

METHODS OF CONDUCTING CHEMICAL EXPLORATION

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Chemical weapons should be understood as toxic substances and the means in which they are used (ammunition, special machines and devices).

Toxic substances (TS) are such chemicals that, when used in combat, can affect people and animals. Toxic substances have the property of infecting air, soil, water sources, foodstuffs, items of equipment and weapons of troops, engineering structures, buildings, etc. [1].

Toxic substances are different in their physicochemical nature and therefore cause human damage of varying nature and severity. The use of toxic substances by the enemy extremely complicates the combat operations of troops and requires the immediate use of special protective equipment.

In all cases of massive artillery-mortar and enemy air raids, observation posts (observers) should pay special attention to the nature of ammunition bursts, since external signs of a rupture can facilitate the detection of the beginning of an enemy chemical attack. Chemical bombs, shells and mines, when exploded, form a creeping gas cloud, which in some cases has a characteristic color.

Chemical reconnaissance must promptly establish: the beginning of an enemy chemical attack; the presence of contaminated areas in the zone of operations of troops; boundaries of contaminated areas and bypass routes or favorable directions for creating passages; the type of toxic substance used by the enemy; the state of the NBC protection of enemy troops; the presence of local agents that can be used for chemical protection.

Detection and determination of the degree of contamination with toxic and highly toxic substances of air, terrain, structures, equipment, transport, personal protective equipment, clothing, food, water, fodder and other objects is carried out using chemical reconnaissance devices or by sampling and subsequent analysis in chemical laboratories.

The principle of detection and determination of TS by chemical reconnaissance devices is based on a change in the color of indicators when they interact with TS. Depending on which indicator was taken and how it changed color, the type of TS is determined, and a comparison of the intensity of the obtained color with a color standard allows us to judge the approximate concentration of TS in the air or the density of infection [2].

Chemical exploration relies on a diverse array of methods to investigate and understand the composition, properties, and behaviors of chemical compounds. This thesis provides an overview of the key methods employed in chemical exploration, including analytical techniques such as spectroscopy, chromatography, and mass spectrometry, which aid in compound identification and quantification. Additionally, it discusses computational modeling and simulation as valuable tools for predicting molecular interactions and behavior. Furthermore, the thesis examines field-work and laboratory experiments as essential methods to gather empirical data, as

well as interdisciplinary collaboration to leverage expertise from various scientific disciplines.

Through these multifaceted methods, chemical exploration advances our understanding of matter and fuels innovation in a multitude of industries.

Chemical reconnaissance following the use of chemical weapons and during emergency situations is crucial for the prompt and effective response to chemical threats. This thesis explores the specialized methods employed in chemical reconnaissance during and after such incidents, including:

1. **Deployment of Specialized Teams:** Trained personnel equipped with personal protective gear and specialized detection equipment are dispatched to assess the affected area.

2. **Mobile Laboratories:** Mobile labs are used to conduct rapid on-site analysis of samples, identifying the specific chemical agents involved.

3. **Air and Ground Sampling:** Sampling devices, both in the air and on the ground, are employed to collect air, soil, and water samples for analysis.

4. **Remote Sensing Technologies:** Satellite imagery and unmanned aerial vehicles (UAVs) equipped with sensors can provide critical data on the extent of contamination and identify hotspots.

5. **Chemical Sensors and Detectors:** Portable and fixed chemical sensors and detectors are used to identify the presence of chemical agents in the atmosphere.

6. **Decontamination Procedures:** Reconnaissance teams assess the level of contamination and plan decontamination procedures to make the area safe for responders.

7. **Real-time Data Analysis:** Rapid data analysis and communication of findings to decision-makers are essential for immediate response and mitigation.

8. **Environmental Monitoring:** Continual monitoring of the affected area and its surroundings to track changes in chemical agent concentrations and environmental impact.

9. **Intelligence Gathering:** Leveraging intelligence sources and networks to gain information about potential threats and perpetrators.

This thesis delves into the role of these methods in ensuring the safety of responders and the protection of affected populations during and after chemical incidents. It emphasizes the need for rapid, well-coordinated, and technologically sophisticated chemical reconnaissance to mitigate the impact of chemical threats and emergencies effectively.

References

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