

INDUSTRIAL SAFETY:

Content:-

1. Plant Location & layout,
2. Utility services,
3. Mechanical hazards,
4. Chemical hazards,
5. Electrical hazards,
6. Fire Hazards,
7. Pharmaceutical hazards and their safety.
8. Accident records

SELECTION OF SITE/PLANT LOCATION

The selection of plant site is very important to ensure that it has all the support required to make the venture a feasible and profitable. There are many factors that must be considered when selecting a suitable site. The principal factors to consider are:

1. Location, with respect to the marketing area.
2. Raw material supply.
3. Transport facilities.
4. Availability of labour.
5. Availability of utilities: water, fuel, power.
6. Availability of suitable land.
7. Environmental impact, and effluent disposal.
8. Local community considerations.
9. Climate.
10. Political and strategic considerations.

❖ Factors Influencing Plant Location

- I. Fundamental (Primary) Factors
- II. Derived (Secondary) Factors

I. Fundamental/ primary factors

1.Raw materials:

- Types of raw materials used:
 - a) Crude drugs
 - b) Inorganic chemicals
 - c) Organic chemicals
- Economical to locate the plant near the source.
- increase in freight charges and risk of danger if not locally available.
- If stable raw materials: other factors to be considered also.

2. Market:

- Strong influence on the establishment of industries.
- The bulk industries are located nearer to the market.
- Bulk drug industry located where drug formulation industries are located, since bulk drugs are the feed for the formulations and buyers are found nearby.

3. Energy availability:

- Fuel and power
- Can also create own power generation facility.

4. Transportation Facility:

- For bringing raw materials and distribution of finished goods.
- Railways, roads and seaport.
- The kind and number of products and raw materials determine the most suitable type of transportation facility.
- Also, a need for transportation for the personnel.

5. Labour Supply:

Low wages and abundant labour help in localization.

Skilled, better paid and highly mobile labour required.

II. Derived/ Secondary Factors

1. Climate and Soil:

- Important for agriculture-based industries. E.g.: Ayurvedic drugs
- A location which is very hot during summers would not be suitable as it is subjected to dust storms and drying up of water supplies.
- Highly humid area will also not be suitable from the point of:
 - cost,
 - Contamination,
 - Difficulties of maintaining laboratory animals in proper condition
 - Efficiency of labour

2. Government concessions:

- Govt. subsidies and concessions have been provided for the industries located in certain notified areas.
- These areas have been declared as industrially backward and the govt. offers low wages, cheap power, tax concessions, etc.
- Antibiotic industries: located in a place wherein the microbial contamination in the environment is low and the ambient temperatures throughout the year are cool.

- If in a cold climate: costs may be increased by the necessity of constructing protective shelters around the process equipment.
- If temp is high: special cooling towers or a/c equipment may be required.

3. Water supply

- Large quantities of water required for cooling, washing, steam generation and also as raw material (liquid orals).
- Study should be conducted regarding the supply position of underground water and/or surface water and their seasonal variation.
- Quality of water also important.
- Temperature, mineral content, silt or sand content, bacteriological content, cost of supply and purification treatment must also be considered while choosing a water supply.
- Detailed estimate of water requirements for the present and the future must be made.

4. Water Disposal:

- Legal restrictions must be considered.
- Site selected should have adequate capacity and facilities for correct waste disposal.
- Attention should be given to potential requirements for additional waste treatment facilities.

5. Site Characteristics:

- Topography of the land and soil should be considered since both may influence the construction cost.
- Cost of land, local building costs and living conditions are also important.
- Expansion of the plant in future should also be considered.

6. Flood and Fire protection:

- A regional history of natural events like floods and hurricanes must be conducted if located near large bodies of water (river, sea, etc.).
- Assistance from fire deptt. should be easily available.
- Fire hazards in the immediate surrounding area of the plant site must not be overlooked.

