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DUST AND TOXIC SUBSTANCES IN INDUSTRY: THEIR NEGATIVE IMPACT ON HUMAN HEALTH AND PREVENTIVE MEASURES

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ANNOTATION: This article examines the negative impact of industrial dust and toxic substances on human health. The mechanisms of exposure to harmful factors in the workplace, their role in occupational diseases, and their overall health effects are analyzed. The article also provides information on preventive measures against these hazardous factors, including protective technologies, occupational hygiene, and prophylactic actions.

KEYWORDS: industrial dust, toxic substances, occupational hygiene, safety, occupational diseases, protective equipment, environmental safety, ventilation systems.

Introduction. Industrial processes are closely linked to human labor, making workers' health and safety of utmost importance. Various physical, chemical, and biological hazards exist in modern industries, among which industrial dust and toxic substances pose significant risks. Long-term exposure to these substances can lead to respiratory diseases, cardiovascular disorders, nervous system impairments, and other health issues.

Industrial dust is generated during technological processes, dispersing into the air and being inhaled by workers. Sectors such as metallurgy, mining, construction, and the chemical industry are particularly susceptible to hazardous dust exposure. Similarly, the release of toxic gases and chemicals into the air presents serious health hazards.

Today, ensuring safety in industrial environments and mitigating harmful factors are crucial issues. Scientific research and technological advancements aim to develop effective measures against these threats. This article analyzes the impact of industrial dust and toxic substances on human health and explores countermeasures to mitigate these risks.

Main part. 1. Industrial Dust and Its Impact on Human Health.Industrial dust can have mechanical, chemical, or biological compositions. Its effects on human health depend on:

Particle size – Larger particles settle in the upper respiratory tract, while finer particles reach the lungs.

Chemical composition – Some dust particles have toxic or allergic effects (e.g., asbestos or silica

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dust).

Dosage and duration of exposure – Prolonged exposure increases the risk of developing respiratory diseases such as pneumoconiosis.

Pneumoconiosis is a lung disease caused by dust accumulation, commonly affecting workers in mining, construction, and metallurgy industries.

2. Toxic Substances in Industry and Their Effects on Human Health. The impact of toxic substances depends on their chemical properties. These substances can enter the body through:

Inhalation – Gases, vapors, and aerosols.

Skin contact – Liquid chemicals and hazardous substances.

Ingestion – Contaminated food or water due to poor hygiene practices.

The effects of toxic substances include:

Damage to the central nervous system (e.g., mercury, lead, arsenic exposure).

Liver and kidney diseases (e.g., exposure to organic solvents, phenols).

Oncological diseases (e.g., exposure to benzene, formaldehyde).

3. Preventive Measures Against Industrial Dust and Toxic Substances. Ensuring safety in industrial processes requires the implementation of the following preventive measures:

3.1. Protective Technologies. Ventilation systems – Filtering and eliminating harmful substances before they disperse into the atmosphere.

Dust suppression methods – Using specialized humidification equipment.

Air filtration systems – Purifying air from dust and chemical pollutants.

3.2. Personal Protective Equipment (PPE)

Respirators and masks – Protecting the respiratory system.

Protective clothing – Preventing chemical exposure through the skin.

Eye protection and gloves – Essential for handling hazardous materials.

3.3. Hygiene and Preventive Measures. Conducting regular medical check-ups for workers. Raising awareness about the dangers of toxic substances. Enforcing hygiene regulations in workplaces.

Conclusion. Industrial dust and toxic substances pose significant environmental and health risks. Long-term exposure contributes to occupational diseases, allergic reactions, and chronic health

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conditions.

Implementing protective measures and safety technologies in modern industries is essential. Innovations in filtration, the use of personal protective equipment, and adherence to workplace hygiene standards can significantly reduce the harmful effects of industrial dust and toxic substances. The theoretical analysis presented in this article serves as a scientific foundation for ensuring workplace safety and protecting human health in industrial environments.

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