lewis synthesized lewisite in 1917, and at the same time the German scientist Wieland also synthesized lewisite. The substance is named after Lewis, an American scientist who suggested using it as a poison. Lewisite was not used as a military weapon. The toxic effects of lewisite have only been studied in animals.

Margimush preparations are used in agriculture to control various pests (arsenic anhydride, calcium arsenate, calcium arsenite, sodium arsenite, sodium arsenate, etc.).

Figure 13. Damage to human skin from mustard substance.

First aid (self, mutual, mutual), paramedics, medical instructors):

-wear a mask. If the poison is in the face, the face of the poisoned person is treated with a personal anti-chemical package (IPP-8, IPP-9, IPP-10), and in case of contact with the eyes, wash with running water, then wear a gas mask (14 - picture);

- Partial sanitation with the help of individual anti-chemical packages (IPP-8, IPP-9, IPP-10);

- In case of oral poisoning, gastric lavage is performed in a "probe-free" manner in uninfected areas. To do this, the poisoned person is given 3-4 glasses of water and returned to the root of the tongue with his fingers.

-People who have been poisoned by mouth are given sorbents (activated charcoal) to drink.

Special medical care (conducted on the basis of hospitals).

In hospitals with special equipment, specialists perform symptomatic treatment and various treatments depending on the condition of the victims.

Figure 14. Procedure for treatment with an individual package against chemicals.

It had a psychochemical effect toxic substances

Research on the use of psychochemicals for military purposes has been conducted in foreign countries since about 1957. Psychochemical toxins do not affect a person's organs, but they do affect their psyche. Poisoning from these substances causes loss of consciousness, memory loss, and severe poisoning from these substances can severely damage the nerve centers. So, any dose of such substances can lead to loss of ability to work and fight.

According to foreign military experts, the use of these substances will temporarily disrupt the work of military headquarters and create chaos in the armed forces.

BZ (BI - ZET) is a colorless white crystalline substance with no odor. The pure drug has a liquidus temperature of 1900 C, a boiling point of 4120 C, a density of 1.8 gsm3, and is poorly soluble in water. Used as an aerosol on battlefields. Inhalation of 0.11 ggm3 in the air for about a minute can cause psychosis.

It enters the body by inhalation, sometimes through water and food. The first signs of poisoning are vegetative, somatic and mental disorders. Tachycardia, dry mouth, thirst, redness of the skin, dilated pupils. There is ataxia, indifference to the environment, and confusion. The degree of poisoning depends on the concentration of the toxin in the air, and the poisoning can be mild, moderate or severe.

Mild poisoning can cause agitation or depression, symptoms of intoxication, mood swings, memory and attention deficits, dilated pupils, dry mucous membranes, insecure gait, and speech disorders. Poisoned people can be interviewed by getting short answers to questions. This condition passes after 6-8 hours, after which the patient falls into an asthenic state (weakness, fatigue, memory loss, etc.) for 2-3 days.

In moderate poisoning, clinical signs appear 2 to 4 hours after intoxication and last 1 to 2 days. In case of poisoning, a state of numbness develops. You have to repeat the question several times to get an answer, and the answer is short - short, with large pauses. The poisoned person is indifferent to what is happening around him. After a while, delirium develops. In the case of poisoning, the illusions are mixed hallucinations (Fig. 15), while the person is confused and only obeys the command.

Poisoning can cause redness of the skin, dryness of the mucous membranes, dry skin, a sharp dilation of the pupil, and meaningless speech. The pulse rate increases and blood pressure rises.

In severe poisoning, clinical signs appear 15-20 minutes after intoxication. Fully developed in 3-5 days. Poisoned people lose their senses and do not know what they are doing. Illusions and hallucinations develop, in which things look different to the eyes, sounds are heard in the ears, and things seem to touch the body, such as the illusions of sight, hearing, taste, and smell. and hallucinations occur. They can’t answer questions, they don’t know anyone. Rapid psychomotor agitation is observed, and sometimes there are cases of aggressive resistance to caregivers and self-injury.

First aid (personal, mutual, medical, medical instructors):

-wear or wear a mask;

-partial sanitation using an individual chemical anti-chemical package (IPP-8, IPP-9, IPP-10);

- Quickly exit and remove from the source of poisoning.

Special medical care (hospitalized). Special care for moderately and severely poisoned people is provided by specialists in the psychiatric ward. Depending on the condition of the victims, symptomatic treatment and various treatments are carried out.

Figure 15. The first signs of BZ poisoning entering the body.

Toxic substances with active properties

Active toxins include chemical compounds that selectively affect the sensory nerve endings of the upper respiratory tract, conjunctiva, and cornea. These substances are also called involuntary poisons due to their physiological mechanism of action, as these substances rapidly tickle the sensory nerve endings and cause involuntary reactions by the respiratory, digestive and cardiovascular systems. 'ladi. Rapid involuntary reactions can lead to a complete or partial disturbance of the body's balance, depending on the time of exposure. The human body is sensitive to external chemical irritants, the most sensitive of which are the respiratory, mucous membranes and digestive organs.

Representatives of the toxin have specific properties, they selectively affect the sensory nerve endings of tissues and cause local specific reactions. For example, tear gas affects only the mucous membranes of the eyes, and sneezing gases affect the mucous membranes of the upper respiratory tract. These substances do not have a general (resorptive) effect on the body, as a result of the rapid onset of involuntary reactions in the body, the pathological process in the nerve endings does not develop.

Substances in this group cause certain changes in the body at the threshold dose, ie the minimum amount of the substance, as well as have a strong effect on the body. The effect of the substance is rapid: lacrimators develop after a minute, sneezing after 2 minutes. The solubility of active substances in lipids has a particularly strong effect on nerve endings, so high concentrations of toxins are formed in lipid-rich nerve endings. Toxins are divided into two groups depending on the clinical picture they cause in the body:

1. Toxins (sternitis or sneezing) affecting the upper respiratory tract and nasal mucosa.
2. Toxic substances affecting the conjunctiva (tear gas or lacrimators).

Toxins (sternitis) affecting the upper respiratory tract and nasal mucosa.

Adamsit Chemically pure adamsite yellow crystalline substance - green technical preparation. Specific gravity 1.65, liquidus temperature 1950 C, boiling point 4100 C. Insoluble in water, poorly soluble in organic solvents. Slowly hydrolyzed in the presence of water and alkalis, the hydrolyzed substance is as potent as adamsite. Does not react with metals. Unitiol is considered an antidote due to its arsenic content. It has a longer-lasting effect on the upper respiratory tract than other toxins. The concentration of the effect is 0.001 - 0.005 mggl.

Diphenylchloroarsin - Chemically pure diphenylchlororasine is a colorless crystalline substance with a distinctive odor. Specific gravity is 1.4 at 200 ° C. Liquidus temperature 38 - 400 C, boiling point 3330 C. Decomposes during boiling. Low volatile, the concentration of diphenylchloroarcin at 200 C in 1 ml of air is 0.35 mg. Poorly soluble in water, soluble in organic solutions: benzene (1: 1), kerosene (500: 100), alcohols (20: 100), carbon tetrachloride (1: 1). It hydrolyzes well in the presence of alkalis. Hydrolysis of alkaline alcohol solutions produces toxic oxides. Strong oxidizing agents: chloramine, hydrogen peroxide, potassium permanganate, etc. quickly oxidize dichloroacin to diphenyls, the resulting acid is as toxic as arsenic, but has little effect on the body. It does not affect metals in the dry state, and hydrochloric acid formed by hydrolysis when wet affects metals. The concentration of the effect is 0.005 mg.

Diphenylcyanarsin is a pure colorless crystalline chemical with a bitter almond odor. Specific gravity 1.45. Liquidus temperature 31.50 C, boiling point 3400 C. Volatility is very low, 0.1 mg at 200 C in 1 m3 of air. Insoluble in water, soluble in organic solvents. Forms cyanide acid very quickly in water and reacts well with alkalis. Oxidation and hydrolysis by oxidizing agents (hydrogen peroxide, etc.) produces diphenylarcin acid and cyanide acid. Diphenylcyanarcin and its hydrolyzed products do not affect metals.

Diphenylcyanarcin contains arsenic, which is considered to be one of the most potent toxins in humans. The concentration of the agent is 0.00015 mggl.

Toxic substances that affect the conjunctiva (tear gas or lacrimators).

Examples of lacrimators include chloroacetophenone and bromobenzylcyanide.

From 1965 to 1972, CS (Cu-es), a member of this group, was widely used during hostilities in South Vietnam. In the following years, CR (Ci - ap), a member of this group, was also synthesized, which has a strong effect similar to CS.

Bromobenzylcyanide is a chemically pure, shiny, colorless or yellowish crystalline substance with a distinctive bitter almond odor. The technical product is a brown or brown oily liquid, sometimes a crystalline substance. The liquidus temperature of a pure chemical product is 25.40 C and the boiling point is 2320 C.

The specific gravity is 1.52 at 200 C. Low volatile, bromobenzylcyanide concentration at 50 C in 1 m3 of air is 50 mg. Absolutely insoluble in water and cold alcohol. Soluble in organic solvents. It does not hydrolyze in cold water, but slowly hydrolyzes when heated. Bromobenzylcyanide begins to decompose when heated above 1500 C, and decomposes completely within 10 minutes if heating is continued at 2000 C.

The threshold concentration of bromobenzylcyanide in the air is 0.003 mggl, and the active concentration is 0.00015 mggl.