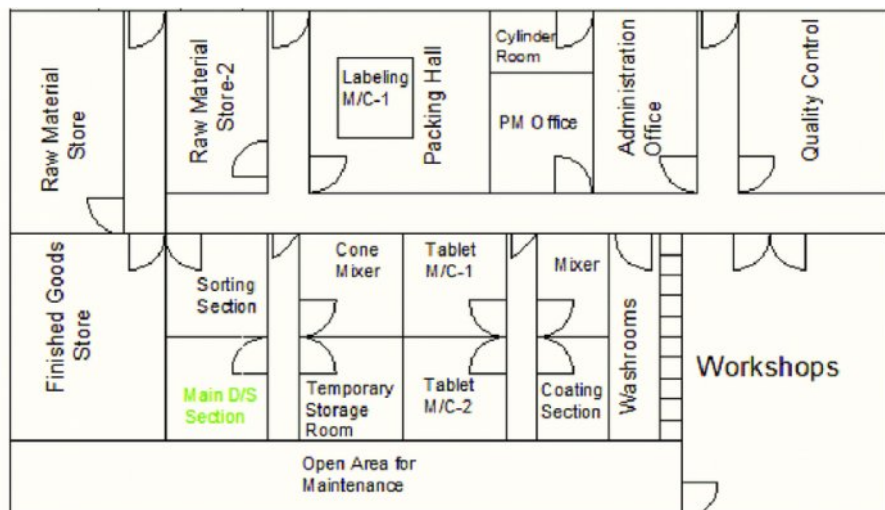
Special provisions of Factory Premises- Location

- Should be located in a sanitary place away from filthy surroundings.
- Should be situated in a place which:

- a. Shall not be adjacent to an open sewage, drainage or public lavatories.
 - b. Shall not be adjacent to a factory, which produces disagreeable or obnoxious odours or fumes.
 - c. Shall not be adjacent to a factory, which emits large quantities of soot, dust or smoke.
- The factory should not constitute undue danger to adjacent life and property.
 - State laws and other related laws should be consulted.
 - Indian Factories Act and the D&C Act should be considered.

PLANT LAYOUT

- Plant layout is a coordinated effort to achieve the final objective to integrate machines, materials, and personnel for economic production.
- Layout can be described as location of different depts and arrangement of machinery in a deptt.
- Proper layout has the advantage from the point of workers, labour costs, other production costs, supervision and capital investment.



❖ **Types of layouts**

- Process or Functional Layout
- Product or Straight Line Layout

1 **Process or functional Layout**

- In this type, all machines of a particular class doing a particular type of work are arranged together in a separate deptt.

Advantages of this type are:

- a) More effective supervision can be achieved.
- b) Division of labour or specialized work can be provided.
- c) Less disruption of production is possible.
- d) Good scope for expansion.

2 Product or Straight Line Layout

All machines doing various operations are arranged in a line.

Advantages:

- a) Facilitates quick and smooth processing of work.
- b) Reduces cost of material handling using conveyor.
- c) Reduces manufacturing time and speeds up the manufacturing cycle.
- d) Facilitates proper use of the floor.
- e) Reduces inventory in work of progress.
- f) Reduces inventory of finished goods.

❖ Factors guiding the layout: -

- New site development or additions to a developed site.
- Type and quantity of products to be produced.
- Types of process and product control.
- Space available and space required.
- Operational convenience and accessibility.
- Economic distribution of utilities and services.
- Type of buildings and building code requirements.
- Health and safety considerations.
- Waste disposal problems.
- Auxillary equipment.
- Possible future expansion.

❖ Some provisions of plant layout

- The premises should be suitable for the purpose of drug manufacturing.
- Measures should be taken to prevent mixing-up of substances or materials and contamination.
- The building of the factory shall be constructed so as to permit the production under hygienic conditions.
- They shall conform to the conditions laid down in Factories Act, 1948.
- The part of the building used for manufacture should not be used as a sleeping place.

- No sleeping place adjoining the building shall communicate therewith except through open air and through an intervening space.
- The walls of the room in which manufacturing operations are carried out shall:
 - Have a height of 6 feet from the floor.
 - Be smooth and water proof
 - Be capable of maintaining cleanliness
 - Have no chinks or cervices
- The flooring shall:
 - Be smooth, even and washable.
 - Be in such a way as to permit any retention or accumulation of dust.
 - Have no chinks or cervices.
 - The buildings are arranged to permit economic conditions.
 - The routing of goods should be logical so that successive unit operations can be done in adjacent rooms with uninterrupted transportation.
- Adequate facilities should be maintained to provide safety and fire protection.
- Regulations controlling escape routes in case of fires, providing firefighting equipment, fire alarms and measures to be taken for prevention of breaking of fires and their spreading should be complied.
- Devices should be installed in every room where process operations are carried on, so that in times of emergency the power supply can be immediately cut off from the transmission machinery.
- Building meant for storing and handling should be segregated and isolated.

