BHARATHIDASAN UNIVERSITY

Tiruchirappalli- 620024,
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Programme: M.Sc., Environmental Science

Course Title : Contemporary Environmental issues
Course Code : NMEC01

Unit-III

Environmental Issues Related to Solid Waste Pollution

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MUNICIPAL SOLID WASTE AND MANAGEMENT

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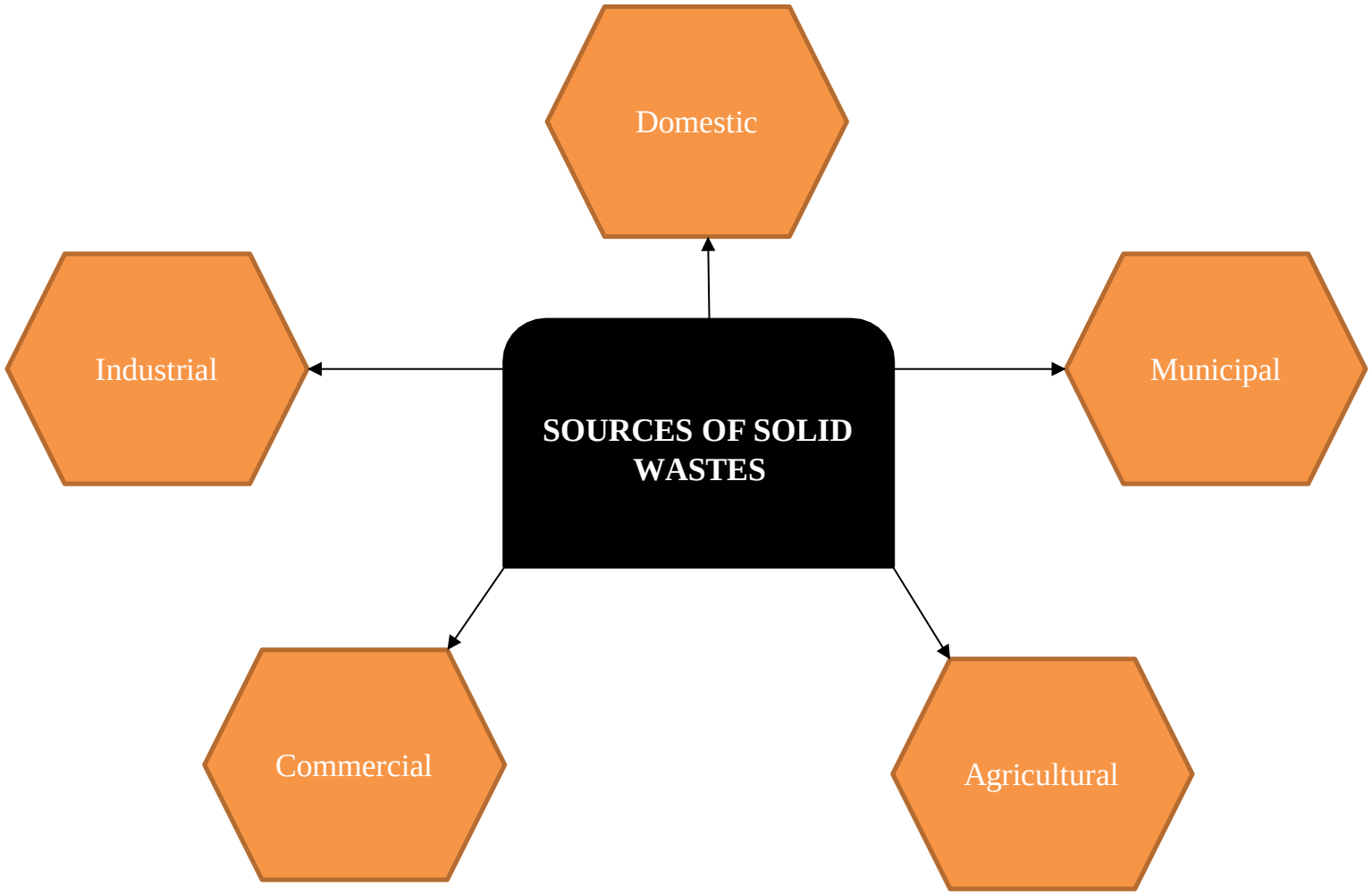
Municipal solid waste:

