

# Environmental Pollution

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(Noise Pollution, Solid waste management, Bio medical waste management and E-waste management)

# Noise Pollution

- Noise pollution can be defined as an unwanted sound.
- Noise pollution is excessive, displeasing human, animal, or machine created environmental noise that disrupts the activity or balance of human or animal life.
- Unlike other pollutants noise does not accumulate in the environment.

Difference between sound and noise:

Sound	Noise
Sound in its most natural and ordinary state is pleasant and good to hear.	Noise is unwanted and unpleasant sound.
Sound does not produce any stress or anxiety.	Noise can create anxiety, increased heart beat, distress, headache etc.

**NOISE  
POLLUTION**



# Noise Measurements

- Sound measured in a unit called the '**Decibel**'. Ordinary conversation has a noise value of 60 decibels. If loudness exceeds 80 decibels, it can cause noise pollution.
- Noise became troublesome above 140 decibels.

Sound produced	Decibels
Threshold of hearing	0 dB
Breathing	10 dB
Whispering	20 dB
Quiet room	30 dB
Busy street	80 dB
Subway train	100 dB
Jet plane take off	120 dB

# Noise rating system

- A noise may consist of different type of sound with different pressure levels operating for different time intervals. The frequency of this sound may vary.
- The combined impact of different sound pressure lasting for different periods is worked by using some statistical measures as  $L_N$  and  $L_{eq}$  system.
- **The  $L_N$  concept:** The value of  $L_N$  represent the sound pressure level will exceed for N% of the gauging time. For example the given time given 70 dB value of  $L_{60}$  will means that the sound level will exceed 70dB for 60% of time.

**The  $L_{eq}$  concept:**  $L_{eq}$  is defined as the constant noise level, which on given time, expands the same amount of energy. This value is expressed by the following equation

$$L_{eq} = 10 \log \sum (10)^{L_i/10} * t_i$$

Where n = total number of sound sample

$t_i$  = time duration of  $i^{th}$  sample, expressed as total sample time

$L_i$  = the noise level of  $i^{th}$  sample

## Sources of Noise Pollution

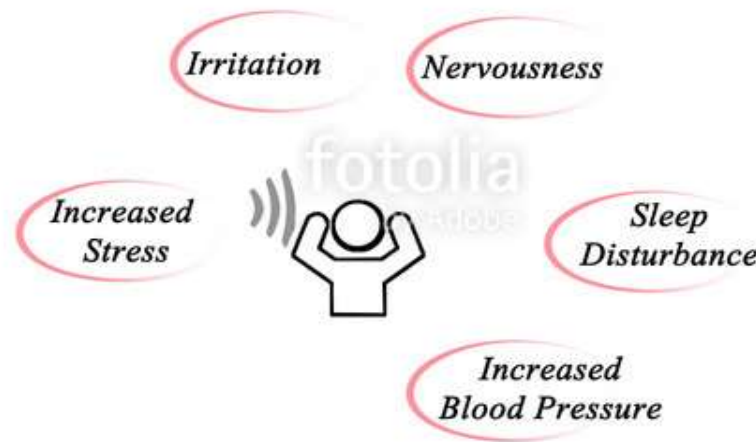
- Transport/Traffic
- Industrial activity
- Domestic activity
- Celebrations

