FACTORS AND MAIN RISKS OF HARMFUL SUBSTANCES DISTRIBUTION IN A PRODUCTION PLANT.

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Abstract. In modern industrial production processes, environmental safety is becoming increasingly important. In particular, the release of harmful substances into the air during production - chemical compounds in gaseous, liquid and solid states, dust particles, toxic substances - poses a serious threat to the environment and human health. These processes have a negative impact on the health of workers, productivity and the sustainable operation of industrial enterprises in general.

Keywords: industrial hazards, dust, industrial noise, physical stress, organic compounds, toxic substances.

The release of harmful substances into the air is associated with the technical condition of technological equipment, the complexity of production processes, non-compliance with safety standards, and insufficient ventilation of workplaces. This creates the need to further strengthen labor protection and environmental control systems. Therefore, determining the amount and qualitative composition of harmful substances in the production process, in-depth analysis of the mechanisms of their distribution, and the development of effective technical and organizational measures to reduce them are considered important scientific and practical tasks. The general characteristics of a production facility include: the full name of the production facility, its purpose, year of commissioning; the name of the research and design organizations that developed the technological process and implemented the project; the number of technological lines (flows) and their purpose.

Technical name of products, quality in accordance with regulatory and technical documents. The quality indicators required for inspection include indicators regulating the content of components that cause corrosion of metals in raw materials, intermediate products and finished products.

The explosive hazard and toxicity characteristics of raw materials, reagents, semi-finished products and finished products are given in the section "Safe operation of production".

The description of the technological process must strictly comply with the technological process diagram, which is a graphic appendix to the regulation.

Description of the technological scheme A technological scheme showing the stages of the technological process, starting from the receipt of raw materials, the main

technological parameters of the process (temperature, pressure, volume flow rate), the main equipment involved in the process and included. As the scheme is described, the main automation and interlocking schemes are shown.

The description of the process includes the main reactions, their parameters, thermal effects and catalysts. Indicate the use of secondary energy resources (parameters of steam or hot water obtained as a result of processing secondary energy resources, the temperature of the exhaust gases after processing the equipment (recovery boilers, air heaters, economizers).

Technological regime standards for continuous and periodic processes are presented in tabular form: names of process stages, devices, regime indicators; device location number on the diagram; permissible limits of technological parameters and permissible accuracy class of measuring instruments.

Regulated operating parameters: temperature, pressure, volume flow rate, operating time, number of loaded or delivered components and other parameters affecting safe operation and product quality are specified for all stages with possible tolerances or intervals. It is allowed to limit the upper or lower limit values. For example: “vacuum, not less than ...”, “temperature, not more than ...”.

Analytical control (laboratory, automatic) at all stages of the technological process is presented in the form of a table: the name of the process stage from which the analyzed product is obtained, the place of sampling, the controlled indicators, methods, standards and frequency of control. At the beginning of the table, laboratory control standards are indicated, followed by automatic control standards.

Process control using alarm systems or interlocks is presented in the form of a table, which indicates the following: the parameter to be monitored, the name of the equipment, the value of the specified limit (min, max), and the type of interlock or signal.

The section provides basic rules for starting and stopping a production facility. The connection with other technological and auxiliary facilities, the supply of the installation with raw materials, electrical energy, steam, water, air and other materials and resources, as well as the direction of product storage are indicated. The operating conditions of catalysts in catalytic processes are indicated.

When describing the start-up and shutdown of large-capacity combined complexes and explosion- and fire-hazardous production facilities, the sequence of start-up and shutdown of individual units, as well as the requirements for compliance with the regime, indicating the consequences of their violation, should be indicated.

The section "Safe Operation of Production" of the Technological Regulations is based on the Regulation on the procedure and content of the development of the section "Safe Operation of Production" of the Technological Regulations and is designed for the design, operation, expansion and reconstruction of facilities in the chemical,

petrochemical, oil refining industries and other explosive industries and related to the handling or storage of chemically hazardous and toxic substances, as well as dust-forming substances, air or vapor-gas explosive mixtures.

The section provides the following technological information:

- characteristics of production risks;
- possible malfunctions and emergencies, methods for their prevention and elimination;
- protecting technological processes and equipment from accidents and protecting workers from injuries;
- safety measures during the operation of production facilities.

