Waste Management

- Segregation and management of solid waste
- Management of biodegradable waste into energy (biogas and carbon material)
- E-waste and its management

- Waste management is the collection, transport, processing, recycling or disposal and monitoring of waste materials.
- Due to the increased use of natural and artificial materials, the large amount of different types of wastes have been developed and accumulated on the surface of soil.
- The source of wastes are Biomedical, Commercial, Industrial, Agricultural, Municipal, Constructional and Electrical & Electronics devices.
- Waste management includes all of the processes and activities that involve handling waste materials.

- All wastes have the capacity to cause environmental damage if not correctly managed. Thus proper management of wastes should be necessary to protect the environment, public health and quality of life.
- The waste management strategy should be 5R i.e Refuse, Reduce, Reuse, Repair and Recycle.
- Another efficient waste management strategy is reducing waste generation and requiring disposal.
- Waste management is essential due to following benefits.

➢ Protects the environment
➢ Enhances public health
➢ Conserves natural resources
➢ Minimizes greenhouse gas emissions
➢ Creates job opportunities
➢ Increases energy efficiency
➢ Enriches the quality of life

Management of solid wastes

- Solid wastes are commonly called trash or garbage obtained from different field like Domestic, Municipal, construction etc.
- It includes food items, paper, plastic, textiles, leather, wood, glass, metals, sanitary waste and other wastes.
- Solid waste management mainly refers to the collecting, treating and disposing of solid wastes.
- In this process, wastes are collected from different sources and segregate the wastes and finally disposed of.
- Generally, there are 5 ways of solid waste management that is reduce, reuse, recycle, recover and residual management.
- Solid waste management are of four types:-
  a) Land filling b) Recycling c) Incineration d)Compositing

Segregation of solid wastes

- Segregation of solid wastes refers to the process of separation of municipal solid waste into different groups i.e food waste, plastic, glass, metals, organic, inorganic, recyclables and hazardous wastes.
- Waste segregation is the sorting and separation of waste types to facilitate recycling and correct onward disposal.
- Waste segregation is based on the type of wastes and the appropriate treatment and disposal method.
- Waste segregation at source can reduce up to 250 tones of dump from entering into landfills.
- The best way of segregation is to collect different types of waste in different containers at the point of generations such as homes, schools, restaurant and industries.

WASTE COLLECTION

Household Waste — Commercial Waste

WASTE SEGREGATION METHOD

Recyclable

Cans, Milk Bags, Disposable Cups & Plates etc.

Inert Debris

Waste that decomposes like diapers, sanitary napkins etc.

