

# Ensuring environmental safety in modern industrial production

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**Abstract.** Nowadays, environmental pollution has become a part of our life. It concerns air, water, soil all over the planet. There are local, regional and global pollution. Some of them are irreversible, others, fortunately, are not. Therefore, it is very important to comply with all environmental parameters and standards at industrial enterprises in order to prevent a negative impact on the environment.

## 1 Introduction

A person is engaged in various activities throughout the entire life cycle, being in various spheres of existence: natural, industrial, social, domestic. At the same time, a person constantly interacts with the environment, being an integral component of the natural environment. People in the course of their activities change the environment and often negatively affect its natural dynamic balance. Technological processes of modern production pollute the environment with dust, gas and thermal emissions, industrial effluents, electromagnetic fields, ionizing and noise radiation, and other physical and chemical negative factors. Such a human impact on the environment negatively affects the course of its basic patterns of development and ecological balance, and as a result leads humanity to an ecological catastrophe [3].

To find the best ways to improve the quality of life, it is necessary to conduct a comprehensive assessment of the impact of various factors on the process of human life. Based on a system-quantitative approach to assessing a large number of private factors affecting the quality and life of the population and its health, as a measure of the optimal correspondence of biological and social abilities and human needs, assess the quality and safety of human life in the urban environment. Health is the most important condition for the further development of society, the efficiency and quality of labor. During the prosperity of world production, the amount of damage caused to nature increases. To minimize damage, it is necessary to apply methods to protect it: reduce the negative impact of waste disposal; rational use of natural resources; carry out timely assessment of the environment; provide improvements in fuel combustion methods. Thus, in the modern world it is very important to conduct environmental education, to take into account the relationship between nature and man. Therefore, training in the field of ecology is very important not only for production workers, but also for the population [1].

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## 2 Research Methodology

As technology advances, new dangers begin to emerge. Some hazards appear due to emergencies. Technogenic hazards may arise due to the lack of necessary knowledge in the field of environmental protection. Disasters at nuclear power plants and accidents on oil tankers have shown the degree of danger hanging over humanity. It is also necessary to consider the role and importance of the human factor, socio-psychological, economic factors in ensuring the security of modern society [2].

Man has always sought to improve his life. He mastered work in various fields: he developed agriculture, learned more about mineral deposits, found new sources of energy, etc. But the increase in the scale of production is the cause of irreversible changes in the environment [3].

Using a large amount of energy, developing industry and building cities, a person fundamentally changes the face of the planet. For example, today the composition of the atmosphere is changing and global warming seems inevitable. The industrial type of pollution is the most common. It includes all types of pollutants: from carbon dioxide to toxic chemical compounds.

It is a threat to the atmosphere, soils and oceans, as well as to all living things on our planet. Chemicals and toxic waste enter all natural environments in huge quantities and accumulate there. Water is polluted at every stage of its cycle, and due to overuse, it is scarce almost everywhere. Fortunately, ecology can suggest a solution to these problems [8].

Waste from the chemical industry heavily pollutes the biosphere. Tons of plastic are thrown away, mostly bags, bottles, food packaging and other industrial waste. All this garbage can be burned, collected and recycled.

## 3 Results and Discussions

Hundreds of thousands of people work at factories for the collection, destruction and recycling of waste. In the production of plastics, chemists choose substances that can be easily "recycled" by special microorganisms. Industry has become a rich source of income that few can refuse, but nature has paid dearly for this. Some natural resources are on the verge of extinction [9]. The countries of the world are trying to come to an agreement on combating various kinds of pollution, considering options for switching to renewable energy resources and recycling waste.

Pollution is a process of negative change in the environment when it is poisoned by substances that threaten the lives of living beings. Samples are constantly taken from air, water and soil to look for unwanted substances in them. In developed countries, for each toxic substance there is a limit of use up to which it can be used without risk to health. "Permissible value" is a value at which there is no threat to a person, "limit" is a value that is dangerous to health to exceed [10]. One of the most common phenomena is an increase in the greenhouse effect, which can occur due to emissions from industrial enterprises into the environment. The earth retains heat due to the greenhouse effect - infrared rays are absorbed by the atmosphere, which reduces heat loss. Pollutants that enter the atmosphere (for example, carbon dioxide, methane, nitrogen oxides, fluorine and chlorine hydrocarbons) increase the greenhouse effect. Perhaps pollution will lead to a general increase in temperature on Earth. This can cause ice melt, sea level rise and climate change. The problem is exacerbated by the fact that gases leading to the greenhouse effect remain in the atmosphere for a long time. There is a serious issue concerning the waters of our planet.

