

CAUSES OF CARBON MONOXIDE FORMATION, ITS PROPERTIES AND PREVENTION MEASURES.

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**Abstract.** This article discusses the causes of carbon monoxide formation, the conditions that lead to it, and recommendations for preventing and eliminating poisoning among citizens from natural and carbon monoxide.

**Keywords:** Carbon monoxide (CO), natural gas, flash, emergency, burn, coal, wood, carbon monoxide, first aid.

As is known, in our country and around the world, emergencies related to natural gas leaks and flare-ups and the formation of carbon monoxide are still a problem. These situations not only cause significant damage to the economies of countries, but also harm the health of many people and lead to their deaths. For this reason, our state pays great attention to preventing the above emergencies. In particular, one of the important tasks is to widely use modern gas analyzers (detectors) in addition to traditional methods for preventing these emergencies (carrying out explanatory work with the population, not using improvised heating devices, etc.), thereby increasing the effectiveness of ensuring the safety of private and multi-storey buildings, and to reduce the risk of emergencies as much as possible, and in the event of such situations, to preserve people's lives and health, and to reduce the amount of damage and material losses caused to the environment.

In order to prevent emergencies and ensure the safety of the population, all organizations and departments should constantly make their contribution, and realize that conducting scientific research is an urgent issue. An example of this process is the emergency situations associated with natural gas leaks and carbon monoxide, which are still a problem. According to the latest data, the main reasons for these incidents include the following.

The population's lack of sufficient information or inattention about the safety precautions associated with natural gas leaks and carbon monoxide;

The population still uses unsophisticated, undemanding stoves for heating their homes;

Gas stoves and other gas equipment in 65-70% of private and multi-storey apartments of the population of our republic are morally obsolete, and there is no system for detecting natural gas and carbon monoxide in these apartments, detecting and reporting their formation.

Based on the above, the issue of preventing emergencies associated with natural gas leaks and carbon monoxide in private and multi-storey buildings remains relevant for us;

Prevention of emergencies associated with natural gas leaks and flare-ups and carbon monoxide in private and multi-storey buildings in the republic;

Existing problems in the system for preventing emergencies associated with natural gas leaks and flare-ups and carbon monoxide in private and multi-storey buildings and ways to solve them.

Based on the analysis of all the above, develop scientific and methodological manuals on improving the system for preventing emergencies associated with natural gas leaks and flare-ups and carbon monoxide. Analyze the state of emergency situations associated with natural gas leaks and flare-ups and carbon monoxide in our republic;

Studying the situation of the above emergencies in foreign countries and their prevention experience. The main issue is the implementation of constant preventive measures to prevent emergencies associated with natural gas leaks and flare-ups and the formation of carbon monoxide.

Currently, cases of poisoning with natural and carbon monoxide are often observed in the manufacturing industry, heating boiler rooms and residential buildings due to improper use of natural gas. In order to prevent these unpleasant incidents, we must first know the properties and effects of natural and carbon monoxide and the rules for their prevention. Such situations often arise as a result of people's carelessness or non-compliance with safety rules when using gas equipment.

Carbon monoxide, which is extremely dangerous for the human body, is released during the incomplete combustion of natural gas and household materials. Carbon monoxide occurs not only during fires, but also in everyday life, due to incomplete combustion of fuel in stoves and malfunctions of gas equipment. Carbon monoxide binds to hemoglobin 100 times more strongly than oxygen.

In addition, the smoke generated by the fire significantly reduces the amount of oxygen in the environment. When oxygen decreases by 8-11 percent, a person's movement deteriorates, leading to impaired muscle coordination, impaired concentration, and difficulty thinking. A decrease in the amount of oxygen by 17% causes death.

Carbon monoxide (CO) is one of the most toxic components of combustion products, is part of smoke and is formed during the combustion and combustion of almost all combustible substances and materials.

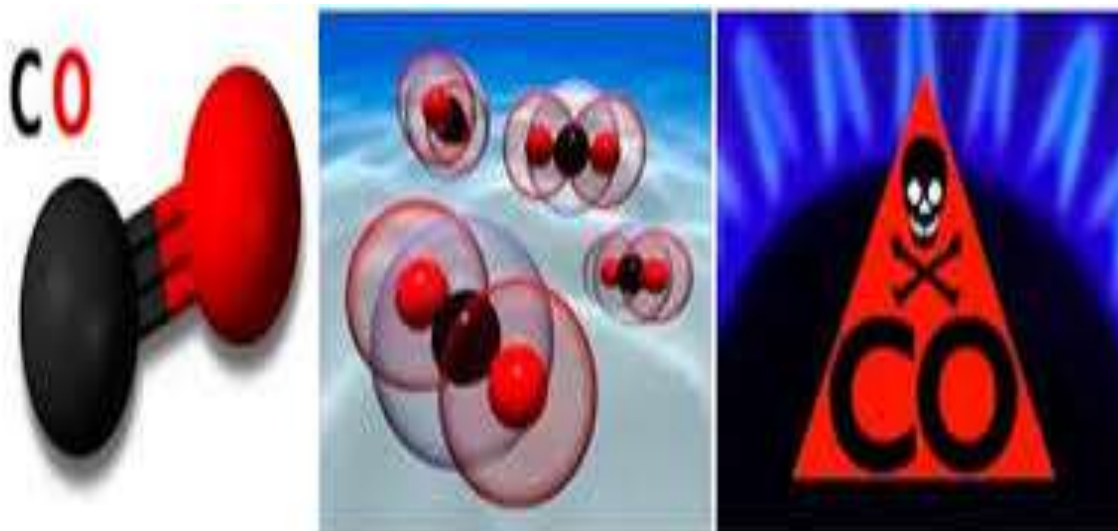
Due to its toxicity, carbon monoxide often causes great harm to the human body, which determines the relevance of this issue. Everyone should know the methods of neutralization after carbon monoxide poisoning, as well as methods of preventing poisoning.