UTILITIES AND SERVICES

❖ **Utilities:**

- Basic utilities: Power and Water
- Decision must be made on either to use purchased power or to set up its own power unit.
- Different methods to transmit power (mechanical energy, heat energy and pressure energy) and the best one to suit the particular process should be chosen.
- Water can be obtained either from plant's own source or from a municipal supply.

- Before going for the new project, the company must ensure sufficient supply of water for all industrial, sanitary and safety demands for both present and future.
- Water used in manufacture shall be pure and of drinkable quality, free from pathogenic microorganisms.

Maintenance Services:

- Sufficient space and facilities for maintenance work must be provided.
- Instruments to measure temperature, pressure and density are used.
- Automatic control systems are best.

Storage:

- Adequate storage for raw materials, intermediates, recycle materials, rejected materials and fuels are essential.
- Bulk storage of liquids is generally handled by a closed cylindrical/ spherical tank so as to prevent the escape of volatile material and minimizing contamination.
- Liquids with vapour pressure above atmospheric pressure must be stored in vented tanks. Flame arrest mechanism must be installed in all the vents.
- Gases are stored at atmospheric pressure in a wet or dry sealed gas holders.
- Solid products and raw materials are either stored in weather tight tanks with sloping roofs or in outdoor bins and mounds.

INDUSTRIAL HAZARDS

Hazard is a term associated with a substance that is likelihood to cause an injury in a given environment or situation.

Safety in simple terms means freedom from the occurrence of risk or injury or loss. Industrial safety refers to the protection of workers from the danger of industrial accidents.

Definition of Industrial Hazard

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.

- Toxic corrosive chemicals, fire explosions and personnel falling into accident are major health and safety hazards encountered in the operations of chemical and pharmaceutical industries.
- Identification of hazards and employing protective measures to control the hazards are important to protect the people from their consequences.

Types Of Hazards

1. Fire hazards
2. Chemical hazards
3. Electrical hazards
4. Mechanical hazards and
5. pharmaceutical hazards.

FIRE HAZARDS

➤ **Fire:**

- ∇ The self-sustaining of rapid oxidation of a fuel which produces heat and light
- ∇ Fire is an exothermic chemical reaction between oxygen and fuel at certain temperature.

Three things essential for the combustion of fire are

- ∇ Fuel (any combustible material)
- ∇ Oxygen (At concentrations above 23 % in air, the situation becomes dangerous due to the increased fire hazard)
- ∇ Temperature.

Sources of Fire Hazards

Fuels include solids, liquids, vapours and gases.

- ***solid fuels***

wood, fabrics, synthetic materials, packing materials, papers

- ***Liquid fuels***

flammable liquids (e.g., nitrophenol, ammonium nitrate and Potassium chlorate, paint and oil-soaked rags, cotton or cellulose soaked with sulphuric acid etc.)-

Other sources include flame, sparks, spontaneous ignition and self-combustible chemicals

Classification of Fires

Most fires that occur will fall into one or more of the following categories

Class A

Fires involving ordinary combustible materials, such as Paper, and textile fibres,

where a cooling, blanketing, or wetting extinguishing agent is needed-

Class B:

Fires involving flammable liquids such as gasoline, thinners, oil-based paints and greases

Extinguishers for this of fire include carbon dioxide, dry chemical and halogenated agent type

Class C

Fires involving energized electrical equipment, where a non-conducting gaseous clean agent or smothering agent is needed. The most common type of extinguisher for this class is a carbon dioxide

Class D

Fires involving combustible metals such as magnesium, sodium, titanium, and aluminium

Special dry powder extinguishing agents are required for this class of fire, and must be tailored to the specific hazardous metal

Class K

Fires involving commercial cooking appliances with vegetable oils, animal oils or fats at high temperatures- A wet potassium acetate, low pH-based agent is used for this class of fire

◆ Detection of Fire Hazards

Many automatic fire detection systems are used today in industry

Some include

- Thermal expansion detectors,
- Heat sensitive insulation,
- Photoelectric fires,
- Ionization or radiation sensors and
- Ultraviolet or I R detectors-