- Solid wastes other than hazardous and radioactive materials, often called municipal solid waste (MSW), consists of all the solid and semisolid materials discarded by a community.
- The fraction of MSW produced in domestic households is called refuse.
- The components of refuse are garbage or food wastes; rubbish, including glass, tin cans, and paper; and trash, including larger items like tree limbs, old appliances, pallets, and so forth, that are not usually deposited in garbage cans.


Domestic
Industrial
SOURCES OF SOLID WASTES
Municipal
Commercial
Agricultural

Domestic sources:

➢ Residences and homes where people live are some of the major sources of solid waste. The garbage from these places includes food waste, plastics, paper, glass, leather, cardboard, metals, yard waste, ashes, and special wastes like bulky household items such as electronics, tires, batteries, old mattresses, and used oil.

➢ Most homes have garbage bins where they can throw away their solid wastes and later, the bin is emptied by a garbage collecting firm or person for treatment.

Municipal sources:

➢Urban centers also contribute immensely to the solid waste crisis in most countries today. Some of the solid waste brought about by the municipal services include street cleaning, wastes from parks and beaches, wastewater treatment plants, landscaping wastes, and wastes from recreational areas, including sludge.

Agriculture sources:

➢Crop farms, orchards, dairies, vineyards and feedlots are also sources of solid wastes. Among the wastes they produce are agricultural wastes, spoiled food, pesticide containers and other hazardous materials.

Commercial sources:

- Commercial facilities and buildings are yet another sources of solid waste today. Commercial buildings and facilities, in this case, refer to hotels, markets, restaurants, go-downs, stores, and office buildings.
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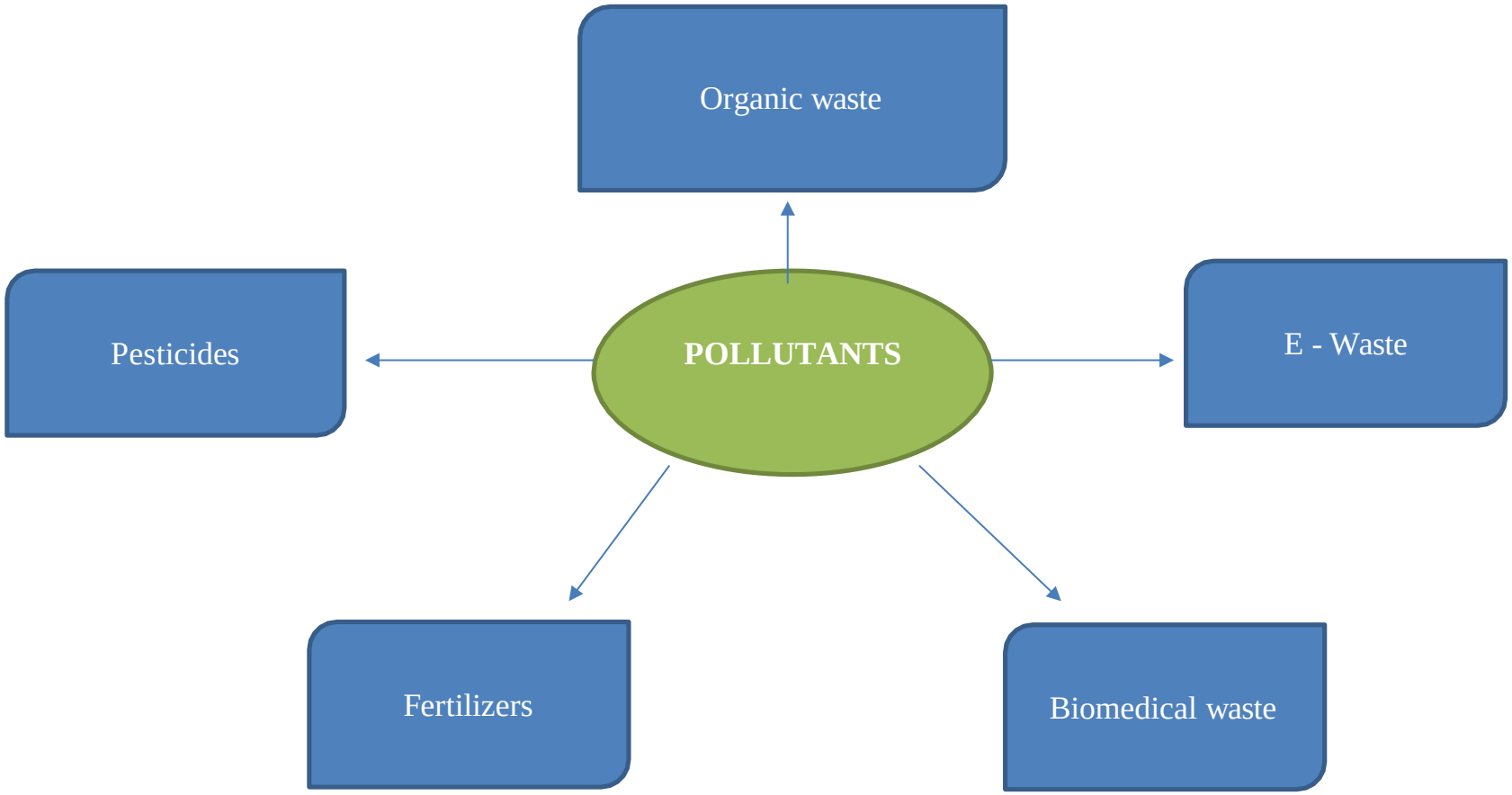
Industrial sources:

- Industries are known to be one of the biggest contributors to solid waste. They include light and heavy manufacturing industries, construction sites, fabrication plants, canning plants, power and chemical plants.
- These industries produce solid waste in the form of housekeeping wastes, food wastes, packaging wastes, ashes, construction and demolition materials, special wastes, medical wastes as well as other hazardous wastes.


Organic waste
Pesticides
POLLUTANTS
E - Waste
Fertilizers
Biomedical waste

Organic Wastes:

- Organic waste is any material that is biodegradable and comes from either a plant or an animal. Biodegradable waste is organic material that can be broken into carbon dioxide, methane, or simple organic molecules.
- Examples of organic waste include green waste, food waste, food-soiled paper, non-hazardous wood waste, green waste, and landscape and pruning waste.

E-wastes:

- Electronic waste is discarded electronic or electrical equipment and devices. Used electronics that are intended for reuse, salvage, resale, disposal, or recycling are also referred to as e-waste. Informal or unorganized processing of e-waste particularly in developing nations can affect human health adversely and also cause pollution of the environment.
- It was announced in March 2021, New Delhi would form an e-waste management park for the safe and scientific disposal of electronic products such as appliances and e-vehicle batteries.

Biomedical wastes:

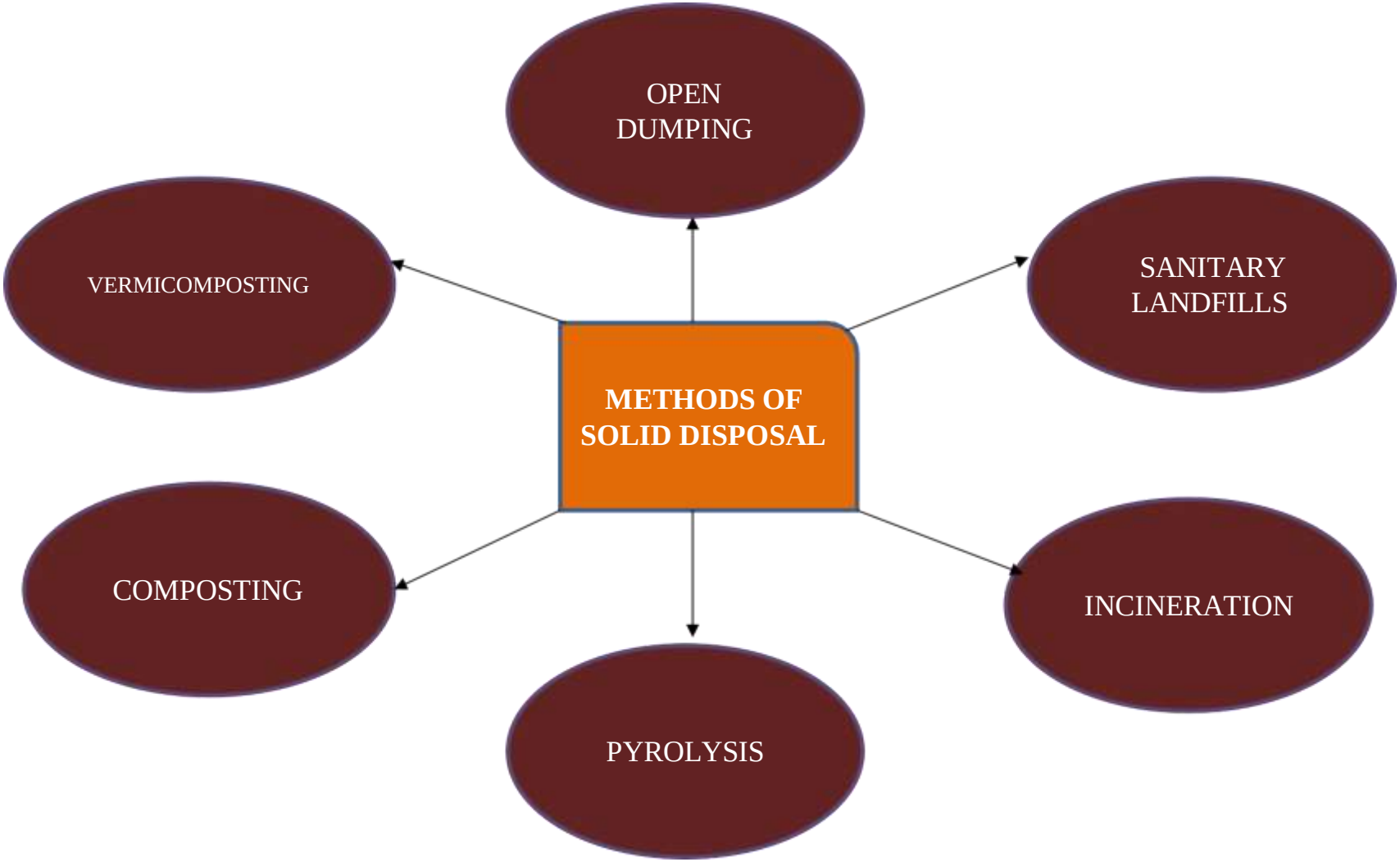
- This refers to hospitals and biomedical equipment and chemical manufacturing firms. In hospitals, there are different types of solid wastes produced.
- Some of these solid wastes include syringes, bandages, used gloves, drugs, paper, plastics, food wastes, and chemicals. All these require proper disposal or else they will cause a huge problem for the environment and the people in these facilities.

