

INDUSTRIAL HAZARDS

Definitions:

Industrial hazard may be defined as any condition produced by industries that may cause injury or death to personnel or loss of product or property.

Types of Industrial hazards:

1. Mechanical hazards
2. Electrical hazards
3. Chemical hazards
4. Fire hazards
5. Dust hazards
6. Accident records

1. Mechanical Hazards:

A mechanical hazard is involving a machine or process. Motor vehicles and air bags pose mechanical hazards. Compressed gases or liquids can also be considered a mechanical hazard.

Causes of Mechanical Hazards:

- It occurs when a machine is malfunctioning.
- Machines may run either manually or automatically.
- A few machines are cutting, shearing, crushing, breaking.
- Most injuries occur when the machine needs human intervention repeatedly for its proper functioning.
- The machines are driven by a suitable power supply (electricity or steam).

Preventions of Mechanical Hazards:

- **Prevent contact:** The safeguard must prevent hands, arms, or any part of a worker's body from making contact with dangerous moving parts.
- **Secure:** Workers should not be able to easily remove with the safeguard. Guards and safety devices should be made of durable material that will withstand the conditions of normal use.
- **Protect from falling objects:** The safeguard should ensure that no objects can fall into moving parts. A small tool which is dropped into a cycling machine could easily become a projectile that could strike and injure someone.
- **Create no interference:** Proper safeguarding can actually enhance efficiency, since workers will not be afraid of injuries then.
- **Allow safe lubrication:** If possible, one should be able to lubricate the machine without removing the safeguards. Locating oil reservoirs outside of the guard, with a line leading to the lubrication point, will reduce the need for the operator or maintenance worker to enter the hazardous area.

2. Electrical Hazards:

Shock is one of the common electrical hazards. It occurs when the electric current passes through the body. This is possible when human is in contact with a conductor carrying a current and simultaneously in contact with the ground. This is referred to as SHORT CIRCUIT .

Causes of Electrical Hazards:

Different sources of electrical hazards are short circuit, electrostatic hazards and explosive materials.

A worker will receive a shock when he/she:

- Touches two wires at different voltages at the same time.
- Touches the phase standing on the ground
- Touches the phase having wet cloth and high humidity.
- Receive a shock from electrical components those are not grounded properly.
- Touching another person receiving an electrical shock.

Preventions of Electrical Hazards:

- Power equipment should be plugged into wall receptacles with power switches in the off position.
- Electrical equipment should be unplugged by grasping the plug and pulling. Never pull or jerk the cord to unplug the equipment.
- Frayed, cracked or exposed wiring on equipment cords must be corrected. Also check for defective cord clamps at locations where the power cord enters the equipment or the attachment plug.
- Temporary or permanent storage of materials must not be allowed within 3 feet of electrical equipment.
- Any electrical equipment causing shocks or which has high leakage potential must be tagged with a DANGER—DO NOT USE label or equivalent

3. Chemical Hazards:

Chemical hazards are systems where chemical accidents could occur under certain circumstances. Such events include fires, explosions, leakages or release of toxic or hazardous materials that can cause people illness, injury, or disability. Chemical accident means an accident involving a fortuitous, or sudden or unintended occurrence while handling any hazardous chemicals resulting in continuous, intermittent or repeated exposure to death, or injury to, any person or damage to any property but does not include an accident by reason only of war or radio-activity.

Causes of Chemical Hazards:

- Solvents used in extraction plants, purification of synthetic drugs and in chemical analysis may produce vapours.
This vapours or gases may produce:
 - Breathing problem and suffocation to worker.
 - Irritation or burn to eye or skin of the worker.
 - Explosion in the work place.
 - General anaesthesia or death e.g. chloroforms and ether vapour

- Liquid chemicals if spilled on workers may produce
 - Dehydration by strong dehydrating agents e.g. concentrated sulphuric acid.
 - Burning by strong acid or alkalis.
 - Oxidation by strong oxidizing agents.

- Dusts of chemicals produced from different equipment may produce
 - Dermatitis or dust allergies to the workers.
 - Skin and eye irritations.
 - Resistance to certain antibiotics e.g. resistant to chloroform if the same worker is exposed to it regularly.
 - Some dusts may be carcinogenic (producing cancers).