The chemically pure product of chloroacetophenone is a colorless crystal with a fragrant purple odor. The technical product is usually yellow, brown or green. The liquid has a liquidus temperature of 590 C and a boiling point of 245 to 2470 C. It does not decompose when heated to high temperatures and is a very stable substance. Insoluble in water, soluble in organic solutions and some toxic substances in mustard gas, liquid phosgene, chlorpicrin, chlorine. It does not decompose even when boiled in water. Aqueous alkaline solutions decompose gradually when heated. Does not react with metals. The specific gravity of chloroacetophenone is 1.334 at 00 C and 1.32 at 150 C. At 200 C, the maximum concentration in the air is 0.105 mggl, and the effective concentration is 0.0003 mggl.

Due to its potent effect, CS (Si-es) was recommended by foreign military experts in the 1930s to be used as a military chemical weapon.

According to foreign data, between 1965 and 1972, 6,800 tons of CS were used in South Vietnam. Although CS has strong teratogenic properties, it has been found to be teratogenic and has not been recommended by police since 1973.

Pure white crystalline substance, liquefies at 950 C, boiling point 3150 C. Poorly soluble in water, soluble in organic solutions (acetone, benzene, etc.), oils and lipids. It hydrolyzes well in water to form chlorobenzaldehyde and malonic acid dinitrile.

When alkalis are added, the hydrolysis reaction is very rapid and the products formed are toxic.

Two different mixtures of this toxin have been developed; CS1 is produced in the form of a micro powder, which contains 5% of silica gel in addition to the substance CS, so it forms a stable toxic lesion at the site of use and lasts up to two weeks. CS2 is a mixture of silicon, which increases its stability and can be used in humid conditions.

Three formulations of CS can be used on the battlefield, all of which are used as aerosols. These toxins are used through smoke generators.

The excretory concentration is 0.001 - 0.005 mggl, the intolerable concentration is 0.005 mggl, and the lethal concentration is 25 mggl.

CR material (Ci - ar). first acquired by Switzerland in 1962. They found that the substance had an effect. After CS was found to have a teratogenic effect, in 1970, experts at the Port Down Research Center in the United Kingdom recommended dibenz oxazepine as a compound that could be used by police. This compound was adopted in 1973 under the code CR as a chemical weapon to arm British police and later U.S. police.

The pure chemical product is a crystalline yellow powder with a melting point of 720 C. It is insoluble in water and is highly soluble in lipidotropic substances, ie lipids. It does not decompose even when boiled with 20% aqueous alkali or concentrated hydrochloric acid. Used battlefields don't disintegrate for long either. Used on battlefields for a long time. Ci - ar is used by aerosol method. Ci-es are 8 times more effective than Ci-es, skin damage is 20 times higher, and Ci-es are 5 times less toxic.

CS and CR are among the most potent toxins. The concentration of fighters is 0.00075 mggl

First aid (self, mutual and medical care provided by nurses, health instructors):

in case of poisoning:

- a mask is worn;

When exposed to the respiratory tract, 1-2 ampoules of smoke mixture (40 g of chloroform, 40 g of ethyl alcohol, 20 g of sulfur ether and 5 drops of rubbing alcohol) or 1 ml of ficillin are poured into the gas mask helmet (Fig. 16).

Figure 16. How to put an ampoule in a gas mask.

After leaving the source of poisoning:

- The mask is opened;

-if the respiratory tract is affected, inhale the smoke mixture or ficillin (1-2 ampoules of liquid);

- Rinse and wash the nasal cavity, throat and eyes with running water;

- Artificially induced when the toxin enters the stomach.

Qualified medical care is provided at the Special Medical Squad (ATO), Military Garrison Medical Hospitals (GTG) and the Central Military Clinical Hospital (MHKG).

Toxic substances with general toxic properties

Common toxins include cyanide acid and chloric acid. Cyanide acid was used by French troops during World War I against German troops on the Somme River (July 7, 1916). Despite its low results, foreign military chemists are currently conducting extensive research on the substance. This is due to the fact that the poisoning clinic is developing rapidly and deaths can occur within minutes on the battlefield. During World War II, German Nazis used cyanic acid esters, methyl cyclone A, and ethyl cyclone B in gas chambers to kill many captives.

Cyanic acid is an additional toxin in foreign armies. In addition, cyanide acid salts are widely used in industry: in agriculture, calcium cyanamide, free cyanamide are used against fruit tree pests. It is widely used in the mining industry to extract gold and silver from ores, in the light industry in the pharmaceutical processing of fabrics, and in dyeing. As a result, cyanide acid is produced in large quantities and can be poisoned by humans during transportation, use and handling.

Cyanide acid is a colorless, volatile liquid with a bitter almond odor. The boiling point Q is 25.70 C, so it evaporates quickly in air. Freezing temperature - 13.40 C.

The vapor density is 0.93 times that of air, which is lighter than air. Vapors are poorly absorbed by activated carbon and are well absorbed into porous materials.

It can be stored for up to 20-30 minutes during the summer, and is considered an unstable toxin. Soluble in water, organic solvents, phosgene, mustard and other toxic substances.

Cyanic acid is a weak acid because it is squeezed out of its salts by the weakest acids, and the salts are oxidized in air to form non-toxic carbonates.

Toxic doses. Cyanide acid and chloric acid are mainly absorbed through the respiratory tract. Its vapor concentration of 0.1-0.12 mggl is dangerous for humans. Inhalation of it in 15-20 minutes leads to severe poisoning, inhalation of 0.2 - 0.3 mggl concentration leads to death in 5-10 minutes, 0.4 - 0.8 mggl. l concentration leads to death within 2 - 5 minutes. Chlorine vapor is less toxic than cyanic acid. Death occurs 5 minutes after inhalation of 0.4 to 0.8 mg.

First aid (self, mutual and sanitary, medical instructors):

- A mask is put on;
- Inhalation antifungal (amyl nitrite) is placed inside the helmet-mask. To do this, an ampoule filled with amyl nitrite is squeezed by hand and placed in a helmet-mask (Fig. 16);
- mouth-to-mouth, mouth-to-nose, or artificial respiration when breathing is impaired;
- The poisoned person is immediately removed from the source of poisoning.

Toxic substances with a suffocating effect

Choking poisons were first used by German troops as chemical weapons on April 22, 1915, against British and French troops during World War I. Chlorine was used, and in December 1915, German troops used phosgene, diphosgene, and chlorpicrin because of the low impact of chlorine gas.

Later, as new toxic chemicals were synthesized, the attention of foreign military experts to suffocating toxins was significantly reduced. Much scientific work is being done to improve its physical and chemical properties.

The chemical industry produces large amounts of chlorine. It is used in agriculture as a pesticide against diseases, pests and weeds (hexachlorocyclohexane, polychlorpinin, polychlorocamphene, heptachlor, keltan, ditox, milbeks, etc.). In the manufacture of paper, pure chlorine is used to bleach the paper. In medicine, chlorinated compounds are widely used in disinfection. Therefore, the chlorine industry does not require much money and time to switch to the production of phosgene and diphosgene for military use.

Chlorpicrin is used as a training poison to test gas masks.

Phosgene is a liquid at a temperature of 8.20 C, at which temperature it rapidly evaporates, a colorless liquid, in low concentrations has a characteristic odor of rotten apples or rotten hay. Phosgene in the vapor state is 2.48 times heavier than air. At 200 C it is 6370 mggl. It can be stored for up to 15-30 minutes in hot weather, so it belongs to the group of non-stable toxins. Poorly soluble in water, about 0.8% of the phosgene in the vapor state is soluble in one volume of water. Very soluble in organic solvents (acetone, benzene, toluene, etc.), fats and lipids, as well as phosgene itself has the ability to dissolve many toxins.

Phosgene reacts with ammonia to form a non-toxic product. When reacting with tertiary amines, such as urotropin, phosgene is completely neutralized, a reaction used in World War I to protect against phosgene in "wet gas masks."

Diphosgene was first obtained in 1847 by O. Kaur (France). During World War I, diphosgene was used in large quantities in pure form, in combination with a mixture of chlorpicrin and smoke-generating substances, and was delivered to artillery shells and mines. It was first used by German troops against French troops (near Verdun) in June 1916.

Widely used during World War I, Germany alone produced 16,000 tons of diphosgene during the war.

Pure chemical diphosgene is a colorless liquid with a boiling point of 1270 C and a freezing point of 570 C, with the smell of rotten apples or rotten hay, similar to that of phosgene. Specific gravity 1.65. Density relative to air 6.9. At a temperature of 200 C, the concentration is 120 mg. Heavier than water, with a density of 1,644 at 150 C, poorly soluble in water, soluble in organic solutions, fuels and oils.

The technical product of diphosgene is a yellow or brown liquid with a molecular weight of 198.

In addition to phosgene and diphosgene, this group also includes triphosphenes.

Tryphosgen is similar to phosgene in its toxicity and chemical properties. In terms of physical properties, it is a solid with a melting point of 790 C and a boiling point of 205 to 2060 C. It is twice as heavy as water, poorly soluble, and soluble in organic solutions.

Phosphenoxime is a colorless solid crystalline substance with a melting point of 39-400 C and a boiling point of 1290 C and is highly soluble in water and organic solutions. It hydrolyzes well in water to form hydroxylamine of hydrochloric acid, hydrochloric acid, and carbon (II) oxide. Aqueous solution of alkalis and ammonia solution breaks down phosgene and forms non-toxic products. Phosgene affects the respiratory tract in the same way as phosgene. When applied to the skin, it is severely affected, and after a while, small blisters form, which are replaced by wounds that do not heal for a long time. It causes temporary blindness when it is seen.

Chlorine (CI2) is a yellow-blue gas with a pungent odor.

It is 2.5 times heavier than air. Soluble in water and some organic solutions. It is well adsorbed with activated carbon. Chemically active substance. When it reacts with water, it forms chloride and hypochlorite acid. Oxygen is released when hypochloric acid decomposes, and this property is used in disinfection and bleaching. Chlorine gas is neutralized with an aqueous solution of hyposulfite. Wet chlorine has a pungent odor.