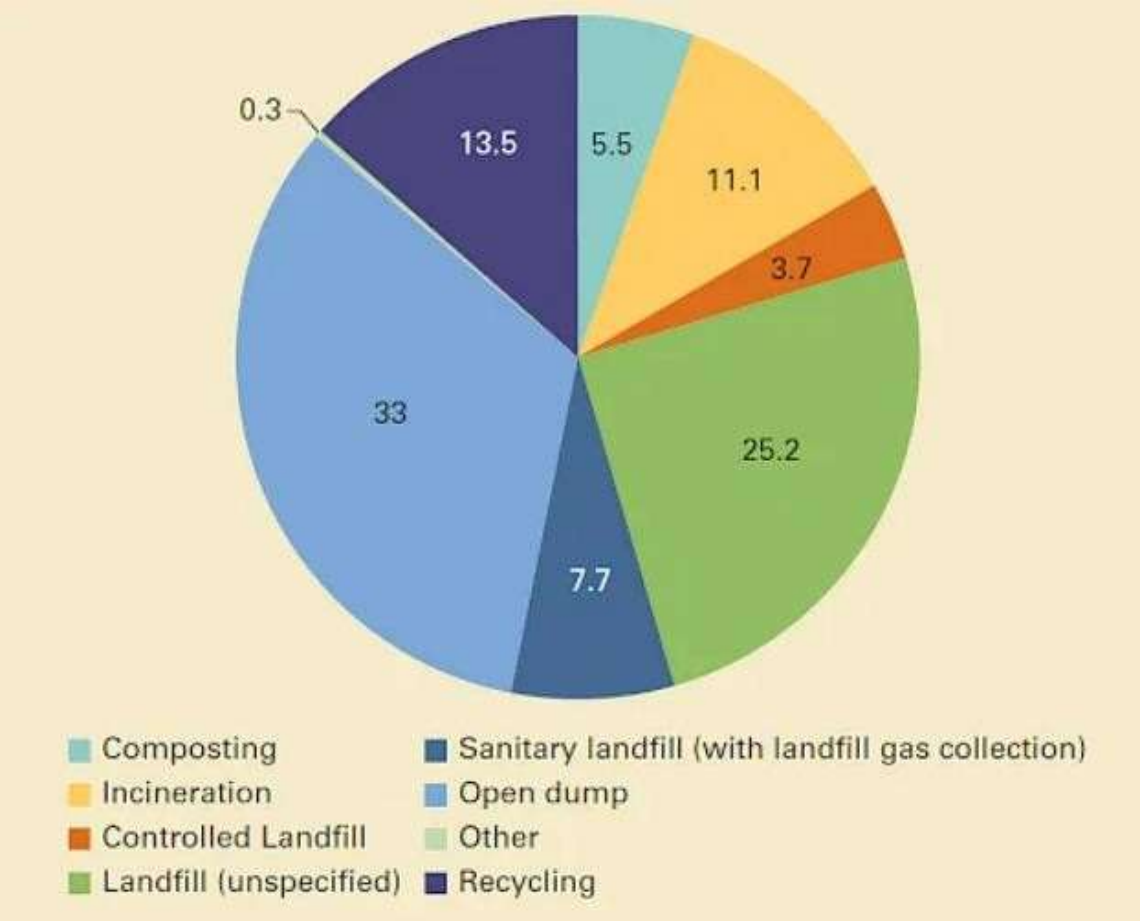
Fertilizers:

- Excess fertilization cause adverse effects to the soil.They alter the soil and may make the soil acidic or alkaline which adversely affects the soil.
- They are non-biodegradable, hence excessive use causes soil pollution.They destroy the life present in the soil.

Pesticide Wastes:

- Management and disposal of pesticide wastes are major problems for greenhouse and nursery producers. Improper handling of these chemicals poses a real threat to the environment, as well as to the health and safety of laborers.
- Excess application or improper disposal of “leftover” mixtures, undiluted chemicals, or even pesticide containers can lead to potential contamination of surface and groundwater.
- However, the risk of a serious incident can be reduced if proper management and disposal techniques are used.