These sound an alarm through which fire flames are detected-



◆ Prevention of Fire Hazards

- ◆ Well planned design and layout
- ◆ Proper ventilated systems
- ◆ Chemical data sheets
- ◆ Proper training of personnel
- ◆ Proper maintenance of
- ◆ surroundings
- ◆ use of fire extinguishers, alarms, sensors,
- ◆ Firefighting equipment
- ◆ Sprinkler systems

◆ Steps to be taken

- ◆ Don't panic
- ◆ Raise the alarm
- ◆ Evacuate the premises
- ◆ Turn off the gas supply
- ◆ Attack the fire with extinguisher or vacate the place
- ◆ In case of fire safe methods to be followed
- ◆ Stair cases only to be used for evacuation
- ◆ Exit doors should be closed after getting out
- ◆ Go down the stair case to the ground
- ◆ Walk do not run
- ◆ Encounter heavy smoke crawl on the floor, do not talk, cover the
- ◆ nose and mouth with a wet cloth

MECHANICAL HAZARDS

❖ Occurs due to:

- ◆ Large number of equipment
- ◆ Crowded work place conditions
- ◆ Frequent interaction between worker and equipment
- ◆ Insecurely fixed machines
- ◆ Worn and teared parts
- ◆ Failure of SOP
- ◆ Dangerous Parts
- ◆ Negligence
- ◆ Improper maintenance of equipment

- These are associated with powers-driven machine, whether automated or manually operated by steam, hydraulic and/or electric power introduced new hazards into work place.
- Mechanical hazards are exacerbated by the large number and different designs of equipment, crowded work place conditions and different interaction between workers and equipment.
- Hazardous electrical and pneumatic thermal energy must be released or controlled before working on active equipment.
- High sound levels may be generated by manufacturing equipment (e.g., ball mill) there by increasing their exposure to noise.
- Injuries like cutting, tearing, shearing, puncturing and crushing may occur with moving machinery.

❖ Prevention of Mechanical Hazards

1. Building planning:

- Floors must be non-slippery type
- Enough space to move easily
- Easy access of workers to the safety switches

2. Safe material handling:

- All material handling equipments should be repaired and maintained properly.

3. Personnel protective devices:

- Protection of head by using hard hats and helmets
- Ears by using ear muffs and plugs
- Face by using face masks

4. 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

5. Prevent contact:

The safeguard must prevent hands, arms, or any part of a worker's body from making contact with dangerous moving parts.

6. 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.

7. 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.

❖ Safety aspects in mechanical hazards

- All the operators should be trained in safe operation, maintenance and emergency procedures to take care when accidents occur.
- Inspection, adjustment repair and calibration of safe guards should be carried out regularly.
- Ear protection devices must be used to prevent the excessive noise.
- Effort should be made to reduce the noise to a safe level.
- All machinery must be fenced or mechanical interlocking or photocell.
- Machine should be fitted with emergency shut down system.
- Control system override should be monitored.
- Operator must have a safe distance from the machine.
- Strictly following SOP.
- Stop and lock button for machines.

ELECTRICAL HAZARDS

Electricity is the flow of electrons through a substance which allows transfer of electrical energy from one position to another.

Electrical hazards occurs when a person come in contact with the conductor carrying current and simultaneously contacts with the ground, usually known to be work place hazard.

❖ Sources of electrical hazards

The most frequent causes of electrical injury/death are:

- ◇ Contact with power lines
- ◇ Path to ground missing or discontinuous
- ◇ Equipment not used in manner prescribed
- ◇ Improper use of extension and flexible cords
- ◇ Electric shocks and burns due to poor indication facilities
- ◇ Wiring faults and improperly wired equipments
- ◇ Sparking at loose connection
- ◇ Short circuits
- ◇ Combustible and explosive materials
- ◇ Electrostatic hazards
- ◇ Arcs and spark hazards
- ◇ Touches two wires at different voltages at the same time.

- ◇ Touches the phase having wet cloth and high humidity.
- ◇ Touching another person receiving an electrical shock.

❖ **Detection of electrical hazards**

➤ Circuit tester

The tester is also used to whether housings and other equipment parts are carrying current

➤ Receptance wiring tester.

A receptance wiring tester is a device with two standard plug probes for insertion in to an ordinary 110 volt outlet and a probe for the ground.