0.01 ggm3 of chlorine has a strong effect, 0.1 ggm3 of chlorine is considered life-threatening if inhaled.

Chlorpicrin (CCI3NO2) - trichlornithromethane was first obtained in 1848 and used as a poison during World War I. In addition to the suffocating effect, it has a strong tearful effect. Pure chlorpicrin is a colorless liquid with a pungent odor. Freezing point - 690 C, boiling point - 1130 C. It is 5.7 times heavier than air. Poorly soluble in water, soluble in organic solvents. It is well adsorbed on activated carbon. Chlorpicrin is not a chemically active substance. Aqueous solutions of acid and alkali do not react well with chlorpicrin. It does not hydrolyze in water, even when boiled. An alcoholic solution of sodium sulfide is used to neutralize chlorpicrin. When heated above 3000 C, it decomposes to form phosgene and nitrosyl chloride.

The minimum effective concentration is 0.002 ggm3. Respiratory damage occurs at a concentration of 0.1 ggm3. Inhalation of 2 ggm3 of chlorpicrin in air for 10 minutes is fatal.

First aid (personal, mutual, medical, medical instructors):

- The gas mask is worn on the contaminated area or the unusable gas mask is replaced with a new one (Figure 17);
- taken out of the poisoned furnace;
-protected from cold;
-reflexive artificial respiration when breathing stops.

Figure 17. Self and mutual first aid.

General concepts of potent toxins

Chemistry has great potential to create things that do not exist in nature, facilitate human labor, save time, dress and heal. All this has led to the rapid development of the chemical industry and the chemical industry in recent years. As a result, the production, use, storage and transportation of various chemical products are growing. Despite the continuous improvement of chemical technology, the risk of accidents associated with the release of highly toxic substances (EPs) into the environment is increasing.

According to the American firm Dow Chemical, there have been 17-18 KTZM-related accidents in the United States every day and night. These accidents occur not only during the production and use of KTZM, but also during their storage and transportation.

In November 1979, a train carrying chlorine, styrene, propane, toluene, and other toxic substances crashed in Ontario, Canada. As a result, 200,000 people had to be evacuated in six days.

In 1974, a pipe at a caprolactam plant in Flixboro, UK, burst and released 40 tons of cyclohexane into the atmosphere, creating a toxic cloud 200 meters in diameter. Forty-five seconds later, a cloud collided with a source of flames and exploded. Its capacity was equivalent to a charge of 50 tons of trinitrotoluene. A fire broke out in an area of 4.5 hectares. KTZM, 1 km away from the plant, even damaged the storage tanks. The company was completely shut down. The blast killed 59 people and injured 36 others. Fifty-three people outside the plant were seriously injured and hundreds were lightly injured, and nearly 2,000 buildings were damaged.

In December 1984, a car accident occurred at Union Carbide, a U.S. pesticide and insecticide chemical plant in Bhopal, India, spilling 43 tons of methyl isocyanate and its by-products. The area of poisoning was 5 km long and 2 km wide. The crash killed 3,150 people, left about 20,000 completely disabled and more than 200,000 injured.

The examples show that the release of KTZM into the atmosphere can have very serious consequences. All of this underscores the importance of protecting troops and the population and dealing with the aftermath of chemical disasters. Thousands of different chemical compounds are now used in industry and agriculture. Their number is growing every year due to the creation of new substances. Depending on the level of toxicity, the chemicals that can enter the body can be divided into six groups (Table 8).

Toxicity of chemicals

Poison group	LC^*_{50} or partially lethal concentration, mggl	LD_{50} ** or a partial lethal dose of mggkkg
Extremely toxic	Less than 1	Less than 1
Highly toxic	1-5	1-50
Strongly toxic	6-20	51-500
Significantly toxic	21-80	501-5000
Less toxic	81-160	5001-15000

***LC_{50} – 50%** average concentration leading to death in injuries.

****LD_{50} - 50%** moderate toxicosis resulting in death from injuries.

Extremely hazardous (excessive and highly toxic) chemicals include:

-compounds of some metals (organic and inorganic derivatives of arsenic, mercury, cadmium, lead, thallium, zinc, etc.);

-carbon compounds of metals (nickel tetracarbonyl, iron pentacarbonyl, etc.);

-cyanide-containing substances (cyanic acid and its salts, nitriles, organic isocyanates);

-phosphorus compounds (organophosphorus compounds, phosphorus chloride, phosphine, phosphidine);

-chlorhydrins (ethylene chloride, epichlorohydrin);

-halogens (chlorine, bromine).

Highly toxic chemicals include:

-mineral and organic acids (sulfuric, nitric, phosphate, acetic acids);

-alkalines (ammonia, potassium permanganate, sodium hydroxide);

-sulfur compounds (soluble sulfides, soluble thiocyanates, sulfur carbon, sulfur chloride and fluoride);

- Chlorine and bromine exchange derivatives of hydrocarbons (methyl chloride, methyl bromide);

-Some aldehydes and alcohols of acids;

-heterocyclic compounds.

Significant, less toxic i and non-toxic chemicals include all remaining chemical compounds. They do not pose any chemical hazards. It should be noted that a special group of substances are pesticides, ie drugs used against agricultural pests and weeds. Many of them are considered dangerous to humans. Many of the chemicals listed above, including mildly toxic ones, can cause serious injury. But not all toxic chemicals cause mass injuries. Only when certain physical and chemical, toxic properties are combined (transition to a vapor or finely dispersed aerosol state) can a mass injury occur in the event of a catastrophe. These chemical compounds form a group of potent toxins (KTZM). Thus, KTZM is one of the most widely used chemicals in industry, causing damage to troops, personnel and civilians in the event of a disaster.

Table 9

PHYSICAL PROPERTIES OF SOME KTZM

KTZM name, formula	Aggregate condition (storage and transportation)	Explosion hazard and combustion
Ammiak NH_3	Colorless gas with a pungent odor. Soluble in water. Stored and transported in a compressed state	Flammable gas. Illuminates when there is a constant source of ignition. Evaporates to form an explosive mixture with air. Storage containers may explode when heated.
Gidrazin $(SN_3)_2$ – N-NN_2	Colorless clear liquid. Strong repellent. It dissolves well in polar liquids and vapor is well adsorbed on various porous materials. Stored in a liquid state and transported	The mixture with oxygen is explosive. Burns when exposed to asbestos or coal and some metal oxides. Easily ignited by sparks and fire. It may ignite spontaneously. Vapors form an explosive mixture with air. Stored containers can explode when heated.

KTZM name, formula	Aggregate condition (storage and	Explosion hazard and combustion

	transportation)	
Carbon monoxide SO (is gas)	Colorless, odorless gas, poorly soluble in water. Colorless transparent liquid in compressed state.	It does not burn, a mixture of two volumes of work gas with one volume of oxygen explodes in an open flame.
Ethylene oxide $(SN_2)_2O$	A colorless liquid with an ethereal odor. It dissolves well in water, alcohol, ether. Chemically active. Gases at temperatures above 11 ° C. Transported in liquid form.	Sparks and flames ignite lightly. The vapors form an explosive mixture with air. Stored containers can explode when heated.
Oltingugurt sulfide SS_2	The fragrant, colorless gas is partially decomposed by light. Decomposition products have a yellow color and an unpleasant odor. Mixes well with ether, alcohol, chloroform. Dissolves sulfur, phosphorus, iodine, fats and oils. Stored in a liquid state and transported	Easily ignited by sparks, fire and when heated. May explode when heated and ignited. It ignites spontaneously when heated. Spilled liquid emits flammable vapors. The vapors can form an explosive mixture with air and spread far away from the scene of the accident. Stored containers can explode when heated.
Sulfate anhydride SO_2	Colorless gas with a pungent odor. Soluble in water. Colorless liquid when compressed. Stored and transported in a compressed state.	It won't burn. Stored containers can explode when heated.
Fosgen $SOSI_2$	A colorless liquid with the smell of rotten fruit. Poorly soluble in water, soluble in benzene, toluene, xylene and chloroform. Gas at temperatures above 8oS. Has high volatility.	It won't burn. It won't explode. But it is dangerous.
KTZM name, formula	Aggregate condition (storage and transportation)	Explosion hazard and combustion

Chlorine Cl_2	A yellowish-green gas with a pungent, suffocating odor. Less soluble in water. Chloroform is well soluble in heptane. Strong oxidizer. It is heavier than air and accumulates in basements and low-lying areas. Stored and transported in a compressed state.	The mixture with hydrogen is explosive. It does not burn, but it is dangerous. Stored containers can explode when heated.
Hydrogen cyanide (cyanide acid NSN	It smells of bitter almonds. Easy volatile, colorless liquid. Mixes well with water, ethyl alcohol and ether, gas at temperatures above 25.7o C. Stored in a liquid state and transported.	A certain mixture of vapors with air can explode. The explosive power is higher than the TNT. Vapors ignite when there is a constant source of ignition.
Dioxin (2,3,7,8-tetrachloride dibenz) $C_{12}H_4Cl_4O_2$	White crystalline substance. Insoluble in water. Soluble in organic solvents. It is chemically quite inert.	Decomposes at high temperatures
Nitric oxides and their mixtures	N_2O – fragrant colorless gas, boiling point - 88.5o C, NO-colorless gas. boiling point -151.8 o C. N2O4 is a colorless liquid with a pungent odor and turns yellow-red at temperatures above 15oC. NO2 is a reddish-brown gas with a boiling point of 20.7 ° C. Soluble in water. Decomposes at 150oC. Hungry-yellow liquid in compressed state.	Explosive and flammable. When exposed to flammable materials, they may ignite spontaneously. Some organic substances form an explosive mixture with vapors.