METHODS OF SOLID DISPOSAL
OPEN DUMPING
SANITARY LANDFILLS
INCINERATION
PYROLYSIS
COMPOSTING
VERMICOMPOSTING

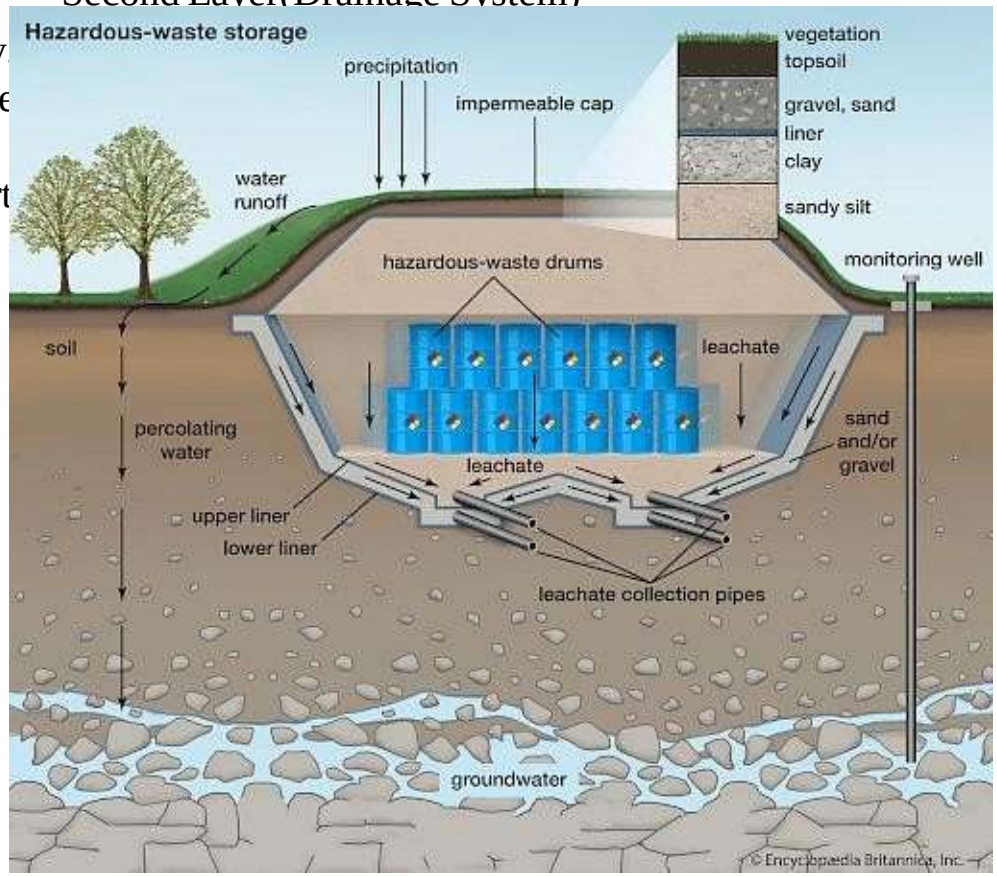

0.3
13.5
5.5
11.1
3.7
33
25.2
7.7
Composting
Incineration
Controlled Landfill
Landfill (unspecified)
Sanitary landfill (with landfill gas collection)
Open dump
Other
Recycling

Open dumping:

- Not a safeguarding idea
- Most remain for an indefinite period of time
- Many potential hazards
- Energy generating factor - CO2 and methane
- Different from sanitary landfill

Sanitary Landfills:

- Protect the quality of groundwater in the vicinity
- A pit with a covered bottom where waste is burie in layers and crushed into a solid mass.
- Bottom half has the least volume and the top part has the largest.
- First Layer (Liner System)
- Second Layer(Drainage System)



Advantages

Excellent Energy Source
Eco-friendly
Cleanliness And Waste Management
Good Storage Facility
Low Cost Option
Pollution Reduction
Employment Generation

Disadvantages

Demands Continuous Maintenance
Consumption of Huge Land
Leachate
Hindering of the City’s Growth

Incineration:

Burning waste in big furnaces at high temperatures.
Landfill reduction approach that reduces trash volume by 95-96 percent.
Hazardous materials must be dug or pumped into containers.
Items are then deposited in an incinerator's combustion chamber
Very high temperature for a specified amount of time