Indicator lights show an improperly wired receptance as follow

SITUATION	LIGHTS OF INDICATOR		
Correct wiring	on	on	off
Ground jumped to neutral	on	on	off
Neutral and ground reserved	on	on	off
Reserved polarity	on	off	on
Open ground	on	off	off

❖ **Prevention of electrical hazards**

- ◇ Proper maintenance of wiring and equipments.
- ◇ High voltage equipments should be properly enclosed.
- ◇ Worker should avoid working with the equipment in wet clothes and shoes.
- ◇ Water supply should be far away from electrical circuits.
- ◇ Grounding of electrical equipments
- ◇ Bonding and grounding
- ◇ Indication of danger sign at every high voltage terminal.
- ◇ Prevention of static electricity
- ◇ Humidification
- ◇ Antistatic materials
- ◇ Ionizers and electrostatic neutralizers, Radioactive neutralizers and Magnetic circuit breaker.

❖ Safety aspects in electrical hazards

- Ensure that power has been disconnected from the system working with it.
- Do not wear conductive material like such as metal jewellery.
- Periodically inspect insulation.
- Verify circuit voltages.
- Use only explosion proof devices and non-sparkling switches in flammable liquid storage areas.
- All electrical parts should confirm ISI specifications.
- Ensure all flexible wires and power cables are properly insulated.
- Installation of earth trip devices for all electrical equipments.
- Safe guarding is essential for all electrical equipments.
- Proper training to workers
- Use warning labels
- Overhead electrical wire should have extra care
- Implement a safe electrical work program
- Observe work practice

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
- Many chemicals can cause severe burns, if these coming to contact with living tissue or other routes like inhalation.
- Living tissue may be destroyed by chemical reactions such as dehydration, digestion, oxidation etc.
- Eye and mucus membrane of the throat are particularly susceptible to the effect of corrosive dust, mist and gases.

❖ Sources of chemical hazards

- **Air born toxics**
 - **Irritants:** Ipecac, Podophyllum etc.
 - **Asphyxiants:** Carbon dioxide, monoxide, Methane, Ethane, Hydrogen cyanide, Hydrogen sulphide, Helium, Nitrogen etc.,

- **Narcotics/anaesthetics:** Acetone, Ether, Chloroform, Methyl-ethyl ketone etc.,
 - **Carcinogens**
 - Coaltar, Cresote oil, Anthracene oil, Paraffin oils, Chromium, Nickel, Cobalt etc.,
 - Hazards may arise when impure or contaminated chemicals are used.
 - By products may accumulate relatively high concentrations in parts of the plant and cause un expected effects.
 - In pharmaceutical industry most of the dermatitis can be attributed to synthetic drugs, especially acridines and phenothiazines.
 - Dusts of chemicals produced from different equipment
- ❖ **Safety aspects in chemical hazards**
- ◇ Application of barrier creams before commencing the work has been found useful in protecting individuals from hazardous chemicals.
 - ◇ While using the high vapor pressure solvents and grinding of vegetable drugs (e.g., capsicum and podophyllum) safety goggles are to be worn. Because these will affect the eyes.
 - ◇ Solvents used in extraction, purification of synthetic drugs and chemical analysis should be handled with care.
 - ◇ Flammable and explosive chemicals should be kept at proper distance.
 - ◇ No eating, drinking, or smoking where chemicals are used.
 - ◇ Skin should be covered with protective clothing
 - ◇ 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.
 - ◇ Tolerance levels for toxic chemicals should be followed as set by Federal regulations.
 - ◇ Whenever a dust allergy or respiratory problem precipitates the worker should immediately be removed from the work place and put under proper healthcare.
 - ◇ Suitable label to the chemicals for proper handling.
 - ◇ 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

- ◇ We must know the exposure limits and toxicity of different chemicals.

