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# HARMFUL FACTORS IN PRODUCTION PROCESSES AND MEASURES FOR PROTECTION AGAINST THEM

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**Abstract**

*The work studied harmful factors in production processes, classification of types harmful factors and measures to protect against them.*

*Characteristics of the impact are given harmful factors on the human body that can cause diseases. Methods and means of protection against harmful factors are widely covered.*

**key words**

*Harmful factors, chemical factors, biological factors, toxic substances, psychophysiological factors.*

A harmful production factor is a factor in the labor process or environment, the impact of which, under certain conditions, on a worker can cause an occupational disease or decreased performance.

Dangerous and harmful production factors are divided into categories:

- Physical;
- Chemical;
- Biological;
- Psychophysiological.

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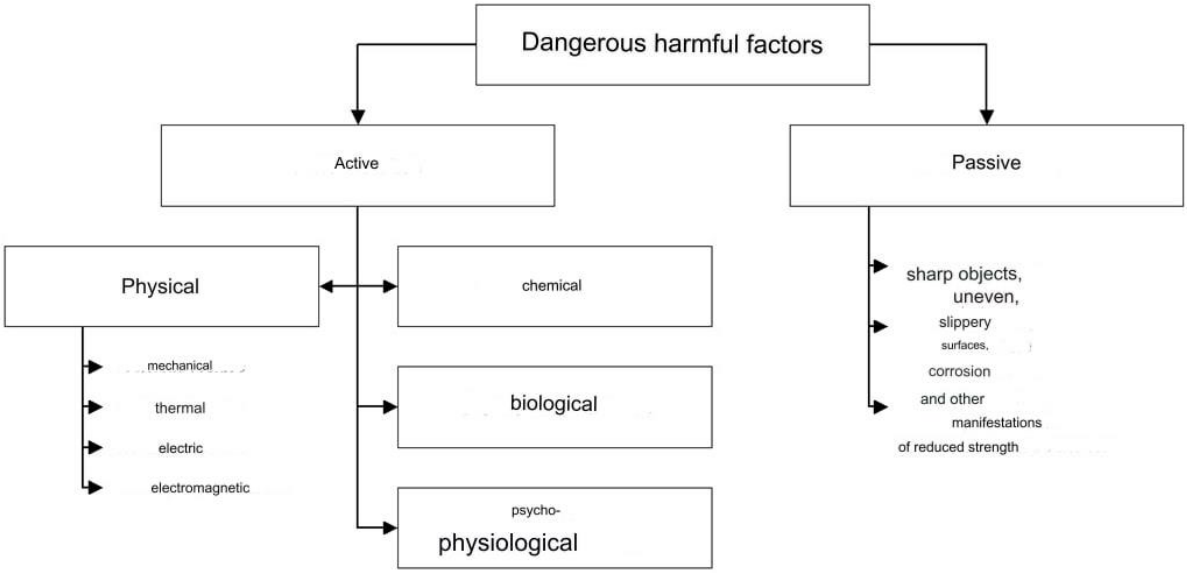


*Scheme 1. Classification of harmful and dangerous factors*

One and the same dangerous or harmful factor in its essence can simultaneously belong to different classes. The choice of methods and means of ensuring safety should be made on the basis of identifying these factors inherent in a particular production equipment or technological process.

Hazardous production factors - mechanical, electrical, falls from a height, falling objects, thermal burns, chemical burns, exposure to high or low temperatures, road accidents, falling, collapse of objects and parts, exposure to harmful substances, etc.

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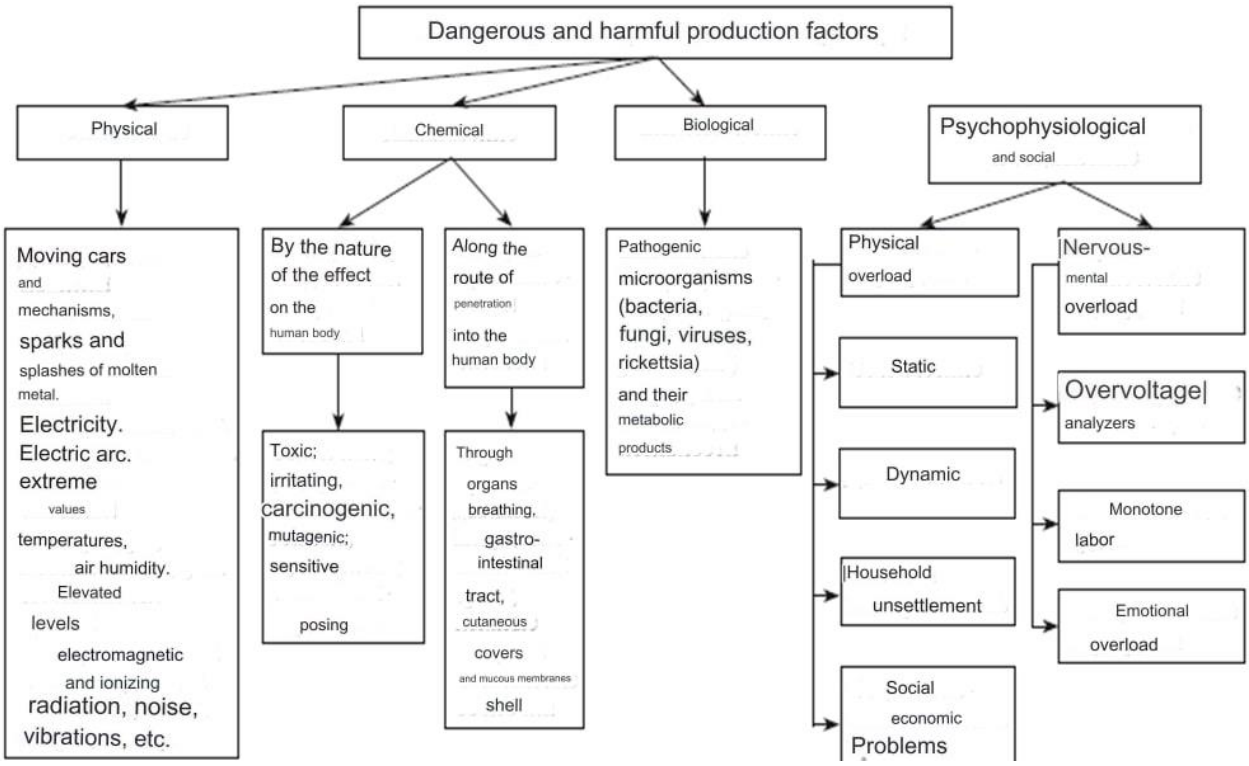