The main goal is to study the effect of carbon monoxide and its compounds on the human body. To achieve this goal, the following tasks are set: to review the chemical formula of carbon monoxide and its compounds, to indicate the most common causes of poisoning, methods of neutralization and first aid, as well as methods of preventing poisoning.

#### **What is carbon monoxide?**

Carbon monoxide or carbon monoxide is a colorless, tasteless, odorless, poisonous gas (under normal conditions). The chemical formula is CO.

The CO molecule has a triple bond, like the nitrogen molecule. Since these molecules are similar in structure, their properties are also similar.



**Figure 1. General structure of carbon monoxide.**

Due to the presence of a triple bond, the CO molecule is very strong and has a small internuclear distance.

Carbon monoxide is a colorless, odorless, and tasteless gas. The odor, which is called the "smell of carbon monoxide" and is flammable, is actually the odor of organic compounds.

Carbon monoxide was first obtained in 1776 by the French chemist Jacques de Lussan by heating zinc oxide with charcoal, but was initially mistaken for hydrogen because it burned with a blue flame.

The presence of carbon and oxygen in the composition of this gas was determined in 1800 by the English chemist William Cruikshank. The toxicity of the gas was studied in 1846 by the French physician Claude Bernard in experiments on dogs.

#### **Carbon monoxide poisoning**

Despite the public's awareness of this danger, carbon monoxide poisoning remains a widespread cause of death. Carbon monoxide (CO) poisoning has long been called carbon monoxide, hence the common name for this gas - carbon monoxide.

Carbon monoxide is completely odorless and can be formed anywhere there is a combustion process, even in a furnace. The main reason for its formation is a lack of oxygen in the combustion zone. And then, instead of completely harmless carbon dioxide - a product of complete combustion of fuel - carbon monoxide is formed. Most cases of carbon monoxide poisoning are associated with breathing engine exhaust from vehicles operating in poorly ventilated areas.

Carbon monoxide poisoning can occur very quietly, because this gas has no color or smell. You can't know that the gas is there until you feel unwell, and a small amount of it is enough to cause poisoning. The mechanism of action of carbon monoxide on a person is that when it enters the blood, it binds to hemoglobin cells. Then hemoglobin loses its ability to transport oxygen. And the longer a person breathes carbon monoxide, the less effective hemoglobin remains in his blood and the body receives less oxygen. The poisoned person begins to suffocate, has a headache, and becomes confused. And if he is not taken out to fresh air in time, then fatal cases are observed. In case of carbon monoxide poisoning, it takes a long time for hemoglobin cells to completely clear carbon monoxide. The higher the concentration of CO in the air, the faster a life-threatening concentration of carboxyhemoglobin is formed in the blood.



For example, if the concentration of carbon monoxide in the air is 0.02-0.03%, then when breathing such air, a concentration of 25-30% carboxyhemoglobin is formed for 5-6 hours, if the concentration of CO in the air is 0.3-0.5%, then at 65-75%, a person will be poisoned by the deadly composition of carboxyhemoglobin after 20-30 minutes of being in such an environment. Carbon monoxide poisoning can occur acutely or slowly, depending on the concentration. At very high concentrations, poisoning occurs rapidly, is characterized by rapid loss of consciousness, convulsions and respiratory arrest. High concentrations of carboxyhemoglobin are found in blood taken from the left ventricle of the heart or from the aorta - up to 80%. The following symptoms develop gradually: muscle weakness appears; dizziness; tinnitus; nausea; vomiting; drowsiness; sometimes, on the contrary, a short-term increase in mobility; then impaired coordination of movements; euphoria; hallucinations; loss of consciousness; coma and death from paralysis of the respiratory center. The heart may continue to beat for some time after breathing has stopped. There have been cases of people dying from the effects of poisoning even 2-3 weeks after the poisoning incident.

#### **Preventing carbon monoxide poisoning**

Symptoms of carbon monoxide poisoning include: headache, palpitations, dizziness, chest pain, dry cough, lacrimation, nausea, vomiting, high blood pressure.

To minimize the negative effects of carbon monoxide on the body, the Ministry of Health strongly recommends not to neglect preventive measures and follow simple recommendations:

- wear a moistened protective mask when the smell of smoke intensifies;
- insulate window and door openings with a damp cloth;
- carry out daily wet cleaning in buildings;
- wear clothes made of natural fabrics;
- take a shower several times a day;
- rinse your nose and throat with running water;
- take multivitamins (unless there are contraindications);
- eat low-calorie foods, mainly vegetables and fruits, except for special medical cases.

If you develop symptoms of acute illness or discomfort (shortness of breath, cough, signs of insomnia), you should immediately consult a doctor.

#### **Conclusion**

Natural gas leaks and flare-ups and carbon monoxide incidents not only cause significant material damage, but also pose a threat to human health and life. According to statistics, in 2021, the number of accidents related to natural gas leaks and flare-ups was 126, the number of injured was 178, and the number of victims was 28. The number of incidents related to carbon monoxide was 55, the number of injured was 45, and the number of victims was 101. When these incidents are analyzed and the properties of natural and carbon monoxide gases are studied, it is found that carbon monoxide cannot be detected by human senses, which leads to unknowingly falling into the trap of death. Carbon monoxide can only be detected using special devices called detectors, so it is necessary to equip residential homes with special detectors (gas analyzers).

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