Characteristics of production risks. This part of the section contains the following basic information:

a) Characteristics of fire hazard and toxic properties of raw materials, intermediate products, finished products and production waste.

b) Classification according to explosion and fire hazard, sanitary characteristics of industrial buildings, premises, zones and external installations.

c) Main production hazards: features of the technological process or the implementation of individual production operations; characteristics of the equipment used and its operating conditions; violation of safety rules by workers.

Possible malfunctions and emergencies, methods for their prevention and elimination. The table of the established form provides information on the nature of malfunctions and emergency situations that may arise when the requirements for the conduct of the technological process, the performance of production operations, the use of equipment and communications are not met, which can lead to fire, explosion, injury or poisoning of workers, or environmental pollution. The table contains information on control, regulation and protective devices, the failure of which requires an emergency stop or a transition to another operating mode (rotation, manual control, etc.). Production equipment, the operation of which is accompanied by the release of harmful substances (including fire and explosion hazards) or harmful microorganisms, includes devices installed for their removal, so that the concentration of harmful substances and microorganisms in the workplace, as well as their emissions into the natural environment, do not exceed the established values and sanitary standards. If necessary, preliminary treatment or neutralization of waste is carried out. If the combined removal of various harmful substances and microorganisms poses a risk, their separate removal is ensured. Production equipment is equipped with local lighting appropriate to the nature of the work. When performing production tasks in chemical enterprises, workers come into contact with chemicals in the form of primary, intermediate, by-products and final products, gases, vapors or liquids, as well as dust, fumes or mists. These chemicals can have a harmful effect on human health when they

contaminate the air in the workplace, clothing and skin, as well as the surfaces of walls, floors and equipment.

According to GOST 12.1.007-76 "Harmful substances. Classification and general safety requirements" "A harmful substance is a substance that, in case of violation of safety requirements when coming into contact with the human body, can lead to industrial injuries, occupational diseases or health disorders, both during work and by modern methods, for the long life of present and future generations." GOST also establishes general safety requirements for the production, storage and use of hazardous substances[8].

Hazardous substances in industry, depending on their properties and exposure conditions (concentration, dose, time), can lead to the development of acute and chronic poisoning (intoxication).

Acute poisonings - diseases that occur during accidents, technological conditions and violations of safety requirements. Acute poisoning develops immediately after contact with harmful substances or after a latent period (from 6-8 hours to several days). In this case, harmful substances enter the body in large quantities: tens and hundreds of times higher than the maximum permissible concentration in the air of the workplace, as well as with incorrect ingestion or severe skin contamination.

Chronic poisoning-a disease that occurs as a result of prolonged, long-term exposure to harmful chemicals that enter the body in relatively small quantities. Chronic poisoning develops due to the accumulation of harmful chemicals in the body.

In chemical enterprises, the combined effects of harmful substances and unfavorable factors in the production environment are of great importance: meteorological conditions (temperature, humidity), noise, and physical stress.

*Temperature change*enhances and accelerates the effect of harmful substances. This is explained by a violation of thermoregulation (increased breathing and accelerated blood circulation). For example, an increase in temperature increases the likelihood of poisoning with benzene compounds, carbon monoxide, mercury vapor, and chlorophos.

Air humidityincreases the risk of poisoning, especially from irritating gases.

*Physical stress*usually accompanied by increased ventilation of the lungs and increased blood circulation. Under such conditions, the amount of harmful substances entering the body through the respiratory system increases, which contributes to the development of intoxication.

*Industrial noise*It enhances the toxic effects of harmful substances and accelerates their action. This has been proven for carbon monoxide, styrene, alkyl nitrite, boric acid aerosol, petroleum gases and other substances.

The nature of the effect of harmful substances on the body depends on their chemical structure. The toxicity of harmful chemicals can increase or decrease with a change in chemical structure. This relationship is best studied between the structure and chemical properties of organic substances.

1. Thus, the toxicity of organic compounds increases with the number of unsaturated bonds, for example, from ethane (CH 3 - CH 3) to ethylene (CH 2 = CH 2) and acetylene (CH≡CH).