*Physical factors:*

• Moving machines and mechanisms, moving parts of trade and technological equipment, moving goods, containers, collapsing stacks of stored materials;

• Increased/reduced temperature of the surfaces of equipment and products;

• Increased dust content in the air of the working area;

• Increased/decreased air temperature in the working area;

• Increased level of noise, vibration, air humidity in the workplace;

• Difficulty breathing, dry mucous membranes of the respiratory tract;

• Increased/decreased air mobility;

• Increased voltage in an electrical circuit, the closure of which can pass through the human body;

• Increased levels of electromagnetic radiation;

• Lack or lack of natural light, etc.

Chemical factors **-** acids, caustic alkalis, disinfectants, detergents.

Psychophysiological factors - physical neuropsychic overload, overstrain of - torus analysis, monotony of work.

Biological factors **-** environmental influences, the possibility of encountering **factors** that poison the air, which leads to temporary or long-term loss of performance.

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Irrational use of chemicals and synthetic materials adversely affects the health of workers. A harmful substance (industrial poison), entering the human body during his professional activity, causes pathological changes.

The main sources of air pollution in industrial premises with harmful substances can be raw materials, components and finished products. Diseases that arise from exposure to these substances are called occupational poisonings (intoxications).

Toxic substances enter the human body through the respiratory tract (inhalation), gastrointestinal tract and skin. The degree of poisoning depends on their state of aggregation (gaseous and vaporous substances, liquid and solid aerosols) and on the nature of the technological process (heating the substance, grinding, etc.).

The overwhelming majority of occupational poisonings are associated with the inhalation penetration of harmful substances into the body, which is the most dangerous, since the large absorption surface of the pulmonary alveoli, intensively washed by blood, causes a very rapid and almost unhindered penetration of poisons to the most important vital centers. The entry of toxic substances through the gastrointestinal tract under industrial conditions is quite rare. This happens due to violation of personal hygiene rules, partial ingestion of vapors and dust penetrating through the respiratory tract, and non-compliance with safety regulations when working in chemical laboratories. It should be noted that in this case the poison enters through the portal vein system into the liver, where it is converted into less toxic compounds.

Substances that are highly soluble in fats and lipids can penetrate into the blood through intact skin. Severe poisoning is caused by substances that have increased toxicity, low volatility, and rapid solubility in the blood. Such substances include, for example, nitro- and amino products of aromatic hydrocarbons, tetraethyl lead, methyl alcohol, etc.

The danger of harmful substances to humans is largely determined by their chemical structure and physicochemical properties. Of no small importance in relation to toxic effects is the dispersion of the chemical substance that penetrates the body, and the higher the dispersion, the more toxic the substance.

Environmental conditions can either enhance or weaken its effect. Thus, at high air temperatures, the risk of poisoning increases; poisoning with amido- and nitro compounds of benzene, for example, occurs more often in summer than in winter. High temperature also affects the volatility of the gas, the rate of