# Effects of noise pollution

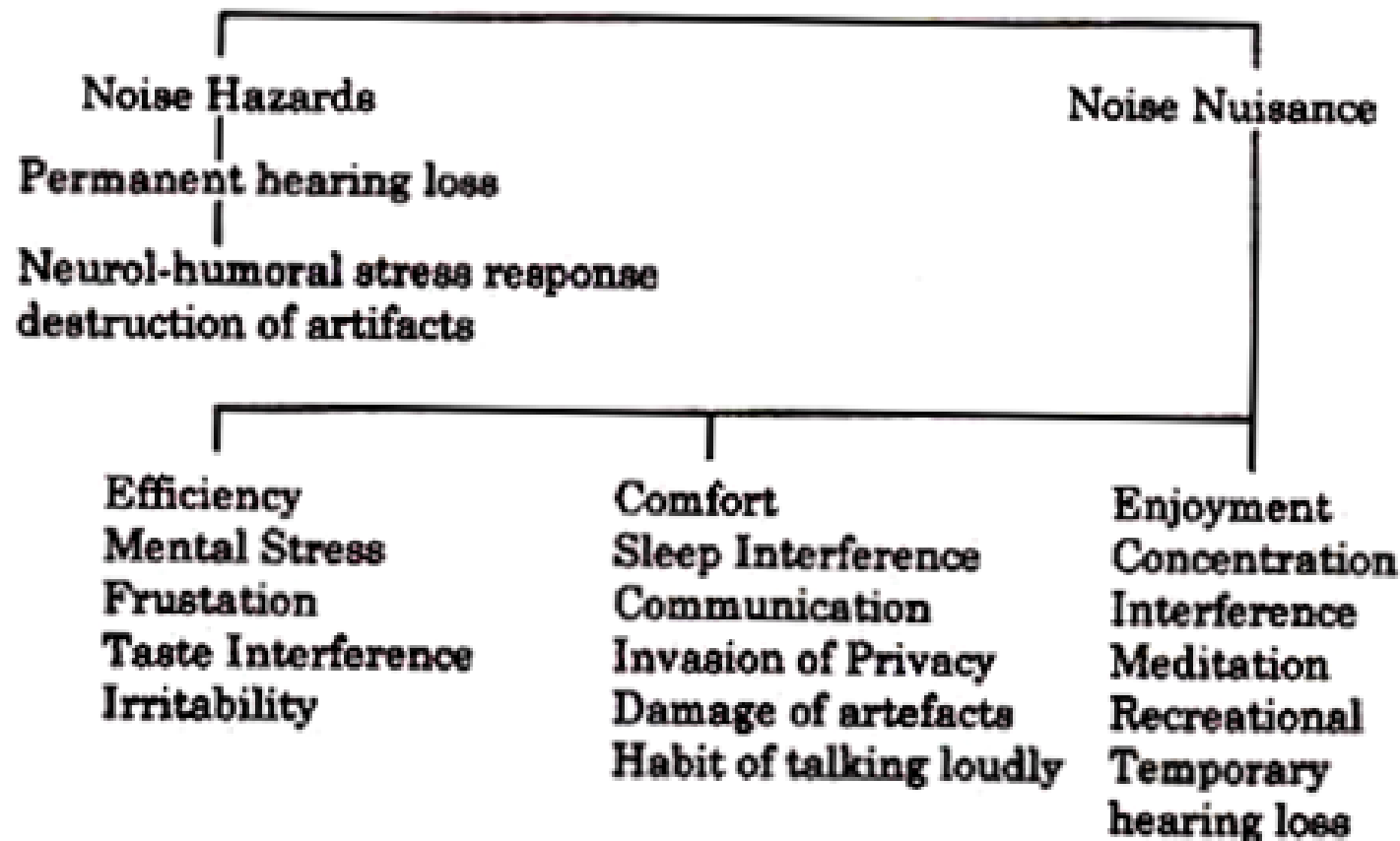
Noise pollution can cause the following effects.

- Hearing damage
- Physical and mental balance
- Interferes with man's communication
- Affect efficiency and productivity
- Health effects

## *Effects of Noise Pollution*



## **Noise Effects on Human Beings**







# Noise Pollution Control Measure

Following methods can be used to control noise pollution:

- **Reduce noise at the source:** Banning use of old vehicles, may not be allowed to ply in the polluted areas.
- **Proper maintenance:** Proper oiling will reduce noise from the machinery.
- **Use of sound absorbing substance/silencers:** Use of substances that absorb sound or silencer in motor vehicles can reduce the intensity of noise pollution.