Toxicity properties of potent toxins The concepts of threshold concentration, tolerance limit, lethal concentration, and lethal dose are used to describe the toxicity of KTZM.

Threshold concentration is the minimum amount of a substance that has a significant physiological effect. In doing so, the wounded experience only the primary symptoms of the injury and retain their fighting ability (ability to work).

Tolerance limit is the minimum concentration that a person can tolerate over a period of time without injury. Permissible concentration is used in industry as a tolerance limit. It is used to meet safety requirements in production. It is usually designed for an eight-hour workday and is not accidental.

Table 10

The extent to which KTZM affects the human body classified by

Indicators	Xavflilik sinfi uchun me'yor.			
	First	Second	Third	Fourth
Permissible concentration-political in the working zone of KTZM (mggm^3**)**	Less than 0,1	0,1-1	1,1-10	More than 10
The average lethal dose ingested (mgg'kg)	Less than 15	15-150	151-500	More than 500
Average lethal dose for skin contact (mggkg)	Less than 100	100-500	501-2500	More than 2500
Average lethal concentration in air (mgg'm^3)	Less than 500	500-5000	50000	More than 50000

The toxicity of KTZM depends on its entry into the human body. Injuries can be local or general (Table 10).

On local exposure, the toxic effect is manifested in the area where KTZM interacts with body tissues (skin, respiratory organs, eyes). In general, the toxic effect occurs after the introduction of KTZM into the blood, skin, respiratory tract or gastrointestinal tract. Therefore, in assessing the toxicity, along with the degree and nature of toxicity, the method of entry of KTZM into the human body is also taken into account.

The concept of toxicity dose is used to quantify the toxicity of various chemical compounds.

Toxic dose is the amount of a substance that produces a specific toxic effect. Respiratory effects on the human body

The following toxicity doses are used to characterize toxicity (inhalation toxicity doses):

- The average lethal dose of LCt50 is 50% fatal;
- The average detoxification dose is ICt50, which eliminates 50% of injuries;
- moderate threshold dose of PCt50, causing the onset of symptoms in 50% of patients;

-doses of inhalation toxicity are measured in g * daqg'm3, g * sg'm3, daqg'l.

In addition, the toxicity of KTZM affecting the skin is expressed in terms of moderate lethal (LD50), moderately excretory (ID50), and threshold (minimum) (PD50) doses. Dermal resorptive toxic doses are measured in mggsm2, mggm2, ggsm2, kggsm2, kggm2 or mggkkg.

Doses of inhaled and skin-resorptive toxicity allow to assess the degree of injury to the victims. The mean threshold toxicity doses of KTZMs are given in Table 11.

Average threshold toxicity doses of KTZM.

KTZM	PCt $_{50}$, gg‘sm^3
Ammonia	454
Hydrazine	14
Carbon monoxide	1620
Ethylene oxide	3600
KTZM	PCt $_{50}$, gg‘sm^3
Sulfur (2) oxide	194
Oltingugurt sulfide SS$_2$	2592
Fosgen	13
Hydrogen cyanide	36
Chlorine	36

Note: The table shows the threshold dose for adults, which is 4-10 times less for young children. The above toxic doses are considered constant over a period of 40-60 minutes. If several toxins are released at the same time in the place and their nature of action is not similar to each other, then the effect of KTZM on the substance with the highest toxicity evaluated.

KTZMs are diverse in structure, physical and chemical properties. Their biological effects are also different. However, in the event of a catastrophe, it is important to identify the dangerous effects of KTZM, first of all, in terms of providing timely and qualified assistance. Therefore, there is a classification of KTZMs on the basis of syndromes caused by acute intoxication.

Chemicals that cause mass injuries are divided into the following groups according to their effects:

The first group includes substances that have a suffocating effect:

a) strong fermenting effect (chlorine, phosphorus-3-chloride, phosphorus oxychloride);

b) weakly fermenting effect (phosgene, chlorpicrin, sulfur chloride).

The second group - substances that have a general toxic effect (carbon monoxide, cyanide acid, dinitrophengon, dinitroortocresol, ethylene chloride, ethylene chloride).

The third group includes substances that have a suffocating and general toxic effect:

a) strong fermenting effect (acrylonitrile);

b) weakly fermenting (sulfur (2) oxide, hydrogen sulfide, nitrogen oxides).

The fourth group is neurotropic toxins, ie substances that affect the generation of nerve impulses (carbon sulfide, organophosphorus compounds).

The fifth group is substances that have a suffocating and neurotropic effect (ammonia).

The sixth group - metabolic toxins (ethylene oxide, methyl bromide, methyl chloride, dimethyl sulfate.).

The seventh group is substances that inhibit metabolism (dioxin).

Substances that are mainly suffocating include toxic compounds for which the main target is the respiratory tract. Under their influence, the damage to the body is divided into 4 periods: the period of exposure to the substance, the period of latent exposure, the period of toxic inflammation of the lungs and the period of aggravation. The duration of each period depends on the toxic properties of the substance and the amount of exposure dose. High concentrations of vapors of some substances can cause rapid death.

Substances that have a general toxic effect include substances that disrupt energy metabolism and, in severe cases, cause death. These substances are divided into blood toxins and tissue toxins.

Substances that have a suffocating and general toxic effect include substances that cause toxic inflammation of the lungs when inhaled, as well as disruption of energy metabolism during resorptive action. Many of the compounds in this group have a strong irritating effect, making it easier to help victims.

Neurotropic toxins, that is, substances that affect the generation of nerve impulses, include substances that disrupt the mechanisms of nerve regulation and the state of modulation of the nervous system.

Substances that have suffocating and neurotropic effects include toxic compounds that inhale toxic toxins into the lungs, resulting in severe damage to the nervous system. Metabolic toxins are toxic compounds that interact with the body's internal processes. The effect of these substances is characterized by the absence of a reaction of the organism to the poison. Injuries usually develop slowly and, in severe cases, can lead to death within a few days.

Metabolic substances include toxic compounds of halogenated aromatic hydrocarbons. Dibenzodiaxine and polychlorinated benzofurans are distinguished by their specific activity. These substances affect the lungs, digestive tract and skin, causing very slow-growing diseases. Virtually all organs and systems of the body are involved in this process. The peculiarity of these substances is that they cause metabolic disorders in the body, which can lead to death.

The nature of potential chemical hazards

Operational safety of chemically hazardous facilities depends on many factors: physical and chemical properties of raw materials and products, the nature of the technological process, design and reliability of equipment and facilities, storage and transportation conditions of chemicals, control measurements condition of equipment and automation tools, effectiveness of disaster protection tools, etc. In addition, the safety of production, use, storage and transportation of KTZM depends on the organization of preventive work, the quality of repair work, the theoretical and practical training of workers and employees. The presence of such factors makes it difficult to solve the problem. A study of some of the major catastrophes that have taken place has shown that today the production team cannot ignore the number of accidents that have caused injuries to the population and troops near chemical facilities.

It should be noted that in the United States from 1971 to 1983 there were more than 150 thousand emergencies at chemical facilities, in which 940 people died and more than 11 thousand were injured to varying degrees. In 1985 alone, there were 6,000 fatalities in the United States.

When analyzing the system of enterprises that produce or use KTZM, their technological processes usually use small amounts of toxic chemicals. Large quantities of KTZM are stored in warehouses. As a result, accidents in factories and workshops damage the air, tools and equipment in the area. In this case, mainly workers and employees may be injured.

Accidents in the warehouses of the enterprise, as a result of damage to large containers, KTZM spread beyond the territory of the enterprise, injuring not only workers and employees, but also the population and the troops stationed in the area.

In general, the capacity of KTZM warehouses is determined by the amount of inventory needed to ensure the uninterrupted operation of enterprises, as well as the amount of products produced and ready for shipment. Typically, chemical stocks in enterprises are stored for at least three days and nights, and in mineral fertilizer plants for 10-15 days and nights.

As a result, large enterprises and some railway stations can store thousands of tons of toxic substances at a time.

On production sites or in vehicles, KTZM is usually stored in standard-volume containers. These should be aluminum, reinforced concrete or steel containers that meet the requirements for storage and transportation. Nowadays, cylindrical and spherical reservoir vessels are widely used.

The capacity of the tanks varies. For example: chlorine 1-1000 t, ammonia 5-30000 t, cyanic acid 1-200 t, carbon monoxide, sulfide anhydride, hydrazine, tetraethyl lead, sulfur carbon in containers of 1-100 tons, ethylene oxide 800 m3 and more are stored in spherical reservoirs.

There are usually several containers stored on the ground, and spare containers are available for KTZM outings. A group of non-combustible and corrosion-resistant materials at least 1 meter high will be built around the group of containers stored on the ground. The distance from the container to the barrier should not be less than 1 meter.

KTZM storage facilities with a capacity of more than 8,000 m3 must be at least 1,000 meters away from settlements. And the distance from public places (stadiums, markets, parks) is twice as much.

There are the following ways to store KTZMs in enterprise warehouses:

- in high pressure tanks;

-in isothermal buildings at pressures close to atmospheric pressure (low temperature storage). When stored in this way, the containers are artificially frozen. The purpose is to reduce the saturated pressure of the compressed gases;

-storage in closed containers at ambient temperature.

KTZM's storage methods determine what consequences they will have if they go out.

When the vessel layer collapses, the release of KTZM into the atmosphere can take a long time. In this case, the evaporation process can be divided into three stages.