Preventions of Chemical Hazards:

- Before starting work with a chemical a “chemical hazard pocket guide” should be consulted for necessary information about the chemical. It will give the type of reaction the chemical may produce, its flammability, carcinogenicity, prevention and treatment procedures etc.
- No eating, drinking, or smoking where chemicals are used.
- Skin should be covered with protective clothing.
- Clothing should be removed immediately it gets wet or contaminated with a chemical.
- Eyes or skins should be washed with plenty of water after an accident
- Face mask may be used in toxic dust or gases.
- Workers working in antibiotic related products must be changed routinely so that an individual is not exposed to a certain antibiotic for a long period of time.
- Whenever a dust allergy or respiratory problem precipitates the worker should immediately be removed from the work place and put under proper healthcare.
- In case of inflammable gas or solvent leakage the exhaust fans should be started and all the source of fire should be extinguished.

4. Fire Hazards:

Fire hazards are the workplace hazards that involve the presence of flame or risk of an uncontrolled fire.

Causes of Fire Hazards:

- Class A Fires: These are fires in ordinary combustible materials such as wood, cloth, paper etc. those produce glowing ember.
- Class B Fires: These are fires of flammable petroleum products, liquids, gases and greases etc.
- Class C Fires: These fires involve energized electrical equipment.
- Class D Fires: These are fires in combustible metals.

Preventions of Fire Hazards:

- **Fire Extinguishers:** Fire extinguishing agents work by:
 - removal of fuel e.g. blanketing with foam or interposing a layer of gas between the fuel and the flames .
 - by removal of oxygen e.g. by dilution with inert gases or vapours .
 - by removal of heat by cooling with water or other extinguishing agents
- **Water based fire extinguishers:** They produce CO₂ by reaction with acid and carbonates, or CO₂ is kept under pressure. E.g. Portable fire extinguisher, Soda-Ash Extinguisher, Antifreeze Extinguisher.
- **Water based foams:** Two types of foams are available. Chemical foams and Mechanical foams. Chemical foams are bubbles filled with CO₂ produced by chemical reaction in an aqueous solution mixed with a foaming agent. The reacting chemicals are usually of sodium carbonate and ammonium sulphate. Mechanical foams are bubbles filled with air. Foams forms barrier and prevents contact between fuel and air.
- **Dry chemicals:** These are finely divided solid particles usually discharged through a hose pipe. Usually they contain sodium bicarbonate, potassium bicarbonate and ammonium sulphate.

5. Dust Hazards:

Combustible dust is defined as a solid material composed of distinct particles or pieces, regardless of size, shape, or chemical composition, which presents a fire or deflagration hazard when suspended in air or some other oxidizing medium over a range of concentrations.

Causes of Dust Hazards:

- Grinding or milling of drugs, excipients, or herbal products.
- During weighing dusts may float on air.
- During powder mixing dusts may be generated. During coating operation dusts are generated.
- During capsule filling and tablet punching operation dusts may be generated.

Preventions of Dust Hazards:

- **Filtration:** Air is sucked through a suitable filter medium (like paper, wool, cotton-wool and nylon). Filter bags can be attached with machines where dust is produced.
- **Inertial separator:** In cyclone separator the air is circulated at high speed in a spiral manner. Due to centrifugal force the dust particles are thrown outward and the particles are collected at the bottom and the clean air comes out through the top.
- **Electrostatic separator:** It consists of metal tubes through which a conductor wire is passed. Several thousand volts of DC current is applied on the metal wire. When air is passed through the pipes the dust particles becomes charged and precipitates on the inner wall of the tube and clean air passes out. Periodically the dust is collected.

EPIDEMICS

Definition:

An **epidemic** is the rapid spread of infectious disease to a large number of people in a given population within a short period of time, usually two weeks or less.

An epidemic may be restricted to one location; however, if it spreads to other countries or continents and affects a substantial number of people, it may be termed a pandemic.

Causes of Epidemics:

- Epidemics relating to the spread of infectious diseases are caused by the lack of knowledge on specific ways a germ is transmitted and the ability for treatments to be effective in controlling the spread of the disease. There are viruses, bacteria, fungi, and protozoa, classifications of disease organisms. Each strain can mutate when exposed in the human body or other living organisms and form new strains of that disease. It is very difficult for scientists and doctors to keep up with this as many environmental factors can influence mutations also. So because of this, until new sanitation preventive measures and treatments are discovered, many diseases spread quickly resulting in an epidemic.
- The conditions which govern the outbreak of epidemics include infected food supplies such as contaminated drinking water and the migration of populations of certain animals, such as rats or mosquitoes, which can act as disease vectors. Certain epidemics occur at certain seasons.
- For example, whooping-cough occurs in spring, whereas measles produces two epidemics, one in winter and one in March. Influenza, the common cold, and other infections of the upper respiratory tract, such as sore throat, occur predominantly in the winter. There is another variation, both as regards the number of people affected and the number who die in successive epidemics: the severity of successive epidemics rises and falls over periods of five or ten years.