Chemicals	Exposure limit (ppm)
Ethyl alcohol	1000ppm
acetone	1000ppm
Methylene chloride	125ppm
Isopropyl alcohol	400ppm

TOXIC SUBSTANCES AND THE ORGANS THEY ENDANGER :

BLOOD	KIDNEYS	HEART	BRAIN
Benzene Carbon monoxide Arsenic Aniline Toluene	Mercury Chloroform	Aniline	Lead, Mercury Benzene Manganese Acetaldehyde
EYES	SKIN	LUNGS	LIVER
Cresols Acrolein Benzylchloride Butyl alcohol	Nickel Phenol Trichloro-ethylene	Asbestos, Chromium, Hydrogen-sulfide, Mica Nitrogen dioxide	* Chloroform * Carbon-tetrachloride Toluene

SOME CLINICAL SYMPTOMS AND HAZARD CAUSING CHEMICALS

ORGAN	SYMPTOMS	CHEMICALS
EYES	Corneal and conjunctival disturbances	Sulphur dioxide, hydrogen sulphide
NERVOUS SYSTEM	Drowsiness	CNS depressants
MOUTH and THROAT	Green tongue Salivation	Vanadium Mercury

Pictograms used in chemical hazards



B-BIOHAZARD



F-HIGHLY
FLAMMABLE
F+-EXTREMELY
FLAMMABLE



O-OXIDIZING



C-CORROSIVE



Xn
X-HARMFUL
Xi-IRRITANT



R-RADIOACTIVE



E-EXPLOSIVE



N
N-DANGEROUS
FOR THE
ENVIRONMENT



T
T-TOXIC
T+-VERY
TOXIC

Bhopal gas tragedy

- Bhopal gas tragedy, considered as one of the world's worst industrial chemical hazard
- It occurred on the night of Dec 2-3,1984 at Union carbide India limited pesticide plant in Bhopal
- Water entered tank 610 containing 42 tons of methyl isocyanate. The resulting exothermic reaction increased the temperature inside the tank to over 200 °C (392 °F) and raised the pressure.
- About 30 metric tons of methyl isocyanate (MIC) escaped from the tank into the atmosphere in 45 to 60 minutes.
- A leak of methyl isocyanate gas causes 8000 deaths, 5,58, 125 injuries.



PHARMACEUTICAL HAZARDS

- Hazardous drugs that pose a potential health risk to health care workers who may be exposed during drug manufacturing, packing and storage.

❖ Criteria for defining hazardous drugs

Drugs that meet one or more of the following criteria should be hazardous.

- Carcinogenicity.
- Teratogenicity.
- Reproductive toxicity.
- Organ toxicity at lower doses.

❖ Routes of exposure to hazardous drugs

- Inhalation of an aerosolized drug.
- Dermal absorption.
- Ingestion.
- Injection.

❖ Types of hazards toxicity

- Acute poisoning.
- Chronic poisoning.

❖ Sources of pharmaceutical hazards

- ⇒ Dust and noise exposures
- ⇒ Exposure to UV radiation
- ⇒ Exposure to formaldehyde
- ⇒ Repetitive motion disorders
 - ◇ Formaldehyde — may cause lung cancer, prostate cancer. Acute exposure may cause pulmonary edema and pneumonia leading to death. Also causes allergic dermatitis
 - ◇ Repetitive motion disorder— motion associated with packing and filling could lead to Carpal tunnel syndrome or Tendonitis.
 - ◇ Hazards from handling crude drugs and it's extracts eg: Ipecacunha.
 - ◇ Solvents eg: Benzene
 - ◇ Alkaloids eg: scopolamine, emetine
 - ◇ Toxic intermediate
 - ◇ Miscellaneous Hazards

- Radiant energy
- Bacteria and viruses

❖ **Safety aspects in pharmaceutical hazards**

- ◇ Personal protective equipment for hazardous drug handling
- ◇ Disposable gowns made of fabric that has low permeability to the agents in use, with closed fronts and cuffs, intended for single use.
- ◇ Powder free gloves, labeled and tested for drugs used with chemotherapy, made of latex, nitrile or neoprene.
- ◇ Face and eye protection when splashing is possible.
- ◇ Approved respirator when there is a risk of inhaling drug aerosols. The labelling of solvents to indicate their properties and health and fire hazards, is an extremely important method for controlling the hazards.
- ◇ Substitution of more harmful material by one which is less danger to health.
- ◇ Every bulk drug and pharmaceutical unit must prepare its disaster management plan
- ◇ To prevent or reduce dangerous expose to toxic materials.
 - i. Gas releases should be vented outside buildings and away work areas and other populated areas.
 - ii. Exhausts and ventilations should be provided to remove emissions.
- ◇ Standard operating procedures
- ◇ Handling of hazardous materials
- ◇ Water supply and drainage
- ◇ Floors and floor coverings
- ◇ Emergency exits
- ◇ Backup plan if anything goes wrong
- ◇ Specially trained personnel
- ◇ Health polices and insurance
- ◇ Written procedures
- ◇ Safety audits
- ◇ Risk analysis
- ◇ Appropriate training and education to employee
- ◇ Regular monitoring of workplace
- ◇ Written documentation of policies
- ◇ Create awareness of the environment.