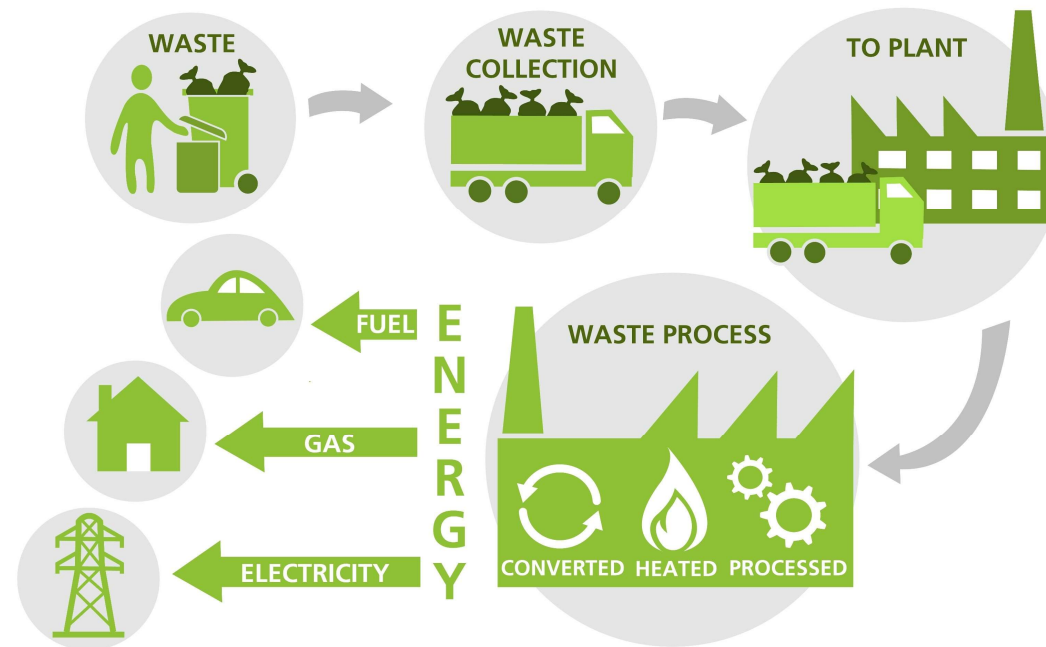
- **Planting trees:** Trees should plant around the hospitals, libraries and school and colleges. These can absorb noise.
- **Personal precaution:** Industrial workers should be provided with ear plugs or cotton plugs. Rooms of hospital can be made sound proof. People should not cause nuisance to public by playing music, television loudly.
- **Law enforcement:** Strict legislation can minimized noise pollution during various festivals and social functions. Use of loud horns should be banned.





# Solid Waste Management

- Solid waste refers to the supervised handling of waste material from generation at the source through the recovery processes to disposal.
- Solid waste can be classified as municipal, industrial, agricultural, medical, mining waste and sewage sludge.





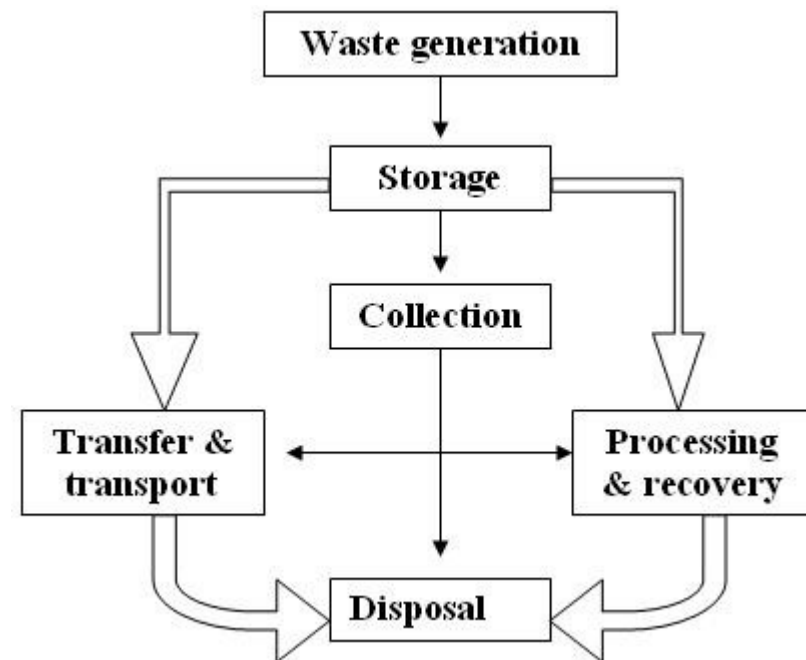
# Sources of wastes

- Waste from homes (Domestic waste):
- Waste from shops:
- Biomedical waste:
- Construction/demolition waste:
- Industrial waste: packaging material, organic waste, acid, alkalis, metals, radioactive wastes, fly ash, scrap metal, rubber, plastic, paper, glass, wood, oils, paints, tars, dyes, batteries etc.