The first stage is the rapid, even instantaneous, evaporation of the saturated vapor KTZM in the vessel due to the sharp difference in pressure and air pressure. During this process, the bulk of KTZM vapors is released into the atmosphere. As a result, a toxic cloud higher than the lethal concentration of KTZM may be formed.

The second stage is the unstable evaporation of KTZM under the influence of ambient heat; this period is usually characterized by a sharp decrease in the intensity of evaporation.

The third stage is the stationary evaporation of KTZM. The duration of this period can be hours, nights or more, depending on the type, amount and external conditions of the KTZM. In this case, the dangerous phase of the catastrophe is the first 10 minutes, when the evaporation of KTZM occurs intensively. The compressed gas escapes under pressure to form an aerosol in the form of heavy clouds.

When the containers for boiling liquids are opened at high temperatures, the primary cloud is not formed. The evaporation of a liquid depends on its physical and chemical properties, the ambient temperature, and the rate of evaporation is very low. These substances pose a direct threat to the population and personnel at the scene of the accident.

It should be noted that industrial facilities contain a large number of various flammable substances, including KTZM (ammonia, ethylene oxide, cyanide acid, carbon monoxide). In addition, many KTZMs are explosive (hydrazine, nitrogen oxides, etc.), and some can pose a fire hazard even if they do not ignite. (chlorine, phosgene, sulfur (2) oxide, nitric oxide, etc.). This should be taken into account in case of fire in the premises. In addition, fires in factories can cause a variety of toxins. For example, the combustion of polyurethane and other plastics releases dangerous amounts of cyanic acid, phosgene, carbon monoxide, isocyanates, and in some cases dioxins and other KTZMs.

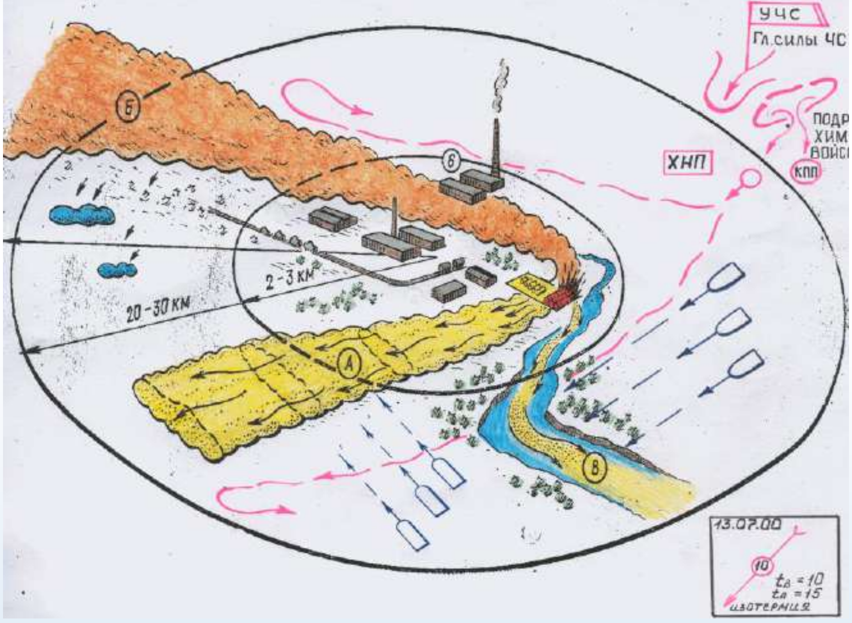
Therefore, when dealing with hazardous chemical accidents, it is necessary to take into account not only the physical and chemical, toxic properties, but also the risk of explosion and fire of KTZM, the formation of a new KTZM as a result of fire. Therefore, the necessary measures will be taken to protect workers and employees.

Figure 18 shows a diagram of the formation of damaging factors resulting from an accident at a chemically hazardous facility.

The analysis of the catastrophic events showed that the hazardous chemical components of KTZM are the source of emissions into the atmosphere, falling into water bodies, powerful explosions, poisoning of ground objects, the formation of toxic fumes in large areas.

The facility will produce 150,000 tons of chlorine, 5,000 tons of plant protection products and other products per year. The company is located on the river. The most dangerous elements of the object are elements 2, 3 and 5. A tank containing 150 tons of liquid chlorine broke down and a fire broke out in the finished goods warehouse. The description of the damaging factors is as follows:

Figure 18. Diagram of the formation of damaging factors in the event of an accident at a chemically hazardous facility.



When the A-chlorine reservoir failed, a cloud of poisonous air formed and spread over the plant (up to 300 meters) and was moving in the direction of the wind in the surface layer of the atmosphere. Clouds with destructive concentrations can range from a few kilometers (isotherm) to several 10 kilometers (inversion);

B - A fire can form a cloud of smoke containing toxic products, which can spread over a significant distance in the boundary layer of the atmosphere. Exposure to various precipitates can result in "spots" contaminated with toxic products;

During the V-fire, some of the toxic products fell into the river and the water was contaminated by the current.

Each of the above types of hazards can occur separately, sequentially, or together, depending on the location and time, and can be repeated multiple times (in various combinations).

Any catastrophic event is characterized by stages of risk formation, development and decline. At the time of an accident at a hazardous chemical facility, there are usually a number of damaging factors - fire, explosion, chemical poisoning, and environmental poisoning outside the facility. Respiratory effects of KTZM are more common than other effects, leading to injuries in large areas.

CHAPTER THREE

BIOLOGICAL WEAPON

The concept of biological weapons

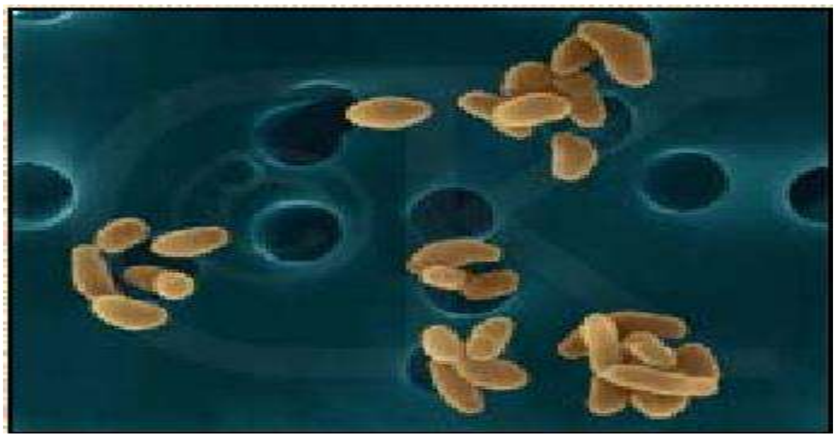
Biological weapons - weapons filled with special biological means - weapons and means of targeting them.

They are designed to destroy farm animals, plants and people. Wars fought with the use of biological weapons are called biological wars. The damaging factor of a biological weapon is biological means. They are biological agents isolated for use in combat and can cause serious illness when ingested. These include: - disease-causing microorganisms; - microbial toxins (toxins that some microbes produce during their life).

Insects can be deliberately used to destroy grain and industrial crops, as well as to undermine the economic potential of the state. Microorganisms are divided into the following classes according to their biological properties and size: bacteria, viruses, rickettsiae, fungi, and microbial toxins.

Bacteria (Figure 19) are the largest group of microorganisms (1,600 known species), most of which are single-celled.

Figure 19. General appearance of bacteria.

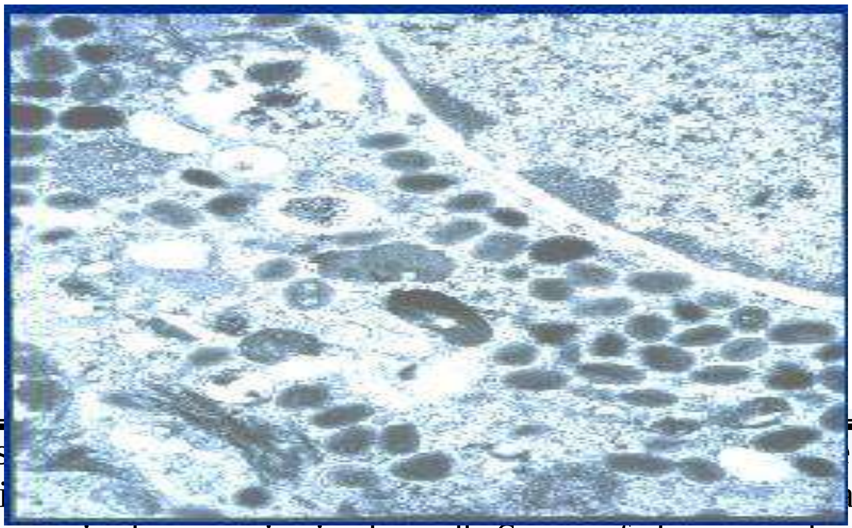


Bacteria are mainly spherical, rod-shaped, and twisted in appearance and size, and multiply by simple division. Bacteria are very small. For example, spherical bacteria have a diameter of 0.5–1.0 µm. will be up to The width of the rod bacteria is usually 0.5-1.0 microns. up to a few micrometers long. The shape and size of bacteria depend on growing conditions, environmental composition, osmotic pressure, temperature and other factors. They die quickly from sunlight, disinfectants and high temperatures.

It is not sensitive to low temperatures and can withstand freezing. Some bacteria form a protective layer or are wrapped in spores to protect them from adverse conditions. Bacteria - cause diseases such as plague, tularemia, anthrax, measles, melodiosis.

Viruses (Figure 20) are microorganisms that are 100 times smaller than even the smallest bacteria. Unlike bacteria, viruses grow only inside living tissue cells and are considered cell parasites. They are resistant to drought and frost. Viruses cause dangerous and serious diseases such as smallpox, yellow fever, Venezuelan encephalomyelitis, and hemorrhagic fever.