ACCIDENT RECORDS

1. Reporting an accident or incident
2. An accident or incident investigation
3. Records

1. Reporting an accident or incident

- The person who first witnesses the event shall report to concern departmental officer / engineer immediately.
- On receiving the information the departmental officer or engineer shall assess the situation and shall inform immediately to shift incharge, GM production, manager EHS.
- If a person is injured he/she shall be given first aid by the trained first aid provider . This shall be recorded in the first aid treatment register.
- If the injury is beyond the scope of first aid, the concerned departmental officer or engineer shall send injured person to the nearest hospital.
- If the accident or incident has a potential that can effect the persons in the vicinity / the plant , concerned departmental officer or engineer shall stop the plant activities , shut off power sources if required except exhaust fans, alarm systems and personal safety protection devices.
- If concerned departmental officer or engineer is unable to control accident or incident then he shall intimate safety squad, activate emergency activation alarm (manual call point) so that everyone knows about the emergency. Report the accident in accident or incident reporting form.

2. Accident or Incident Investigation

- Manager EHS shall inform senior vice president (technical) about the accident or incident.
- Manager EHS shall form a cross – functional investigation team in consultation with senior vice president (technical) this team shall have at least 3 representatives.
- 1 representative will be the person who reported the accident/Incident,
- 1 representative from any other department
- 1 from the EHS department.
- After completion of the investigation report shall be prepared.
- The report shall be completed within 48 hours on starting the investigation.

3. Accident Records

- After accident or incident during work, an accident record should be maintained.
- A standard form is filed up and a copy is kept at the factory premises, another copy is sent to respective authorities of the country (ministry labor and employment, govt of India)

Sample form for your own use (not for reporting to WorkSafe).

ACCIDENT/INCIDENT REPORT FORM

Record No: _____

Personal details

Name: _____

Occupation: _____

Section/Dept: _____ Date of report: / /

Accident/incident details

Date: _____ Time: _____ Date reported: / /

Location: _____ Witness: _____

Reported to whom: _____

Full accident/incident details – what happened, or in the case of a near miss, what could have happened

Injury – Nature of Injury

- | | | | |
|--|---|---------------------------------------|--|
| <input type="checkbox"/> Contusion/crush | <input type="checkbox"/> Burn | <input type="checkbox"/> Dislocation | <input type="checkbox"/> Amputation |
| <input type="checkbox"/> Laceration/open wound | <input type="checkbox"/> Superficial injury | <input type="checkbox"/> Foreign body | <input type="checkbox"/> Internal injury |
| <input type="checkbox"/> Concussion | <input type="checkbox"/> Sprain/strain | <input type="checkbox"/> Fracture | <input type="checkbox"/> Dermatitis |

Location of Injury

- | | | |
|--|--|--|
| <input type="checkbox"/> Head/face | <input type="checkbox"/> Eye | <input type="checkbox"/> Internal organs |
| <input type="checkbox"/> Hand/fingers | <input type="checkbox"/> Shoulder/arms | <input type="checkbox"/> Trunk (other than back) |
| <input type="checkbox"/> Hip/leg | <input type="checkbox"/> Foot/toes | <input type="checkbox"/> Back |
| <input type="checkbox"/> Other (state) | | |

Results of accident

Lost time injury Y / N No. of days: _____ days Workers' compensation Y / N
 Treatment received: First aid Doctor Hospital

Damage to equipment/buildings/vehicles etc.

What was damaged? _____

Extent of damage: _____

Contributing factors

What were the contributing factors (if any)? _____

Corrective actions

Immediate actions _____

What controls can be put in place to prevent this from happening again? _____

Recommendations for action _____

Who is to implement these controls/corrective actions? _____

Date by which action is to be taken / /

Signatures

Officer: _____ HS Rep: _____ Manager: _____

Director: _____ Investigating officer: _____

Actions completed: _____ Date: / / Manager: _____