Marine pollution is an acute global problem. First of all, this applies to people who live in the coastal zone. The causes of pollution are different - the activities of industrial enterprises, emissions from vehicles and ships, urban waste [7]. Organic, chemical and

radioactive substances affect the quality in different ways. For example, agricultural fertilizers can cause an excess of nitrogen and phosphorus in coastal waters, leading to an increase in algae that can be correlated with an oil spill. But pollution can be present not only near the coast, but also in the open sea, where the water is cleaner, but even there pollution occurs. Toxic substances come from the atmosphere in the form of precipitation, shipwreck, drilling accidents or rupture of pipelines that transport gas and oil.

There are different gases that are scattered over our planet, ozone is such an example. It is a gas whose triatomic molecules contain oxygen atoms. There are factors that violate the ozone layer: deforestation, aircraft flights, rocket launches, testing of various types of weapons, the use of freons in everyday life. The main ozone-depleting substances are freons and fluorochlorohydrocarbons. These compounds are used in the production of organic solvents, refrigeration units, etc. The reduction of the ozone layer in the upper atmosphere is due to emissions containing bromine or chlorine from industrial enterprises or other human activities. The destruction of the layer that protects the planet from UV radiation leads to minimal growth, flowering and photosynthesis of plants, the emergence of diseases in humans and animals, and an increase in the greenhouse effect. After stopping the entry of freons into the atmosphere, it will take a large amount of time for the renewal of ozone. Now large areas of soil are withdrawn for buildings, roads, mining or industrial production areas, which is accompanied by the removal of the fertile soil layer and its storage. On the territory for the needs of agricultural production, mineral fertilizers and pesticides are increasingly being used, which lead to changes in the composition of the soil and the accumulation of pesticides in it. A negative impact is exerted by transport, which produces emissions of pollutants that accumulate in the soil. When manufacturing products at industrial enterprises, chemical elements can be released into the environment, which tend to be deposited in biological organisms and contribute to disturbances in their development [4].

A technological breakthrough in the nuclear industry has caused the most powerful pollution of a huge area of our environment [5]. The use of the atom in the power industry leads to the formation of radioactive waste, which is not always disposed of correctly. There is bacterial pollution, which is caused by various microorganisms entering the habitat from outside. Sources are industrial discharges and emissions from enterprises. They can provoke outbreaks of various infections. Organic contamination is very similar to bacterial contamination, but is caused by putrefactive substances. As a result, the water area can be completely destroyed, and pathogenic bacteria appear in the process of fermentation. These pollutions can expand to the extent of a serious catastrophe. Sources of pollution in industry: energy industry; air pollution occurs due to the production of electricity at thermal power plants; characteristic emissions of the energy complex are sulfur dioxide, oxides of carbon, nitrogen, soot, as well as the most toxic - vanadium (V) oxide and benzopyrene. Oil refining industry [6]. The sulfur recovery process, cracking catalyst regenerators and boilers, storage tanks for raw materials and products, water and oil separators are not only sources of environmental pollution, but also a potential hazard to the public. Oil production enterprises have a negative impact on all spheres of life. Hydrocarbons and carbon monoxide are substances that poison the biosphere to a greater extent. Possible damage to the environment can be caused by accidents on drilling rigs and platforms, as well as on gas and oil pipelines. Ferrous and non-ferrous metallurgy. This area of activity has an acute impact on the level of pollution of groundwater and soil.

Most often, the waste products of this industry are carbon monoxide, sulfur dioxide and nitrogen oxide, and their sources in the ferrous metallurgy are sintering machines, roasting furnaces, places for loading and pouring materials, blast furnaces, open-hearth and steelmaking furnaces, continuous casting plants, pickling departments.

## 4 Conclusions

The formation of harmful emissions in the production of alumina, aluminum, copper, lead, tin, zinc, nickel and precious metals in non-ferrous metallurgy occurs due to various types of furnaces, crushing equipment, converters, loading points, drying units, open warehouses. Gas industry. During the extraction, processing, storage and transportation of natural gas (methane), the environment deteriorates due to emissions of harmful substances into the atmosphere, which are characterized by the presence of hydrocarbons, nitrogen oxides and sulfur dioxide. Promising cleaning methods include irradiation of the ammonia-gas medium with an electron beam. Reducing CO<sub>2</sub> emissions.

To extract carbon dioxide from the flue gases of furnaces, a gas separation method using ion-exchange membranes is used. The CO<sub>2</sub> concentration rises to 98.0–99.0%. Next, CO<sub>2</sub> is mixed with water vapor and the mixture is subjected to electrochemical decomposition. At 1100 °C, oxygen is released at the anode, and “synthesis gas” is released at the cathode.

The Institute of Petrochemistry has developed new technologies for the synthesis of methanol and dimethyl ether from CO<sub>2</sub>. This method will reduce the accumulation of CO<sub>2</sub> in the atmosphere. And there are other technological methods to reduce emissions.

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