Figure 20. An overview of the smallpox virus.



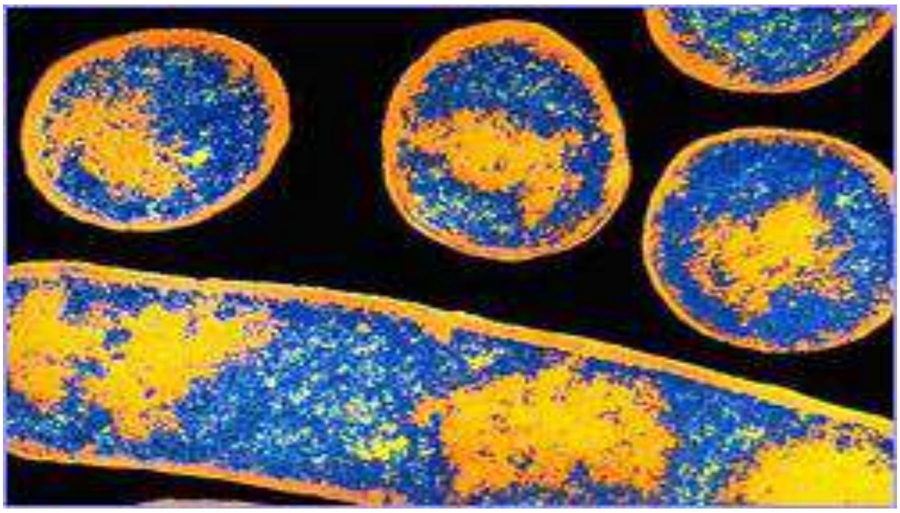
Ricketts s and bacteria that are simi t brings them closer to viruses is the parasite in the cell. Some of them are drought and cold tolerant. Rickettsiae - typhoid fever, Ku - causes lichen disease.

Fungi are fungi of eukaryotic organisms. Mushrooms are also called molds and are a large and diverse group of plant organisms. Because they do not contain chlorophyll pigment, they cannot synthesize the necessary organic matter from SO2 gas and N2O. That is why they need ready-made organic matter.

In nature, zebras live in a variety of substrates: water, soil, plant and animal remains. They differ from bacteria in their complex structure and reproduction. Fungal spores are resistant to drying and sunlight, as well as to the effects of pesticides. Diseases caused by pathogenic fungi can lead to long-term and severe poisoning of internal organs.

Microbial toxins (Fig. 21) are highly toxic substances that some bacteria secrete during their lifetime. It enters the human body through food and water and causes severe poisoning, sometimes death. The most well-known of the bacterial toxins is botulinum toxin, which can be fatal in 60-70% of cases if not treated in time. Toxins, especially dried ones, are resistant to freezing, retaining toxic properties for up to 12 hours. When toxins are boiled for a long time, they break down under the influence of detoxifiers.

Figure 21. Appearance of botulinum toxin microbe.



Pathogenic microorganisms. Microorganisms that cause disease in humans, animals, and plants are called pathogens or pathogenic microorganisms.

An important feature of pathogenic microorganisms is the formation of specific substances - toxins. Many toxins are highly toxic. Pathogenic microbes produce two types of toxins - exotoxins and endotoxins.

As biological means, the enemy can use:

- for human poisoning - botulinum toxin, staphylococcal enterotoxin, plague, tularemia, anthrax, yellow fever, measles, brucellosis and other diseases (Fig. 23);

- for damage to agricultural crops - grain moth, potato phytophthora, etc.

When biological agents enter the body, they cause disease. Methods of using biological agents:

-biological, aerosol contamination of the surface atmosphere;

-distribution of artificially poisoned blood-sucking carriers to the target area;

-Indoor air and water pollution by biological means.

Means of using biological weapons

Biological Aids (BV) - Aerial bombs are used with cluster missiles and warheads, refueling aircraft, and ground aerosol generators. The distribution of insects in the target area is carried out using aerial bombs, special containers. Targeted biological weapons include, but are not limited to, missiles, aircraft, radios, and remote-controlled balloons (Figure 22).

Figure 22. Biological weapons and live organisms.

External signs of the use of biological weapons

The enemy uses biological weapons en masse, suddenly, taking into account the destructive factors of biological weapons, in order to achieve its goals and large-scale results. Therefore, in the organization of reliable protection of personal content, it is important to determine the fact of its use, preparation for use, and other information. The presence of special units and means of biological attack using all types of intelligence, the readiness of troops to defend against biological weapons (vaccinations, emergency prophylactic work), as well as the capture of samples of biological weapons, headquarters and medical records can be obtained by interrogating captives. The use of BV by the enemy is confirmed by general external signs and indications of non-specific biological agents by laboratory detection of samples taken as a result of intelligence.

Figure 23. Effects of anthrax on human skin.

The use of ZM, followed by radioactive substances, and then biological weapons is detected in radiation and chemical intelligence devices. In the absence of RM and ZM, it is assumed that biological agents were used in such areas. Air, water, soil and plants, object surfaces, bomb fragments, and insects can be sampled in areas suspected of being contaminated with BV. Airborne sampling is used in BVs in dormitories and service rooms. Samples and samples are given to the Army Sanitary Epidemiology Laboratory or to the unit's doctor.

Measures to protect and destroy biological agents include:

- Always keep personal and collective protective equipment, respiratory and skin protection equipment in combat readiness;

-storage of water, food products with special protection and disinfection means ready for work;

-It is recommended to use various ointments used to prevent insect and canal bites.

External signs of the use of biological weapons include:

- Clouds or fog traces that quickly disappear from the tracks of aircraft, rockets, balloons;

- when the cassette is opened, the elements fly around the ground axis without falling directly to the ground;

- the presence of fragments of weapons, objects on the ground and cloudy droplets in the environment, the presence of dusty substances;

- The specificity of the design of weapons with biological agents;

- the appearance of non-native creatures that live in the area where the entomological weapons landed;

-collection of insect and various animal carcasses;

-correct and timely use of protective equipment in the source of biological poisoning, all personnel must comply with mandatory rules of conduct;

- not to remove personal protective equipment without the permission of the commander, not to carry out partial sanitation, which is decided by the commander depending on the circumstances;

- not to touch military equipment, weapons and other items without special means of protection, not to come into contact with the personnel of neighboring units;

- It is impossible to refuse to take part in emergency prophylaxis, not to take part in vaccinations;

- not to use water without disinfection, not to take water from the contaminated area, not to consume the captured food;

- Immediately notify your commander at the first sign of illness and consult a paramedic or doctor. Reliable protection of personnel from BV, protection from blood-sucking insects;

- Proper use of military clothing, wearing appropriate clothing, carrying all buttons and straps, tying the sleeves with a bandage or tape, spraying insecticides and mosquito repellents on exposed areas of the skin.

CHAPTER FOUR

BURNING WEAPONS

General concept of firearms and their brief description

Incendiary weapons are incendiary substances and means of their use in combat. Firearms are used to destroy enemy personnel, weapons and military equipment, supplies, and to create fires in battlefields (Figure 24). The main harmful factors of a firearm are heat energy and combustion with the release of toxic substances.

Figure 24 Formation of fires due to the use of incendiary weapons.

The damaging effects of a firearm are determined as follows:

-burns of the respiratory organs and skin;

- Incineration of flammable substances and weapons, military equipment, the environment;
- burning of flammable substances and metals;

-contamination of indoor air with toxic and toxic substances;

- Decreased psychological impact and resistance to personnel.

Petroleum-based combustibles: - napalms, which can be liquid or thick. It is a very common incendiary substance and has a burning and scorching effect. Liquid fuels are made from gasoline, diesel fuel, and lubricants. Solid combustibles are viscous substances that consist of gasoline or liquid hydrocarbons.

Spontaneous flammable substances, including: - A mixture of triethyl aluminum with polyisobutylene. It looks like a normal napalm, but it ignites in the air.

Metal mixed combustibles (pyrogels) - petroleum products and powdered magnesium, aluminum, oxidizers, liquid asphalt, heavy oils. The addition of flammable metals to pyrogels increases the combustion temperature and increases the combustion capacity of these combustibles. Napalms, self-igniting compounds, pyrogels have the following main properties:

- Adheres to military equipment and weapons, clothing and the human body;

-easy to ignite, difficult to remove and extinguish, napalms emit heat up to 1000-12000 C, pyrogels up to 1600-18000 C.

-Self-igniting compounds are difficult to extinguish with water, they emit heat energy of 1100-15000 C when burned.

Napalms and self-igniting compounds burn at the expense of oxygen in the air, and pyrogels burn at the expense of atmospheric oxygen and oxidants.

Napalms are used to fill fire tanks, mechanized and shoulder-mounted firearms, aerial bombs and tanks, and explosives. The self-igniting mixture is used to refill four-barrel rocket-propelled grenades and rocket-propelled grenades. Pyrogels are filled with small and medium-sized aerial bombs, napalms, self-igniting compounds, and pyrogels cause severe burns to personnel. Pyrogels dilute thin steel ingots and duralumin.

Termite and termite-containing substances - When burned, oxides of one metal react with another to generate heat energy. Iron-aluminum termite compositions are very common. Termite and termite-containing substances burn to form thick slag, which reaches a temperature of 30,000 ° C. Burning termites can dilute some elements of military equipment and weapons. Termite and termite-containing substances burn without oxygen. Used in incendiary mines, shells and bombs, hand grenades and checkers.

White phosphorus is a translucent waxy substance that ignites spontaneously in the air, producing large amounts of white smoke that ignites the eye. The ignition temperature of powdered phosphorus is 340 C and the flame temperature is 900-12000 C.

