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DISTRIBUTION AND PROTECTION OF POTENT TOXIC SUBSTANCES

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Abstract:
The article provides information on highly toxic substances, as well as an assessment of the chemical situation in case of accidents at chemically hazardous facilities, first aid to those poisoned and the procedure for protection against toxic substances.

Keywords: Toxic substance with strong action (POX), chemically dangerous object, industry, human body, population, evacuation.

Introduction

Highly toxic substances are chemical compounds that are widely used in industry, leading to mass casualties among troops, personnel and citizens in the event of a disaster. [1].

The term "potent toxic substances" was introduced in the mid-60s of the last century. During the times of the former Soviet Union

A list of toxic chemical substances of 107 names was developed, which, along with ammonia and chlorine, included methanol, dichloroethane and other substances that are most dangerous for the body when taken, and substances that are not prone to the formation of foci of mass destruction when inhaled. In addition, these substances and the work with them were under the control of the Ministry of Labor. Therefore, the development in the late 80s of new criteria for toxic chemicals included in the composition of highly toxic substances led to a reduction in the list of highly toxic substances and amounted to 34 substances. But in 1991, the list of highly toxic substances was revised and reduced to 21 [2].

According to the routes of penetration into the human body, toxic substances are divided into :

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inhalation effect - entering the body through the respiratory tract;
oral exposure - intake through food and water;
skin- resorption effect - penetration through the skin and mucous membranes.
SDYAV is divided into two groups according to the duration of the impact of damage:
stagnation - their traumatic effect lasts from several hours to several days (soman, skin lesions) ;
unstable - their traumatic effect lasts for several minutes (evaporating, damaging) [3].
The minimum stock of highly toxic substances at manufacturing plants is calculated for an average of three days, at mineral fertilizer plants - for 10-15 days. Large manufacturing plants located near industrial cities can simultaneously store thousands of tons of highly toxic substances.
Highly toxic substances are stored at production sites or in transport vehicles, usually in standard containers. These can be aluminum, reinforced concrete or reinforced concrete vessels that create conditions corresponding to the specified storage procedure. The container shape and type of coating are selected based on the content of highly toxic substances, the scale of production and transportation conditions. Cylindrical and spherical vessels are widely used .
Highly toxic substances are stored at manufacturing facilities:
in high pressure vessels (compressed gases);
in isothermal warehouses (containers with artificial cooling) close to atmospheric pressure;
in closed vessels at ambient temperature.
The methods of storing highly toxic substances determine their nature in accidents. Vessels under pressure with highly toxic substances are subject to destruction and subsequent release of large quantities of liquid into the atmosphere over a long period of time. In this case, the evaporation process is divided into three phases:
the first phase is instantaneous rapid evaporation (maximum 1-3 min) due to a variety of saturated vapors of highly toxic substances. At this time, the vapors of the main amount of the substance enter the atmosphere (the primary cloud is formed). In addition, some highly toxic substances evaporate as a result of changes in the thermal composition of the liquid, the ambient air temperature and the impact of solar radiation. As a result, the temperature of the liquid decreases

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to the boiling point. At this time, an accident can lead to significant evaporation of chemical toxic substances, the formation of clouds with a concentration of highly toxic substances. This can increase mortality;
the second phase is an accident caused by unstable evaporation of toxic chemicals due to heat on surfaces (the surface of buried soil, devices placed under containers), changes in the thermal composition of the liquid and the heat flow in the environment. This period is characterized by the fact that, simultaneously with a sharp drop in evaporation, the liquid layer drops below the boiling point.
the third phase is an accident with stationary evaporation of toxic chemicals due to heat in the environment, the spread of which can last for hours and days (formation of a secondary cloud) [4].
The most dangerous of these periods is considered to be the first 10 minutes, when rapid evaporation of chemical poisonous substances occurs. At the same time, a heavy aerosol cloud is formed from the compressed gas under pressure, which instantly rises to a height of about 20 meters. Then, under the influence of gravity, it falls into the soil. At first, the cloud boundary becomes clear, that is, it has a high optical density, and after 2-3 minutes the boundaries begin to diverge. The radius of this zone can reach 0.5-1.0 km or more.
As a result of the destruction of the isothermally preserved shell and the subsequent accident, it depends on the non-stationary phase until a large amount of chemical poisonous substance is released, and then it passes into the stationary phase. In this case, the content of the substance entering the primary cloud does not exceed 3-5% of the ambient air temperature of 25-30 degrees.
Key measures to protect military personnel and workers after accidents:
reporting accidents at chemically hazardous facilities;
temporary evacuation and placement of people in protective structures;
restriction of the exit and entry of the population from the poisoned zone;
providing medical assistance to victims of accidents at chemically hazardous facilities;
effective use of personal protective equipment ;
use of antidotes;
definition and observance of chemical protection procedures;
partial or complete special treatment of people, territories, structures, transport, equipment and means [5] .
Methods of providing first aid in case of poisoning :

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When providing assistance to victims, the respiratory organs are protected first of all to protect against subsequent exposure to toxic substances. To do this, a victim poisoned by chlorine is given a cotton gauze mask soaked in soda, water or a 2% solution of baking soda, and in the case of ammonia poisoning, a cotton gauze mask soaked in a 5% solution of citric acid is put on, and the victim is taken out of the affected area.

In case of ammonia poisoning, the skin, eyes, nose and mouth are washed with water. 2-3 drops of 30% albusid solution are dripped into the eyes, and olive oil into the nose. Artificial respiration.

In case of chlorine poisoning, the skin is repeatedly washed with a 2% solution of baking soda. After breathing has stopped, artificial respiration is given.

In those poisoned by hydrocyanic acid, immediate artificial vomiting of the stomach is performed. The stomach is washed with clean water or 2% baking soda. After breathing has stopped, artificial respiration is given.

There is no specific treatment or preventive measure against phosgene. In case of phosgene poisoning, the person is taken out into fresh air and heated. Artificial respiration.

In case of carbon monoxide poisoning, ammonia is soaked, a cold cloth is put on the head and chest, and humidified oxygen is inhaled if possible. If breathing stops, artificial respiration is given.

In case of mercury poisoning, the stomach is repeatedly washed with water with 20-30 g of activated carbon. Then milk, egg yolk mixed with water are given, and then intravenous agents. In case of acute, mainly inhalation poisoning, complete rest is provided after removal from the affected area, and after recovery, the patient is taken to the hospital [6].

CONCLUSION

No device in the world can stop or maintain destruction for years. People cannot work without making mistakes. Therefore, we must always look for a second or backup path and avoid the danger that can be expected.

Based on modern requirements, the following proposals can be made to prevent emergency situations: continuous study of foreign experience in eliminating accidents involving nuclear weapons; development of information on forecasting emergency situations, as well as computer programs to identify their occurrence and consequences.

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