# Classification

- **Biodegradable wastes:**
- **Non-biodegradable wastes:**
- Different steps in solid waste management are

- a) Collection
- b) Transportation
- c) Storage
- d) Segregation
- e) Processing
- f) Disposal

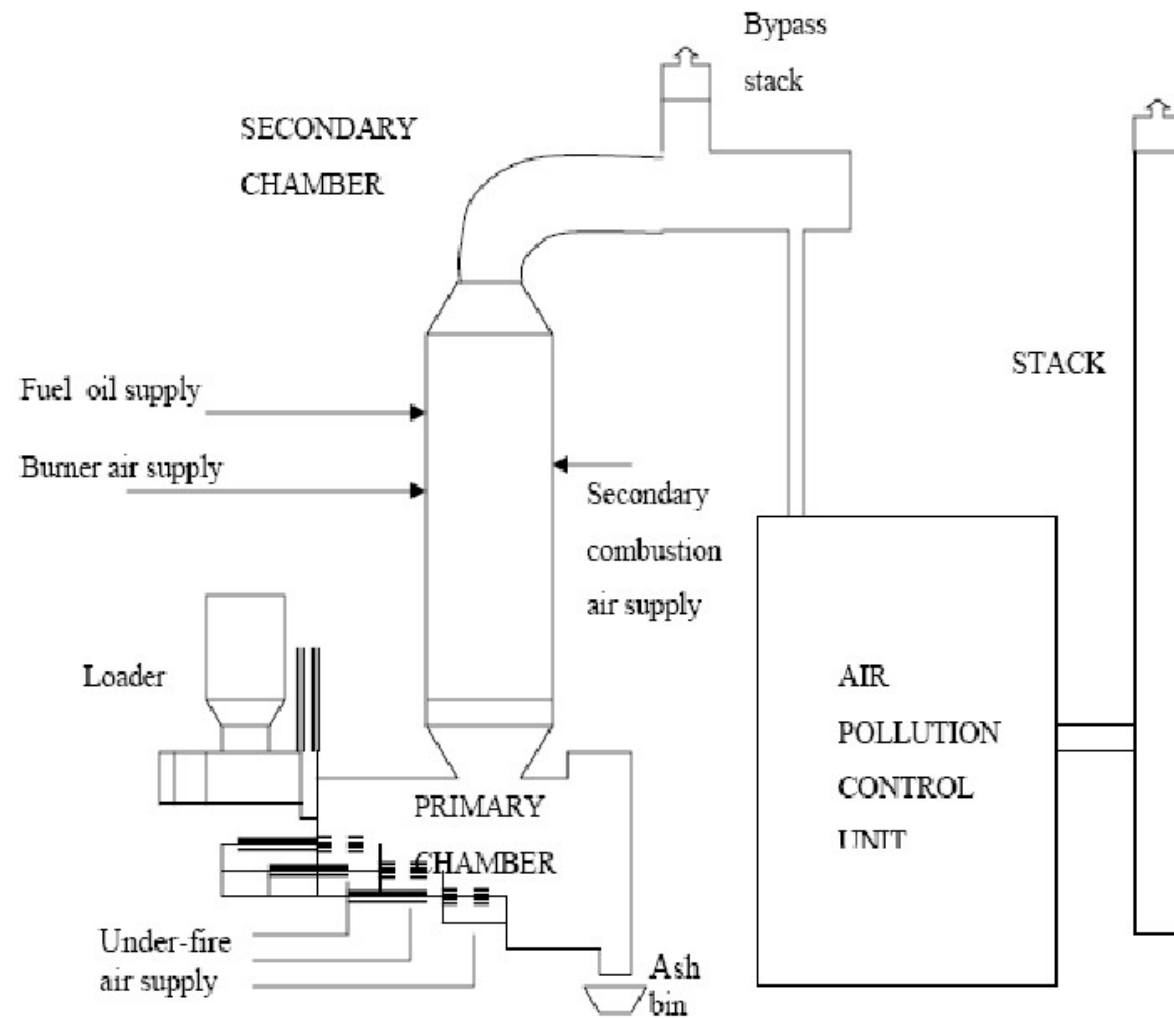




## Collection, Segregation and Storage at the Site of Collection

YELLOW BAGS	RED BAGS	BLUE BAGS	BLACK CARBOY
Infectious waste, bandages, gauze, cotton or any other objects in contact with body fluids, human body parts, placenta etc.	Plastic waste such as catheters, injection syringes, tubings, iv bottles	All types of glass bottles and broken glass articles, outdated & discarded medicines	Needles without syringes, blades, sharps and all metal articles.