White phosphorus is used in incinerators as a napalm and pyrogel incinerator.

Softened white phosphorus is a mixture of white phosphorus and synthetic rubber. Softened phosphorus with rubber also adheres to vertical surfaces, which can damage vertical surfaces. Softened phosphorus is used in the manufacture of bombs, mines and shells. Resistant to white phosphorus, it forms slow-burning particles when broken down into smaller pieces. Artillery shells, mines and aerial bombs are used in hand grenades. White and plastic phosphors are used to make incendiary and smoke weapons.

It consists of an alloy of magnesium (96%), aluminum (3%) and other elements (1%), ignites at a temperature of 6000 C and ignites with a dazzling white or blue flame. Combustion temperature reaches 28000 C. Used to make the shells of aircraft bombs.

In some countries, the use of incendiary weapons involves the use of incendiary aircraft and incendiary tanks.

The ground forces use artillery shells, mines, tanks and mechanized jet, suspended firearms, incendiary grenades, checkers and cartridges.

There are two types of firearms used in aviation:

- aerial bombs and tanks filled with termites and pyrogels;

-Napalm-filled aircraft bombs and tanks.

Both types of weapons are divided into small and medium-sized bombs according to their structure and caliber.

Small-caliber firearms are designed to destroy wooden structures, warehouses, stations and other objects with fire. Small-caliber incendiary bombs also have the property of burning and shattering, creating local fires. They have the ability to leak into buildings, military equipment and set them on fire. The burning time of the main volume is 2-3 minutes. By design, these bombs can be round, hexagonal, stable or unstable cylinders.

Medium-caliber firearms are used to burn industrial plants, city buildings, warehouses and other facilities. When they explode, they create separate flammable particles and fires. The burning period of the main volume is 3-5 minutes.

Incineration tanks are designed to damage personnel, create fires in the area, and create fires in populated areas. Depending on the caliber, the capacity of the tanks is 125-400 liters. They are filled with napalm. They are lightweight, round, made of aluminum or steel. When the incinerator hits the target, it forms a volumetric burning flame area, burning time is 3-5 seconds, burning area is 5900-1500 m2, some burning parts can fall to 3000-5000 m 2 and burn for 3-10 minutes.

Artillery firearms are used to burn wooden buildings, fuel depots, ammunition, and flammable objects. They can also be used to damage personal content and weapons. Incendiary and smoke weapons, shells and mines of various calibers are filled with white and softened phosphorus. When a phosphorus bomb explodes, it spreads to a radius of 15 to 20 meters, creating a cloud of white smoke at the site of the explosion.

The flow of flammable liquid is based on firing a stream of combustible liquid under the pressure of compressed air or nitrogen gas. The liquid is ignited using a special ignition device as it exits the armor pipe. Fluid launchers are designed to burn personal items and objects.

Suspended weapons are designed to shoot 12-18 liters of flammable liquid at a distance of 50-60 meters. The amount of fire depends on the number of burners.

Mechanized equipment - mounted on a lightly floating ZTR chassis with a capacity of 700-800 l of combustible material, firing distance 150-180 m, firing is short, non-stop The opening time is 30 seconds.

The firing tank is equipped with medium tanks with a capacity of 1400 liters of flammable liquid, firing duration 1-1.5 minutes. It can fire up to 20-60 short shots with a range of 230 m.

Anti-RPO - 4-barrel 66 mm Jet M202-A1, capable of destroying one or more targets. Designed for the destruction of combat targets, warehouses, dugouts, personnel with jet ammunition up to 700 m. One shell contains 0.6 kg of incendiary substance.

Hand grenades are filled with termites or similar substances. Maximum shooting distance is 40 m, 150-200 m when shooting from a rifle. The burning time of the main ingredient is 1 minute.

Incendiary explosives and cartridges are various metal containers filled with viscous napalm. They are planted with mines on the ground and can burn up to 15-70 meters.

Protection of personnel, military equipment, fortifications from firearms

Measures to protect against firearms should be taken to prevent or minimize their impact on personnel, weapons and military equipment, fortifications and facilities, to prevent and prevent the spread of fires and, if necessary, It is organized to put out fires.

The main measures to protect against firearms are:

- equipping the area with fortifications, taking into account the protection from incendiary weapons;

-use of protective and masking properties of places;

- effective use of firefighting measures and personal protective equipment, protective properties of military equipment;

-Organize rescue operations at the scene of the fire, isolate and extinguish fires (Figure 25).

The following are used to protect personal belongings from firearms:

-closed fortification facilities, dugouts, shelters;

-tankings, PJM, ZTR, cars;

-skin and respiratory protection;

-cotton jackets, cloak tents, cloak blankets;

-natural shelters and various devices.

Equipping the sites with fortifications will provide effective protection of personnel, weapons and military equipment, and material resources from the damaging effects of incendiary weapons. For reliable protection of personnel, fortifications should be equipped with firearms that take into account the nature of the impact on both personnel and the facility itself. Additional equipment can come from a variety of barriers, sheds, and the like. Protective barriers are made of non-flammable or non-flammable materials and are sprinkled with soil at least 10-15 cm thick. In order to prevent flammable mixtures from entering the structures, the entrances to them will be equipped with ditches, and the sheds will be built on the outside.

Figure 25. How to separate and extinguish fires.

Entrances to underground facilities shall be equipped with non-combustible means. Fire breaks are provided every 25-30 meters to prevent the spread of fire along the trenches.

Parts of fortifications made of combustible materials are plastered with special or natural means (mud, soil).

To protect weapons and military equipment from incendiary weapons, shelters are built on top of concealed areas by local means, and soil is sprinkled on top, and the sides are covered with barriers that are difficult to ignite or protective. If it is not possible to equip the sheds, a thick cloth or similar barrier will be placed on top of the equipment and it will be quickly removed when flammable mixtures fall on them.

Weapons, ammunition and other items should be stored in concealed areas or in specially excavated areas.

As a result of the use of protective and masking properties, the impact of incendiary weapons on personnel, weapons and military equipment, and material resources is significantly reduced. Personnel must be able to make effective use of the hidden features of the terrain, cliffs, underground pits, ditches, caves, and other natural barriers while performing combat missions, marching, and occupying areas.

Firefighting measures are aimed at partially or completely eliminating the causes of fires and their causes. The purpose of firefighting measures is to extinguish fires, create favorable conditions and conduct successful rescue operations.

Units will be equipped with firefighting equipment, and personnel will be trained in fire prevention and extinguishing techniques. Weapons and military equipment are covered with fire-resistant paints. Equipment made of fabrics, wood, and similar combustibles is impregnated with fire retardants. Areas occupied by units should be cleared of dried grass, hay and leaves.

The wooden openings of the fortifications are covered with mud (and in snowy conditions with a solution of chalk and lime). Load-bearing parts of vehicles are emptied of fuel. Personal weapons and other items are stored in locked areas or in special trenches.

In order to extinguish fires, fire extinguishers must always be kept ready in all departments. Special areas equipped with firefighting equipment will be set up at fire-hazardous facilities.

Figure 26. Extinguish flammable substances using natural means at hand.

Use of personal protective equipment and protective features of military equipment. Protective suits, military uniforms and gas masks are used to protect personnel from incendiary weapons. When flammable compounds fall on them, they are quickly removed and the incendiary substance is extinguished. In the field, greenery, twigs, and the like can be used to enhance the protective properties of the technique (Figure 26).

Equipment, especially armored vehicles, reliably protects flammable substances from direct contact with personal belongings.

Covers, fabrics and bedding are not attached to the equipment. This allows them to be removed quickly if they catch fire. When firearms are used by the enemy, personnel immediately take their place in the equipment. Doors, manholes and other openings shall be closed to prevent flammable substances from entering. When flammable substances enter the equipment, the burning area should be sealed with any means at hand (Fig. 27).

Figure 27. Firefighting with firefighting equipment.

Rescue operations include rescuing personnel, transporting the injured to medical facilities, rescuing firearms and military equipment, and supplies.

Rescue operations begin as soon as the enemy uses firearms and are carried out by the units affected. Self-help and mutual assistance in units are of particular importance, given that the damaging effects of fires increase over time.

Rescue personnel include searching for victims, removing flammable substances and flammable clothing, transporting them to safety and providing first aid.

First aid for personnel begins with the removal of flammable substances from the body or clothing with the help of the injured person or his / her friends. To extinguish small amounts of flammable substances, the burning area should be covered with a tent, a general protective kit, moist soil or snow to prevent air ingress. To extinguish large amounts of flammable material, the injured person should be covered with a tent, a general protective kit, sprinkled with plenty of water, and sprinkled with soil or sand.

Once the flammable substances have been extinguished, the burnt areas on the clothes are cut and partially removed. Remnants of the extinguished burn on the burnt skin are not removed, as it is very painful and can cause damage to the burn. A bandage soaked in water or 5% copper sulphate solution is applied to the affected area; clothes are soaked in the same solution.

On hot summer days, keep the moistened bandage moist until it reaches a medical facility. In the absence of copper sulphate solution, the affected areas of the body should be bandaged using a personal bandage kit.

In case of burns on large surfaces, first aid should be provided by a health instructor. Severely burned personnel will be sent to a medical facility on the instructions of unit commanders. In the case of minor injuries to the skin (redness of small surfaces or small blisters), first aid is given to the injured and they are left in the line. Rescue of weapons, military equipment and supplies will involve evacuating them from dangerous areas to safer areas. When weapons and military equipment are exposed to incendiary weapons, fires are often caused by the ignition of rubber parts, various coatings, and objects, and then by the explosion of fuel containers and ammunition. It takes 10-15 minutes for the fire to spread to the entire facility, so rescue operations should consist of clear, short-term actions. Soil, sand, or mud is sprinkled to extinguish flammable substances in weapons and military equipment; tarpaulins and similar fabrics, sandbags, tents; the flame is suppressed with freshly cut deciduous tree branches or a bundle of plants (Fig. 28).