Advantages

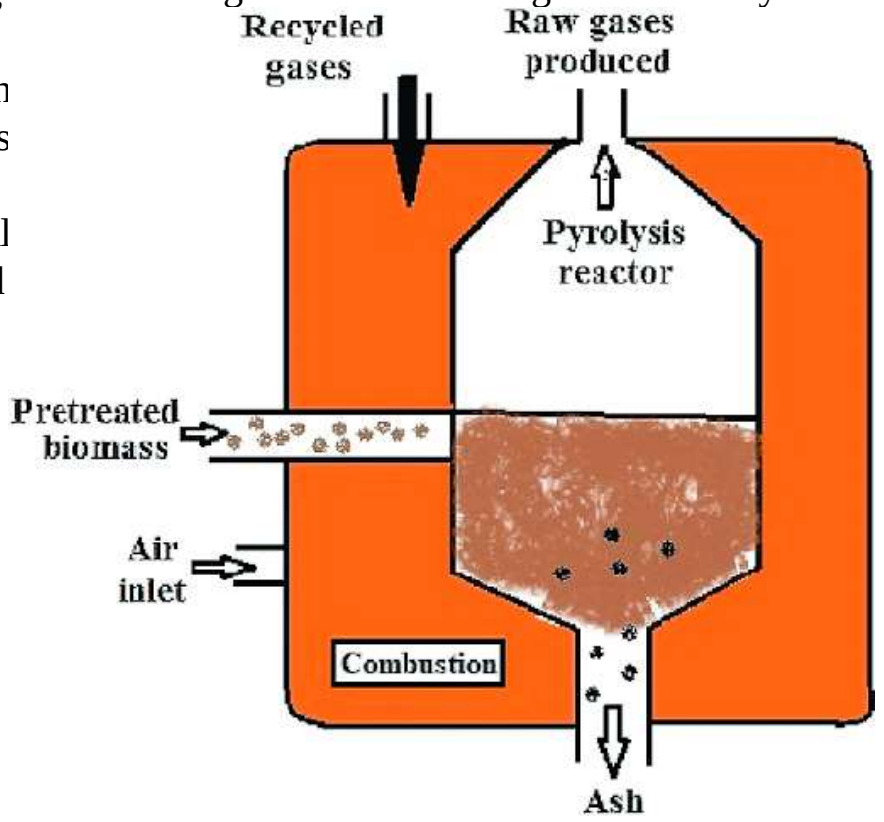
Energy Generation
Pavers Bricks
Fly Ash with Carbon
Activated Carbon
Pollution Reduction
Doesn’t Require Space

Disadvantages

Harming Emissions
Health Issues
Poor Compliance
Air and Water Pollutants
High moisture content and low calorific value

Pyrolysis:

- Mechanical preparation and separation of glass, metals, and inert materials
- Process of exposing compounds to extremely high temperatures in comparatively inert environments in order to speed up their thermal decomposition.
- Conversion of municipal solid wastes, agricultural residues, scrap tyres, non-recyclable plastics, and other non-recyclable materials into clean energy.
- Transforming urban waste into goods that may be



Advantages

Destruction of Pathogens
Reduced Water Volume
Limited Need for Fuel

Disadvantages

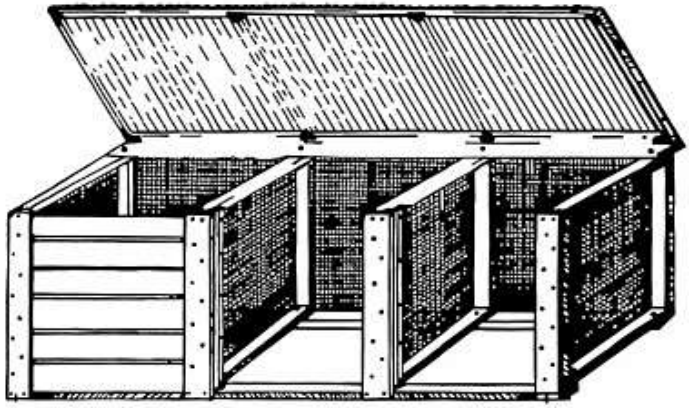
Complication And High Cost
Incomplete Combustion Products
Toxic Molten Salt
Ineffective in Destroying Inorganics

Composting:

- Biological process that allows the organic element of waste to decay under carefully controlled conditions.
- Compost or humus is the name for this stabilized product
- Composting allows for the simultaneous digestion and recycling of waste and sewage sludge
- Composting is projected to become increasingly popular
- Composting goes through three main phases under optimal conditions:
  - **Mesophilic Phase**
  - **Thermophilic Phase**
  - **Maturation Phase**

Composting - Various Methods

- Passive Composting or Piling
- Aerated Static Piles
- Windrows: Windrows are long, narrow piles that are turned when temperature and oxygen requirements dictate.
- Bins
- In-vessel system
- Vermicomposting



Advantages

Reduction in Methane
Reduction in Chemical Fertilizers:
Boosts Crop Yields:
Rehabilitate Soils:
Money Saver:
Improves Moisture Dispersion
Aids Carbon Sequestration

Disadvantages

Availability – suitable distribution systems
Functions of government schemes – lack – administrative complexity
Great volume but low value
Compliance with the government’s requirement to meet the Fertilizer Control Order's quality requirements (FCO)

Vermicomposting:

- Vermicomposting is the scientific method of making compost, by using earthworms.
- They are commonly found living in soil, feeding on biomass and excreting it in a digested form.
- Two methods:
  - **Bed Method:** This is an easy method in which beds of organic matter are prepared.
  - **Pit Method:** In this method, the organic

Collection	Earthworm Casting 	Earthworm can be collected by observing earthworm's casting
Construction of Vermibed and compost pit	 Vermibed	 Compost pit
Separation of earthworms and solid waste	 Vermicompost heap	 Meshing
Packaging	 Packaging and labelling	
Transportation and Marketing	  Green house plant  Plant nurseries  Gardeners	

Process of Vermicomposting

Advantages

Compact size
Nutrient-rich compost
Reduction of waste
Educational opportunity -sustainability and the natural decomposition process

Disadvantages

Initial setup costs
Maintenance requirements
Limited types of waste
Potential for odor
Risk of pests

TNPCB – Annual Report 2021-22:

- https://tnpcb.gov.in/pdf_2022/SWMAnnualRpt2122.pdf

SOLID WASTE Generation status	
Solid waste generation in the state (TPD)	14585.49 TPD
Collected	14470.69 TPD
Treated	7205.57 TPD
Landfilled	6776.31 TPD

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Original Article

A Case Study on Industrial Waste Management of Madurai, India

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Abstract *— Industrial waste contains a diversity of impurities, and therefore, for this reason alone, its treatment constitutes a special task. Furthermore, the emission limits for industrial effluent are constantly being tightened up. Cottage, small and medium scale industries in developing countries account for a large share of employment and, in most cases, production. The recent growth of these classes of industries has been in response to high labour availability and low financial resources in most of these developing countries. Waste Management is the collection, transport, processing or disposal, managing and monitoring of waste materials. The term usually relates to materials produced by human activity, and the process is generally undertaken to reduce their effect on health, the environment or aesthetics. Despite requirements for pollution control measures, these wastes are generally dumped on land or discharged into water bodies without adequate treatment and thus become a large source of environmental pollution and health hazard. Typical Techniques of waste management are Waste*

Therefore, wastes seem to be a by-product of growth. Management of Industrial Waste is not the responsibility of local bodies. Industries generating waste have to manage such waste by themselves and are required to seek authorisations from respective State Pollution Control Boards (SPCBs) under relevant rules. Wastes are unwanted or unusable materials. Waste is any substance that is discarded after primary use, or it is worthless, defective and of no use. The term is often subjective (because what is waste to one need not necessarily be waste to another) and sometimes objectively inaccurate (for example, to send scrap metals to a landfill is to inaccurately classify them as waste because they are recyclable). Industrial waste is the waste produced by industrial activity, which includes any material that is rendered useless during a manufacturing process, such as that of factories, industries, mills, and mining operations. It has existed since the start of the Industrial Revolution. Some examples of industrial wastes are chemical solvents, paints, sandpaper, paper products, industrial by-products,

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- https://prepp.in/news/e-492-open-dumps-disposal-of-solid-waste-environment-notes
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