# Incineration



- Incineration is the most common thermal treatment process.
- Commonly used when waste contain hazardous material and organic content.
- So it is a combustion of waste in presence of oxygen.
- Waste heated at high temperature in incinerator and after that it is converted into CO<sub>2</sub>, water vapor and ash.
- It significantly reduces volume of the waste, harmless and reduce transportation costs.

# Advantages and Disadvantages

- It requires minimum land
- It can be operated in any weather
- The volume of wastes are reduced to about 25%
  
- It is expensive to build and operate
- High energy requirement
- Cause significant air pollution due to burning of wastes. Foul smell also produced.

- **Pyrolysis and Gasification:** it is a process which decompose waste by heating it to high temperatures and low amounts of oxygen. Gasification uses a low oxygen environment while pyrolysis allows no oxygen.
- **Composting:** it is a controlled aerobic decomposition of organic matter by the action of micro organisms and small invertebrates.

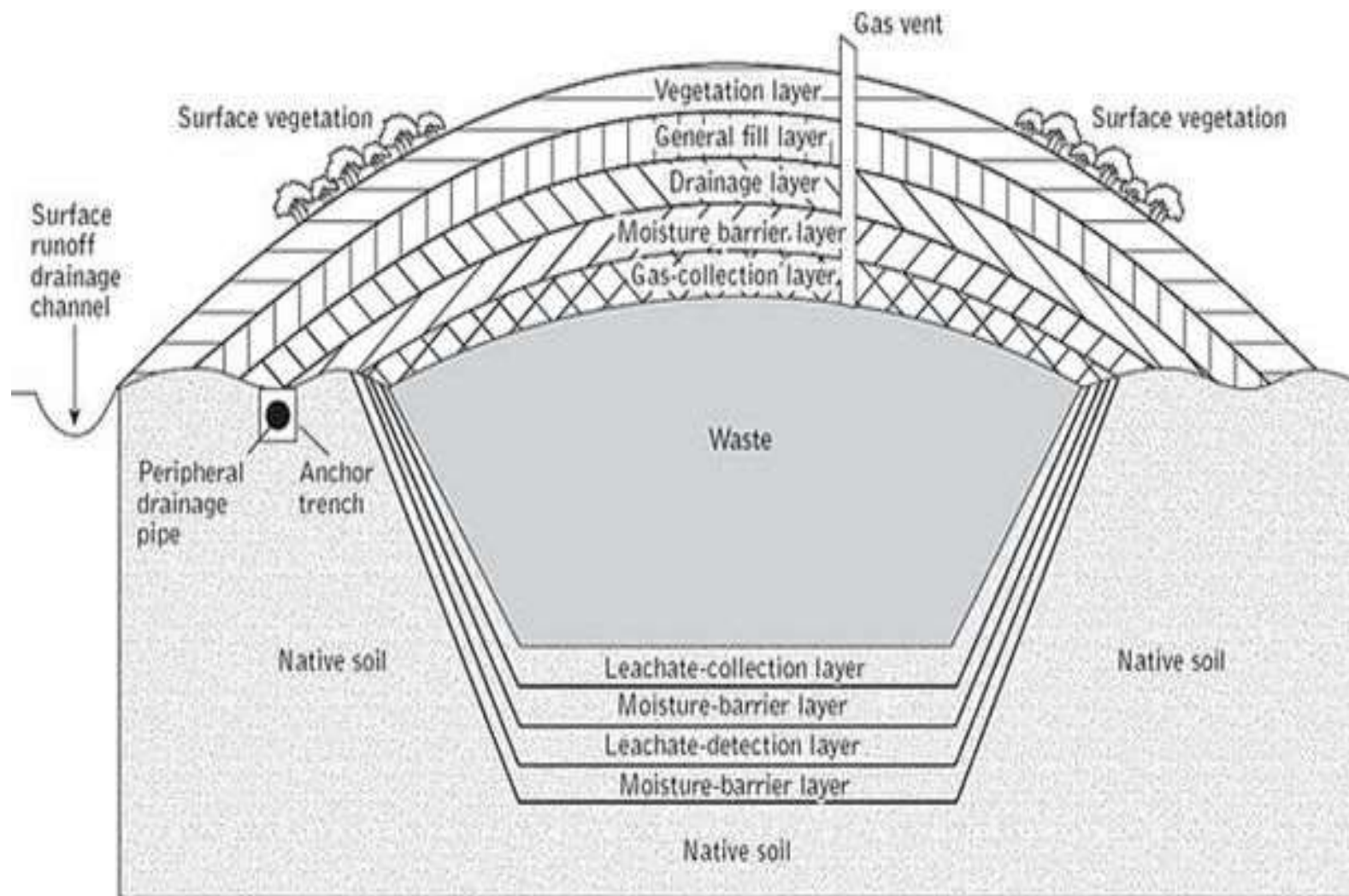
Waste are dumped into earthen trenches and covered with Earth.