Dirt, sand, mud and snow are effective and convenient means of extinguishing combustibles. Tarpaulins, sandbags, and tents are used to extinguish small fires.

It is not recommended to use a single stream of water to extinguish large amounts of flammable substances, as this may cause the combustible mixture to scatter.

Extinguished flammable compounds can easily re-ignite from a source of ignition. Flammable compounds can ignite spontaneously when they contain phosphorus. Therefore, the extinguished parts of the combustible mixture should be separated from the damaged objects and burned in separate places.

Figure 28. Extinguish the fire with a blanket.

Separation and extinguishing of fires is carried out primarily in cases where they endanger personnel, weapons and military equipment, material means or interfere with the performance of the tasks assigned to the units, and the units have their own forces and means. is done with. Separation of fire is an attempt to limit the spread of fire. Extinguishing the fire will ensure a complete cessation of combustion. To extinguish fires use flame retardants (water, water vapor, foam, sand, soil, snow, etc.) and fire extinguishers (deciduous tree branches, plants) prepared brooms, tents, tarpaulins, beds, signboards, fire extinguishers, special firefighting equipment, fire trucks, car pumps and the like). Fires should be extinguished and extinguished promptly, in strict compliance with perfect and clear safety requirements.

CHAPTER FIVE

PROTECTION AGAINST WEAPONS OF MASS DESTRUCTION, CHEMICAL SUPPLY

Protection against weapons of mass destruction

Protection against weapons of mass destruction is one of the types of combat equipment, which is aimed at minimizing damage from the enemy's nuclear, chemical and biological weapons, maintaining the combat capability of personnel, ensuring the successful completion of their tasks.

Protection against weapons of mass destruction is fully organized during the war and includes:

- equipping the occupied lands with engineering facilities;

-use of masking and protective properties of premises and military equipment;

- to alert personnel with established signals when there is a threat of the use of weapons of mass destruction by the enemy, as well as to inform about radioactive, chemical and biological poisoning;

- Carrying out sanitary-hygienic and special medical preventive measures against the epidemic;

-ensure the safety and security of personnel when moving in contaminated areas, disaster areas, fire and flood areas;

- End the effects of weapons of mass destruction used by the enemy.

Equipping the site with engineering structures in the occupied initial condition: open and closed ditches for personnel, trenches and interconnection corridors, trenches, dugouts; ditches for weapons and military equipment, closed structures. The procedure for equipping designated areas with engineering facilities is determined by the unit commander, and the process should begin as soon as the unit arrives at the designated area. Simple fortifications (ditches, trenches and inter-trench communication corridors) are equipped by the units themselves.

Closed trenches significantly reduce the effects of nuclear explosion damaging factors such as shock wave, light radiation, transient radiation, as well as reduce the contamination of places with radioactive substances, direct exposure of personal contents from droplets and aerosols of toxic substances. - protects against proper poisoning.

The top of the trenches should be moistened to increase the effectiveness of neutron weapon protection. To increase the strength of simple fortifications, there is always a low elevation on the outside (if time and materials are available).

Trenches are built at the expense of one for each section (crew). To protect the personnel from the shock wave, the entrance to the covered trenches is covered with a barrier made of wood, twigs and similar materials. Trenches should always be constructed in areas where personal content is plentiful. This allows personnel to quickly occupy trenches at warning signals that the enemy is in danger of using weapons of mass destruction and has begun to use them.

Trenches and hideouts are dug primarily to protect weapons and military equipment from the damaging effects of a nuclear explosion. Covered ditches should be dug to protect and rest crew crews. They should be located at the edge of the ditches, at a distance of not more than 20-30 m from them.

The use of masking and protective properties of facilities and military equipment reduces the impact of weapons of mass destruction on personnel, weapons, military equipment and supplies.

Units must be able to skillfully use forest massifs, pine forests, topography, depths and pits, caves, and other natural masking and protective devices when performing combat missions, marching, and locating an area. Movable, especially armored objects, significantly reduce the risk of damaging factors such as the shock wave of a nuclear explosion, transient radiation and radioactive radiation, reliably protect against light radiation and droplets in liquid form; and those with a system of protection against weapons of mass destruction provide reliable protection against radioactive substances, vapors and aerosols of toxic substances, and biological agents.

Warning of personnel when there is a threat and use of weapons of mass destruction by the enemy, as well as notification of radioactive, chemical and biological damage by the only and always in use and above commanders is done with set signals and they are transmitted to all personal content.

In the event of the use of a nuclear weapon by the enemy and a nuclear explosion, personnel will take the following protective measures: in combat vehicles - shutters, doors, collars, blinds will be closed and a system of protection against weapons of mass destruction will be launched; when parked in open cars - bends down, and when parked outside cars - quickly takes up nearby shelters or lies on the opposite side from the side where the head exploded. Once the shock wave has passed, the personnel will continue to perform the task.

Units must be able to skillfully use forest massifs, pine forests, topography, depths and pits, caves, and other natural masking and protective devices when performing combat missions, marching, and locating an area. Movable, especially armored objects, significantly reduce the risk of damaging factors such as the shock wave of a nuclear explosion, transient radiation and radioactive radiation, reliably protect against light radiation and droplets in liquid form; and those with a system of protection against weapons of mass destruction provide reliable protection against radioactive substances, vapors and aerosols of toxic substances, and biological agents.

Radifaol immediately puts personal protective equipment into combat mode without stopping the task on foot or in open vehicles on signals of chemical and biological damage, and in the case of indoor moving objects, mass destruction In facilities that do not have a system of protection against firearms, only respirators (gas masks) are worn, and in facilities that have this system, shutters, doors, collars and blinds are closed and the system is activated. Personal content in underground shelters triggers a system of collective protection. Personnel wear respirators (gas masks) on the "**Risk of Radiation**" signal and gas masks on the **"Chemical Alarm**" signal.

Strict adherence to the established hygienic requirements for the placement and feeding of personnel for anti-epidemic, sanitary and special medical prevention, as well as compliance with the rules of personal and public hygiene, anti-radiation drugs that increase the body's resistance to ionizing radiation, toxic substances It is achieved through the judicious and timely use of antidotes, which increase the resistance to secretions.

Anti-radiation drugs should only be used under the direction of commanders. Counter-poisons are used by personnel independently or under the direction of the unit commander with the appearance of signs of damage from toxic substances.

The safety and protection of personnel in the affected areas, disaster areas, fires and flood areas is ensured by: personal and collective protection, military equipment and protective properties of the premises, anti-radiation drugs, antidotes, fortifications. 'z timely and prudent use; Strict adherence to security measures in areas affected by personnel.

Personnel shall wear respirators (protective masks), protective masks, socks and gloves when walking in dry weather on foot or in open vehicles in areas contaminated with radioactive substances; wears. Personnel in moving facilities not equipped with a system of protection against weapons of mass destruction wear only respirators (gas masks). When located in facilities equipped with such a system, shutters, doors, openings, blinds are closed and the protection system is activated. When walking in humid weather in areas contaminated with radioactive substances, personal personnel wear only skin protective equipment.

In order to eliminate the consequences of the use of weapons of mass destruction, first aid will be provided to the injured, rescue operations will be carried out, evacuation will be organized, as well as dosimetric and chemical control will be carried out, firefighting measures will be taken. special processing measures are carried out.

First aid for the wounded and injured is carried out on a self-help and mutual aid basis. These activities take place at the site of injury and include wearing a gas mask, taking anti-toxins, and exposing exposed parts of the body and clothing using a personal anti-chemical package.

In order to protect personnel from weapons of mass destruction, the section commander must study the area after assuming a combat mission and determine its protective and masking properties. In combat orders, it provides warning signals about the threat and use of weapons of mass destruction by the enemy, as well as signals of radioactive, chemical and biological damage and the procedure for their action.

Chemical supply

Chemical supply is organized for the group (section) in case of radioactive, chemical, biological damage, in order to create the necessary conditions for the group (section) to perform the task, as well as to mask the group (section) actions with smoke and aerosols.

The group's chemical supplies include: radiation, chemical and non-specific biological agents; timely and prudent use of personal and collective protective equipment; dosimetric and chemical control; special processing; timely and efficient use of smoke and aerosols.

Radiation, chemical and non-specific biological intelligence is organized to obtain information on the radiation and chemical situation and is carried out using radiation, chemical intelligence instruments, as well as surveillance.

Timely and prudent use of personal and collective protective equipment is achieved by: constantly monitoring their suitability for use; pre-training and training of personnel on the use of these tools in different situations; to put personal protective equipment in a "combat" state and to determine the time of their resolution; determine the conditions and procedures for the use of weapons and military equipment, determine the order of use of facilities equipped with filtering and ventilation equipment.

Dosimetric and chemical control is performed to determine the combat status of the personnel and whether there is a need for special treatment. It is carried out using military dosimeters and radiation and chemical devices.

Special treatment involves decontamination, decontamination and disinfection of weapons, military equipment, ammunition and other raw materials when they are contaminated with toxic, radioactive substances and biological agents. Sanitary treatment of personnel may also be performed if necessary. Custom processing can be partial or complete. Typically, partial processing is performed without interruption of the combat mission, and full processing is performed after the completion of the combat mission.

The use of smoke and aerosols is intended to counter enemy intelligence and weapons. It is also used to mask the movement of its units, to protect it from light radiation and laser weapons in a nuclear explosion. Smoke and aerosols are used in smoke generators, smoke grenades and checkers.

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CONTENTS