

Air Based Hazards

Sources of Air Based Hazards

Basic idea

- Air based hazards originate from industrial processes, chemical reactions, and environmental contamination inside or outside the workplace.



- These sources release harmful particles or gases into the air, which may be inhaled by workers or contaminate products.

Major Sources

1. Industrial Processes

- Manufacturing activities release dust, fumes, and chemical vapors into the air.
- High temperature processes like welding and smelting produce toxic gases and metal fumes.

2. Chemical Handling

- Volatile chemicals evaporate and contaminate surrounding air.
- Spills and leaks from containers increase airborne exposure.

3. Pharmaceutical and Laboratory Work

- Powdered drugs and chemical reagents generate fine particles.
- Aerosol formation occurs during mixing and compounding processes.

4. Biological Sources

- Microorganisms such as bacteria, viruses, and fungal spores can become airborne.
- Improper waste handling increases risk of airborne infections.

5. Ventilation Systems

- Poorly maintained air conditioning systems can spread contaminants.
- Contaminated filters may release trapped particles back into air.

Importance

- Identifying sources helps in controlling pollution at the origin.
- Proper control reduces health risks and improves workplace safety.

Types of Air Based Hazards

Basic idea

- Air based hazards can be classified based on their physical nature and biological impact on humans and equipment.

Types



1. Dust

- Solid particles suspended in air.
- Generated from crushing, grinding, and handling powders.
- Can cause respiratory irritation and lung diseases.

2. Fumes

- Very fine particles formed from condensation of vapors.
- Common in welding and metal processing.
- Can penetrate deep into lungs and cause toxicity.

3. Gases

- Substances that exist in gaseous form at room temperature.
- Examples include carbon monoxide, chlorine, and ammonia.
- Can cause poisoning or suffocation.

4. Vapors

- Evaporated form of liquids or solids.
- Examples include solvent vapors like ethanol and acetone.
- Can cause dizziness, irritation, and long-term organ damage.

5. Aerosols

- Fine liquid droplets or solid particles suspended in air.
- Common in spray operations and medical procedures.
- Can carry infectious agents or toxic substances.

6. Biological Contaminants

- Includes bacteria, viruses, mold spores, and allergens.
- Can spread infectious diseases through air transmission.

Importance

- Different types of hazards require different control methods.
- Proper classification helps in selecting safety equipment and ventilation systems.

Air Circulation Maintenance in Industry for Sterile and Non-Sterile Areas

Basic idea

- Air circulation maintenance refers to controlling airflow, filtration, and pressure conditions to maintain safe and clean environments in industrial areas.
- Sterile and non-sterile areas require different levels of air cleanliness.

Sterile Areas

Characteristics

- Sterile areas require complete absence of viable microorganisms.

- These areas are used for aseptic manufacturing and sterile product preparation.

Air circulation system

1. HEPA Filtration

- High Efficiency Particulate Air (HEPA) filters remove fine particles and microorganisms.
- They ensure clean air supply in sterile zones.

2. Laminar Air Flow

- Air flows in a single direction at uniform speed.
- This prevents contamination from surrounding areas.

3. Positive Pressure

- Air pressure inside sterile rooms is higher than outside.
- This prevents entry of contaminated air.

Non-Sterile Areas

Characteristics

- Non-sterile areas allow controlled levels of contamination.
- These areas include general manufacturing and packaging zones.

Air circulation system

1. General Ventilation

- Air is circulated using mechanical or natural ventilation systems.
- It helps dilute airborne contaminants.

2. Controlled Filtration

- Basic filters are used to reduce dust and particulate matter.

3. Negative or Neutral Pressure

- Some areas use negative pressure to prevent hazardous substances from escaping.
- Others maintain neutral pressure depending on process requirements.

Importance

- Proper air circulation prevents cross-contamination between areas.
- It ensures product quality and worker safety.

Preliminary Hazard Analysis (PHA)

Basic idea

- Preliminary Hazard Analysis is a structured method used to identify potential hazards at an early stage of a process or system.
- It is used before detailed design, or operation begins to prevent accidents and reduce risks.

Objectives

- To identify possible hazards in a system or process.
- To evaluate potential consequences of these hazards.
- To recommend control measures to reduce risk.
- To improve safety during design and planning stages.

Steps in PHA

1. Identification of Hazards

- All possible sources of danger are identified in the process or system.
- This includes chemical, physical, biological, and operational hazards.

2. Assessment of Risk

- The likelihood and severity of each hazard are evaluated.
- This helps in prioritizing hazards based on risk level.

3. Evaluation of Consequences

- Possible outcomes of each hazard are analyzed.
- This includes injury, environmental damage, or equipment failure.

4. Recommendation of Controls

- Safety measures are suggested to eliminate or reduce hazards.
- These may include engineering controls, administrative controls, or PPE.

Applications

- Used in pharmaceutical manufacturing industries.
- Applied in laboratory safety planning.
- Used in chemical process design.
- Helpful in hospital and healthcare facility safety systems.

Importance

- PHA helps in early detection of safety problems.
- It reduces cost by preventing accidents before they occur.
- It improves overall safety culture in industries.

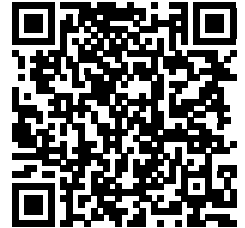


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