Organic matter such as dead and dry leaves and twigs decomposed by worms and insects and finally broken down by bacteria and fungi, to make dark rich soil like material called **compost**.

Most widely used composting is vermicomposting using earthworms.

## **Sanitary landfill:**

- It is designed greatly to reduce or eliminate the risk that waste disposal may pose to the public health and environment quality.
- In sanitary landfill, garbage is spread out in a thin layers.
- It is then covered with mud or clay or plastic and then compacted.
- Next layer of waste is spread on top of it followed by another layer of soil.
- Suitable precaution should be taken so that underground water table is not contaminated.
- When landfill is full it is covered with clay, sand, gravel and top soil to prevent seepage of water.



# Advantages and disadvantages

- Segregation not required.
  - Simple and economical.
  - When landfill is complete , it can be reclaimed, built on or used as parks or farming land.
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- Landfills can pollute water, the air, and also the soil.
  - It can decrease in soil fertility.
  - Improperly constructed landfill can pollute underground water.
  - Landfill can attract animals and insects like rats, mosquitoes, cockroaches, etc.
  - It can also cause sickness in communities.
  - Anaerobic decomposition produces methane, which is a 20 times more dangerous gas than carbon dioxide.



Best option —————→ worst option

Reduce waste

Reuse

Recycle/compost

Incineration

Landfill

# Biomedical Waste management

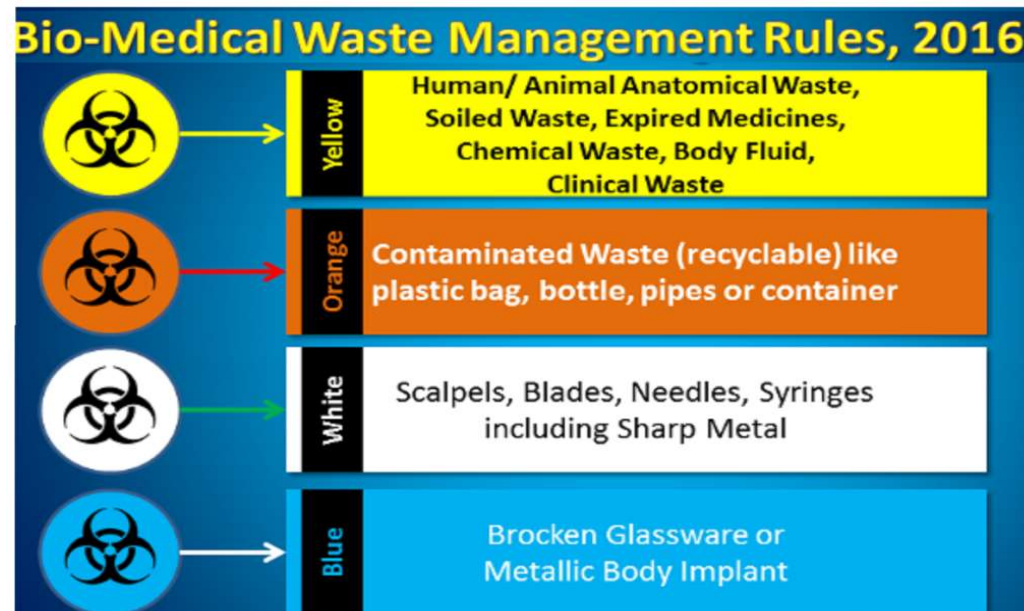
- Biomedical waste is defined as any solid or liquid waste that is generated in the diagnosis, treatment or immunization of human beings or animals.
- Testing of biomedical waste including all type of wastes produced by hospitals, clinics, laboratories and other medical and research facilities
- Examples of biomedical waste includes discarded blood, unwanted microbiological cultures and stocks, identifiable body parts, needles, other human or animal tissue, used bandages and dressings, discarded gloves