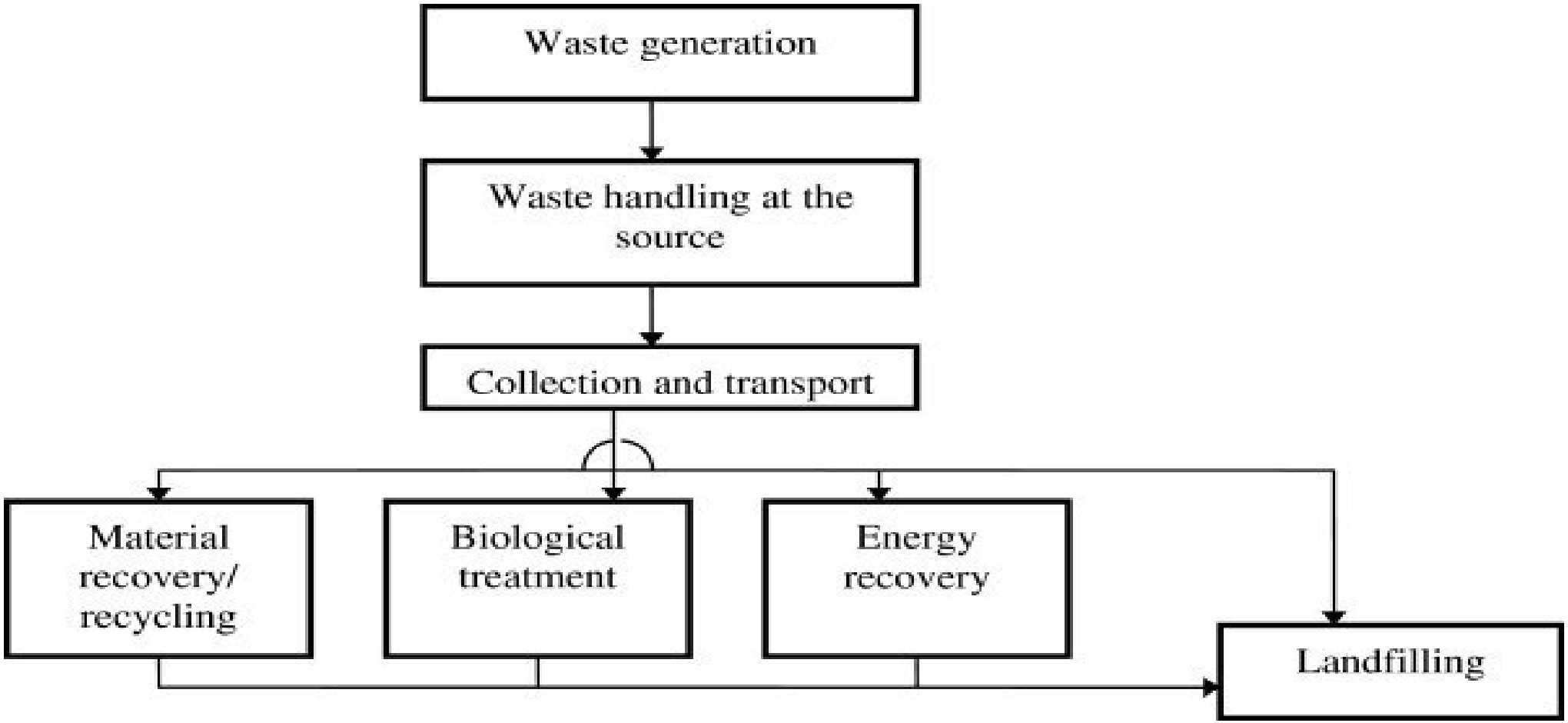
Organic or Kitchen Waste

Hazardous Waste

Paints, batteries, cleaning agents etc.

Management of segregation of solid waste

- The segregated solid wastes should be properly managed by using different methods such as biodegradable wastes should be subjected to Landfill for the generation of biogas and plastic based wastes should be subjected for recycling and reuse.
- The main motif of management of segregation of solid waste are to reduce waste dumped in landfills and reduce air, soil and water pollution and allow different methods of compositing, recycling and incineration to be applied to different types of wastes.


Waste generation
Waste handling at the source
Collection and transport
Material recovery/ recycling
Biological treatment
Energy recovery
Landfilling

Management of biodegradable waste into energy

- Biodegradable wastes are those waste material which are generally produced by plant and animals.
- Biodegradable wastes are food wastes, paper, sewage sludge, slaughterhouse waste, hospital waste and dead animals & plants.
- They are naturally decomposed by bacteria, fungi and abiotic elements like temperature, UV and oxygen.
- Biodegradable waste, also called bio-waste, can be used to produce bio-gas and carbon nanoparticles.
- The bio-waste can be converted into bio-gas with anaerobic digestion or decomposition process which produces large amount of Methane gas and this gas can be used in heating and electricity.

- Bio-waste can be transformed into valuable materials using appropriate treatment method.
- For example, nanomaterials like nanocarbon can be obtained from bio-waste followed by carbonization process.
- Due to high specific surface area, high porosity, good electrical conductivity and chemical stability, nanocarbon has several application in the field of energy storage and energy conversion.

Advantages of management of bio-waste into energy

- Renewable energy generation
- Waste diversion and reduction
- Greenhouse gas emission reduction
- Resource recovery
- Promotes sustainable practices
- Economy benefits


Gas energy
Liquid energy
Compost
Biowaste
Bioflocculant
Organic acid
Biopesticide
Biodegradable plastic
Protein product

E-waste and its Management

- E-waste is one of the fastest growing waste streams in today's world.
- The rapid growth of Electrical & Electronic gadgets ,Information technology and globalization, the demand and uses of E-devices and technology has been increasing. Due to this, large amount of E-waste has been produced.
- E-waste includes batteries, computer parts, wires, all kind of electrical equipment's, remote control device, watches, cellphones, light bulbs, fluorescent light, television parts etc.
- E-waste is much more hazardous than other municipal wastes because electrical gadgets contain different chemicals and metals like lead, mercury, chromium, PVC etc.
- Thus, the long term exposure to these substances damage the nervous system, reproductive system, kidney, bones and endocrine system etc.

- E-waste can be managed by using following methods:-

a. Landfilling
b. Acid bath
c. Incineration
d. Recycling of e-waste
e. Reuse of electronic devices
f. Repair of electronic and electrical parts

Effects of E-waste on Environment and human health

- Toxic chemicals from E-waste enter the “Soil-Crop-Food pathway”.
- Emission from E-waste create environmental damage.
- Acidification of soil
- Emission of toxic gas and fumes
- Chronic damage to the brain
- Damage to heart, brain and spleen
- Affects brain development of child
- Pollution of ground water
- Produce 40% of lead and 75% of cadmium of heavy metals found in landfill.

Advantages of E-waste management

a. Asset recovery(Tokyo Olympic medals)
b. Reduction of need for landfill
c. Resale and reuse
d. Protects human health and environment
e. Reduces business cost
f. Reduction of waste volume
g. Highly toxic substances cab be changed into less toxic substances
h. Reduction of emission of GHG