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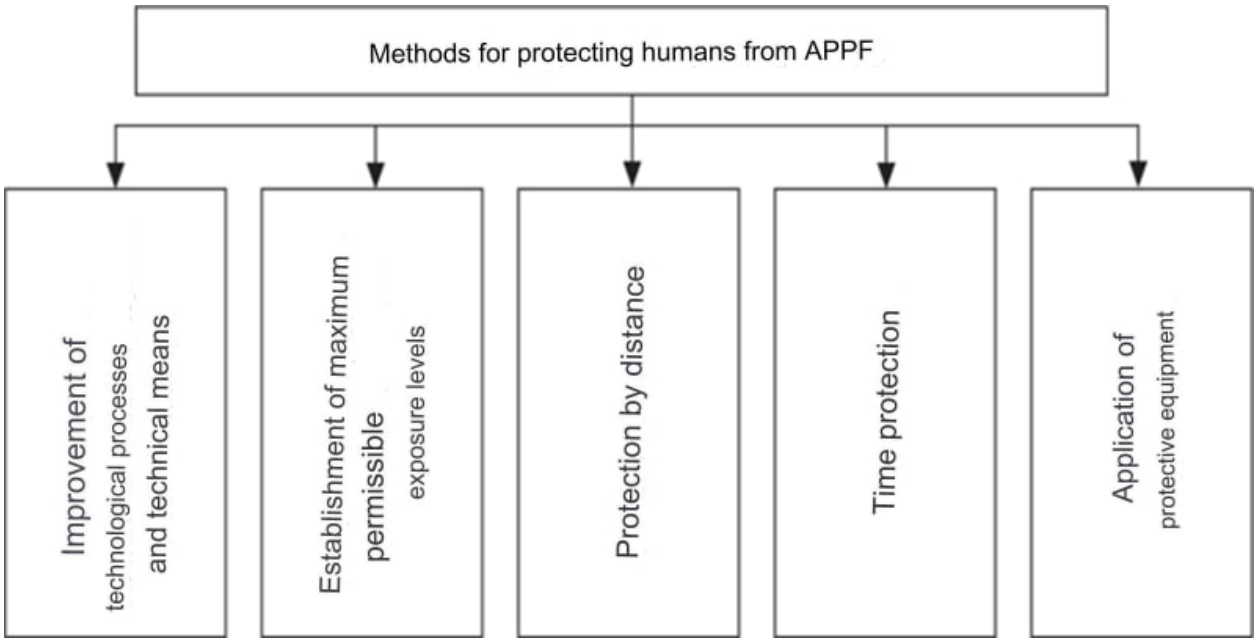
evaporation, etc. It has been established that air humidity increases the toxicity of some poisons (hydrochloric acid, hydrogen fluoride).

Sensitivity to poisons depends to a certain extent on the gender and age of workers. It has been established that some physiological conditions in women can increase the sensitivity of their body to the influence of a number of poisons (benzene, lead, mercury). The poor resistance of women's skin to the effects of irritating substances is undeniable, as well as the greater permeability of fat-soluble toxic compounds into the skin. As for teenagers, their developing body has less resistance to the influence of almost all harmful factors in the working environment, including industrial poisons

One of the main methods of protecting people from exposure to harmful production factors (Fig. 2) is to establish maximum permissible concentrations (MPC) for exposure (standardization); protection itself is carried out by reducing the level of harmful factors to levels not exceeding the maximum permissible.

From a technical point of view, the most promising method of protection is to improve the designs of machines and technological processes, replacing them with more advanced ones that have a minimum level of physical harmful production factors and the release of harmful substances.




Rice. 2. Basic methods of protecting humans from harmful production factors

If it is impossible to exclude exposure to harmful factors, use the following methods of protection:

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removing a person to a safe distance from the source of the harmful factor (protection by distance);

- reducing the time spent in the zone of action of a harmful factor (time protection);
- use of protective equipment.

Personal protective equipment provides protection for one person and is worn on the human body or parts thereof.

Collective protective equipment includes: heating, ventilation, air conditioning, sound absorption, sound insulation, lighting, various screens, fences, etc. The following requirements apply to protective equipment: they must not be a source of dangerous and harmful production factors, must meet the requirements of technical aesthetics and ergonomics. The choice of a specific type of protective equipment for workers should be made taking into account the safety requirements for a given process or type of work.

Measures to prevent occupational poisoning include hygienic rationalization of the technological process, its mechanization and sealing. An effective remedy is to replace toxic substances with harmless or less toxic ones. Hygienic standards are important in improving working conditions, limiting the content of harmful substances by establishing maximum permissible concentrations in the air of the working area and on the skin. For this purpose, hygienic standardization of raw materials and products is carried out, providing for limiting the content of toxic impurities in industrial raw materials and finished products, taking into account their harmfulness and danger.

A major role in the prevention of occupational intoxications belongs to the mechanization of the production process, which makes it possible to carry it out in closed equipment and minimizes the need for worker contact with toxic substances (mechanical loading and unloading of fertilizers, washing and detergents). Similar problems are solved when sealing production equipment and premises that emit toxic gases, vapors and dust. A reliable means of combating air pollution is to create a certain vacuum that prevents the release of toxic substances through existing leaks.

Sanitary measures include ventilation of work areas. Operations with particularly toxic substances should be carried out in special fume hoods with powerful suction or in closed equipment. Sometimes the cause of severe acute and even fatal poisoning is the lack of awareness of personnel about the dangers of the

production process and basic preventive measures, therefore it is necessary to carry out sanitary instructions and train workers in safe working methods.

The number of occupational poisonings is one of the most important indicators for assessing sanitary and hygienic working conditions and health care for workers. It is necessary to emphasize the great importance of periodic medical examinations in the system of preventive measures and their role in identifying early and, therefore, easily treatable stages of occupational poisoning.

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