## CATEGORIES OF BIO MEDICAL WASTE

OPTION	WASTE CATEGORY	TREATMENT & DISPOSAL
Category No. 1	Human Anatomical Waste	Incineration / deep burial
Category No. 2	Animal Waste	Incineration / deep burial
Category No. 3	Microbiology & Biotechnology Waste	Local autoclaving / microwaving / incineration
Category No. 4	Waste Sharps	Disinfection by chemical treatment / autoclaving / microwaving and mutilation / shredding
Category No. 5	Discarded Medicines and Cytotoxic drugs	Incineration / destruction and drugs disposal in secured landfills
Category No. 6	Solid Waste	Incineration / autoclaving / microwaving
Category No. 7	Solid Waste	Disinfection by chemical treatment / autoclaving / microwaving and mutilation / shredding
Category No. 8	Liquid Waste	Disinfection by chemical treatment and discharge into drains.
Category No. 9	Incineration Ash	Disposal in municipal landfill
Category No. 10	Chemical Waste	Chemical treatment and discharge into drains for liquids and secured land for solids
<i>Source: Bio-medical Waste Management Rules, 1998, Schedule I.</i>		

# Segregation, Packaging, Transportation and Storage

- Biomedical waste shall not be mixed with other waste.
- Waste shall be segregated into containers at the point of generation and container shall be labeled.
- If the container is transported from the premises where biomedical waste is generated to any waste treatment facility outside the premises, the container shall that information.



- No untreated biomedical waste shall be kept stored beyond 48 hours.
- The municipal body of the area shall continue to pick up and transport segregated non biomedical waste generated in the hospitals and nursing homes, as well as duly treated biomedical wastes for disposal at municipal dump site.

**BIOHAZARD SYMBOL**  
जैविक परिसंकट चिन्ह



**BIOHAZARD**  
जैविक परिसंकट



JIPMER

JIPMER Health Initiative Video

# E-Waste and Management

- E-waste is termed as electronic products that have become unwanted, non-working and have essentially reached at the end of their useful life.
- Electronic devices become obsolete due to,  
Advancement in technology  
Change in fashion, style and status  
Nearing the end of their useful life
- India generates an estimated 1.70 million TPA (tonnes per million) of e-waste comprising mobiles, laptops and other electronic devices.

# Causes

- Advancement in technology:
- Increase in population:
- Human mentality:



# Effects of E-waste on health

Sources of e-waste	Constituent	Health effects
Solder in printed circuit boards, glass panels and gasket in computer monitors	Lead	Damage to nervous and blood systems. Kidney damage. Affects brain development.
Relays and switches, printed circuits boards	Mercury	Neural damage. Damage to brain.
Front panel of cathode ray tubes	Barium	Muscle weakness. Damage to heart, liver and skin.
Mother board	Beryllium	Lung cancer, skin disease such as warts.

# Management of e-waste

Steps involved in management of e-waste:

- Collection → Sorting → processing → repairing → recycling → dismantling → components recovery → residual
- Main principle of e-waste management is reduce, reuse and recycle.
- Usually sanitary landfills or incineration is done of residual disposal of e-waste.

# Responsibilities of Government

- Government should set up regulatory agencies.
- Government should provide an adequate system of laws and controls.
- Government should encourage research into development and production of less hazardous equipment.

## Responsibilities and role of industries

- Generators should take responsibilities to determine the output characteristics of wastes.
- All involved person should be properly qualified and trained in handling e-waste in industries.
- Companies should adopt waste minimization techniques.

# Responsibilities of the citizen

- Reuse
- Donating electronic devices to school, non-profit organizations, and lower-income families.
- E-waste should never be disposed with garbage and other house hold wastes.
- E-waste should be collected at a separate site and they should be sent for various processes like Reuse, Recycling and Donating.