2. In organic compounds, increasing the number of atoms in the molecule and increasing the number of isomers reduces toxicity. For example, benzene is more toxic than toluene. (C 6 H 6 and C 6 H 5 - CH 3). Propyl and butyl alcohols are stronger drugs than isopropyl and isobutyl, propylbenzenemore toxic than isopropylbenzene, octane is isooctane. It is known that in the case of cyclic hydrocarbons, compounds with one side chain are more toxic than their isomers with two or more side chains. For example, dimethylcyclohexane vapors are less potent than ethylcyclohexane vapors.

3. The closure of the carbon chain increases the toxicity of hydrocarbons when inhaled. Vapors of cyclopropane, cyclopentane, cyclohexane and their homologues are more potent than vapors of propane, pentane, hexane. The transition from a polymethylene ring to an aromatic ring increases the toxicity by inhalation. Vapors of benzene and toluene are more potent than vapors of cyclohexane and methylcyclohexane.

4. The introduction of a hydroxyl group into a molecule (due to increased solubility) usually increases the toxicity of the compound. Phenol is more toxic than benzene. Methocresol is more toxic than toluene, cyclohexanol than cyclohexane, and methylcyclohexanol than methylcyclohexane. The irritation of amyl alcohol vapor (C 5 H 11 OH) is much stronger than pentane vapor, and allyl alcohol vapor (CH = CH - CH 2 OH) is stronger than propylene (CH 2 = CH - CH 3).

5. The introduction of halogen, amino acids and nitro groups into organic molecules usually increases the toxicity of substances. The introduction of organic compounds of chlorine and fluorine into the molecule gives them an irritant property and increases toxicity. Thus, toxicity increases from methane to chloroform. The toxicity of nitro- and amino acids of aromatic hydrocarbons (nitrobenzene, dinitrobenzene, aniline, toluidine, xylidine) is especially high.

6. In the homologous series of hydrocarbons, there is an increase in toxicity (Richardson's rule). The rule applies to substances of the aliphatic series, but has not been confirmed for aromatic compounds. Thus, the strength of the narcotic effect increases from pentane (C 5 H 12) to octane (C 8 H 18) methylincreases from alcohol (CH 3 OH) to allyl alcohol (CH = CHCH 2 OH).

The physical properties of harmful substances (state of aggregation, volatility, solubility, dispersion) affect toxicity. In particular, the ability to penetrate the body,

distribute in it and be excreted. Some harmful substances in the gaseous state are more toxic than solid and liquid substances, since they enter the body more easily. It is known that, for example, metallic mercury in the liquid state is not dangerous, but mercury vapor is very toxic.

Conclusion

The direction and severity of the toxic effects of harmful substances in people of different sexes are manifested both in specific signs of damage (certain organs and systems) and in general behavior. Men are more sensitive to some toxic substances than women. It is known that beryllium, mercury and their inorganic compounds can cause lung cancer in men. Reproductive dysfunction has been identified in female workers who have industrial contact with solvents and components of rubber products. The risk of pregnancy complications is high among workers producing plastics, styrene, viscose and artificial fibers.

References

1. Minko V.M. Razvitie upravleniya oxranoy truda v Rossii: monografiya // Kaliningrad: FGBOU VPO «KGTU», 2015. – 191 s.
2. KR-09/177.13.02.2023 yildagi O‘zbekiston Kasaba Uyushmalari Federasiyasining mehnat muhofazasiga oid tahliliy axborot xati ma'lumotlari.
3. Oxrana truda. MOT: Nasionalnie sistemi oxrani truda. https://www.ilo.org/moscow/areas-of-work/occupational-safety-and health/WCMS_249273/lang--ru/index.htm
4. Turakulova G.Z “Ishlab chiqarish korxonalarida havfsiz mehnatni sharoitlarini o‘rganish va tavsiyalar ishlab chiqish” Xalqaro ilmiy-amaliy Anjuman materilalar to ‘plami.:And 2022. 401-403b/
5. Turakulova G.Z “ORGANIZING A SYSTEM OF SAFE WORK IN INDUSTRIAL ENTERPRISES, ORGANIZING A MANAGEMENT SYSTEM” NamTSI Maxsus son Nam. 2024.285-289b