Typical Adverse Effects of Epidemics:

Direct Effects of Epidemics:

- Epidemics usually affect large number of individuals and can lead to complications including disabilities and death.
- There is always a possibility of existence of sufficient number of disease carriers who may favour the resurgence and spread of disease.
- On seeing the suffering and deaths especially within close relatives, psychological effects are also common during epidemics.

Indirect Effects of Epidemics:

- Social and political disruption due to tension and law and order problems.
- Economic loss arising from lack of strength of cultivates.
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- Scarcity of clean food and water leading to malnutrition and starvation.

Mitigation measures:

- Investment in improved sanitation, provision of clean water and better urban infrastructure can reduce the frequency of human contact with pathogenic agents.
- Building strong health systems and supporting proper nutrition will help ensure good baseline levels of health, making people less susceptible to infectious diseases.
- Investment in reliable disease surveillance in both human and animal populations will help in reducing epidemics.
- Technological solutions can help minimize the burden of sizable outbreaks and epidemics.
- Better and less costly treatments including novel antibiotics and antiviral to counter resistant diseases, are sorely needed. New and improved vaccines are even more important.

HEAT WAVES

Definition:

Heat-wave is a condition of atmospheric temperature that leads to physiological stress, which sometimes can claim human life.

- Heat-wave is defined as the condition where maximum temperature at a grid point is 3°C or more than the normal temperature, consecutively for 3 days or more.
- World Meteorological Organization defines a heat wave as five or more consecutive days during which the daily maximum temperature exceeds the average maximum temperature by five degrees Celsius.
- If the maximum temperature of any place continues to be more than **45° C** consecutively for two days, it is called a heat wave condition.

There will be no harm to the human body if the environmental temperature remains at 37° C. Whenever the environmental temperature increases above 37° C, the human body starts gaining heat from the atmosphere. If humidity is high, a person can suffer from heat stress disorders even with the temperature at 37°C or 38°C.

Causes of Heat waves:

A heat wave occurs when a system of high atmospheric pressure moves into an area. In such a high-pressure system, air from upper levels of our atmosphere is pulled toward the ground, where it becomes compressed and increases in temperature. This high concentration of pressure makes it difficult for other weather systems to move into the area, which is why a heat wave can last for several days or weeks. The longer the system stays in an area, the hotter the area becomes. The high-pressure inhibits winds, making them faint-to-nonexistent. Because the high-pressure system also prevents clouds from entering the region, sunlight can become punishing, heating up the system even more. The combination of all of these factors come together to create the exceptionally hot temperatures we call a heat wave.

Adverse Effects of Heat waves:

- Heat waves causes serious health risks like dehydration, heat rash, heat cramps, sunburn, heat exhaustion, heat stroke etc.
- Excessive heat causes psychological stress
- Abnormally hot temperatures cause electricity demand to increase during the peak summertime hours which leads to electricity spikes due to increased air conditioning use, which can create power outages. As a result, available electricity supplies are challenged during a higher, wider, peak electricity consumption period.
- If a heat wave occurs during a drought, which dries out vegetation, it can contribute to bushfires and wildfires.
- Heat waves can cause roads and highways to buckle and melt water lines to burst, and power transformers to detonate, causing fires.

Mitigation measures:

- **Establish Early Warning System and Inter-Agency Coordination** to alert residents on predicted high and extreme temperatures. Who will do what, when, and how is made clear to individuals and units of key departments, especially for health.
- **Capacity building / training programme** for health care professionals at local level to recognize and respond to heat-related illnesses, particularly during extreme heat events. These training programs should focus on medical officers, paramedical staff and community health staff to reduce mortality and morbidity.
- **Public Awareness and community outreach** Disseminating public awareness messages on how to protect against the extreme heat-wave through print, electronic and social media and Information, Education and Communication (IEC) materials such as pamphlets, posters and advertisements and Television Commercials (TVCs) on Do's and Don'ts and treatment measures for heat related illnesses.
- **Collaboration with non government and civil society:** Collaboration with non-governmental organizations and civil society organizations to improve bus stands, building temporary shelters, wherever necessary, improved water delivery systems in public areas and other innovative measures to tackle Heat wave conditions.