Chapter-5

Solid waste: Generation and Management

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Topics to be covered

- Definition and Important terms.
- Types and Sources of Solid Wastes.
- Generation rates of Solid waste.
- Causes of Solid waste pollution.
- Effects of Solid waste Pollution.
- Solid waste management.

Definition:-

- **Garbage:-** All types of putrescible organic wastes obtained from kitchen, hotels, restaurants in from of waste food etc., in from of waste food articles, peeling of vegetables, fruits etc. It also includes animal dung, grass and leaves etc.
- **Rubbish:**- All non putrescible wastes except ashes are known as rubbish. It includes rags paper pieces of glass, paper packets, glass and plastic bottles, broken crockery etc.
- **Ashes:-** Ashes are incombustible waste products obtained from, industries, hearth and furnaces.
- **Putrefaction**:- Microbial decomposition of organic matter accompanied by odour is called putrefaction.
- **Leachate:**- Liquid that has travelled through solid waste or other medium and has extracted, dissolved or suspended materials from it is called leachate.

Types and Sources of Solid waste:

- **Municipal waste**:-Municipal waste are those waste which arise from house hold activities, public places, restaurants, institution markets street-sweeping etc.

- **Industrial wastes**:- Industrial wastes are that waste which arises from industrial activities. It typically includes rubbishes, ashes demolition and construction waste, special waste and hazardous waste.

Types and Sources of Solid waste:

- **Hazardous waste:-** Wastes that poses a substantial danger immediately or over a period of time to human animal or plant life are called hazardous wastes.

Causes of Solid waste pollution

1. Over population:- As the number of people producing pollutant increase, pollution will naturally increase. Same is true for solid waste pollution too. Solid waste pollution increase with increase in population.

2. Technology:- rapidly growing technology fro most economic goods indicates a shift in technology from the returnable packaging to non-returnable packaging.

Causes of Solid waste pollution

3. Urbanization:- Solid waste is preliminary as urban problem, though not exclusively urban. Solid waste pollution increases with increase in urbanization.

4. Affluence:- With increase in the affluences there is a tendency to declare items as being in or out fashion and promptly throw away the ones which are out of fashion. This results in solid waste pollution

Effects of solid waste pollution:-

- Transmission of many disease due to flies breed on the refuse/solid waste dumps.
- Rats flourishing upon the solid wastes may also cause the diseases.
- Improper disposal can cause contamination of crops and water supply.
- Obnoxious order arising from decomposing solid waste can call air pollution and causing problems in the surrounding areas.
- Solid waste dump also creates aesthetically unpleasing surrounding environment.

Solid Waste Management

- The solid waste management has the following components:
- Identification of waste and its minimization at the source
- Collection, segregation and storage at the site of collection
- Transportation
- Treatment
- Energy recovery
- Disposal

Collection of Solid waste:-

- **Kerbside collection:** The house owner is responsible for placing the solid waste containers at the curb on the scheduled day. The workmen come, collect and empty the container and put back at the curb. The house owner is required to take back the empty containers from the curb to his house.
- **Block collection**:- Individuals bring the waste in containers and hand it over to the collection staff who empties it into the waiting vehicles and the return the container to the individuals**.**
- **Community Storage point:-**The solid waste is taken to a fixed storage bins and stored till the waste storage agency collect it as per the schedule of the collection**.**

Processing of Solid Waste

- Processing techniques are used in solid waste management systems to (1) improve the efficiency of solid-Waste disposal systems (2) To recover Resources and (3) To prepare materials for the recovery of conversion products and energy.

Disposal of Solid waste:-

- Disposal on or in the earth's mantle is, at present the only viable method for long-term handling:
- (1) Solid Wastes that are collected and are of no further use,
- (2) The residual matter remaining after solid wastes have been processed,
- (3) The residual matter remaining after the recovery of conversion products and energy has been accomplished.
- Landfilling is the method of disposal used most commonly for municipal wastes; land farming and deep-well injection have been used for industrial wastes. Although incineration is often considered a disposal method, it is in reality, a processing method.

Disposal of Solid waste:-

1. open dumping
2. Sanitary Land filling
3. Incineration
4. Composting
5. Pyrolysis

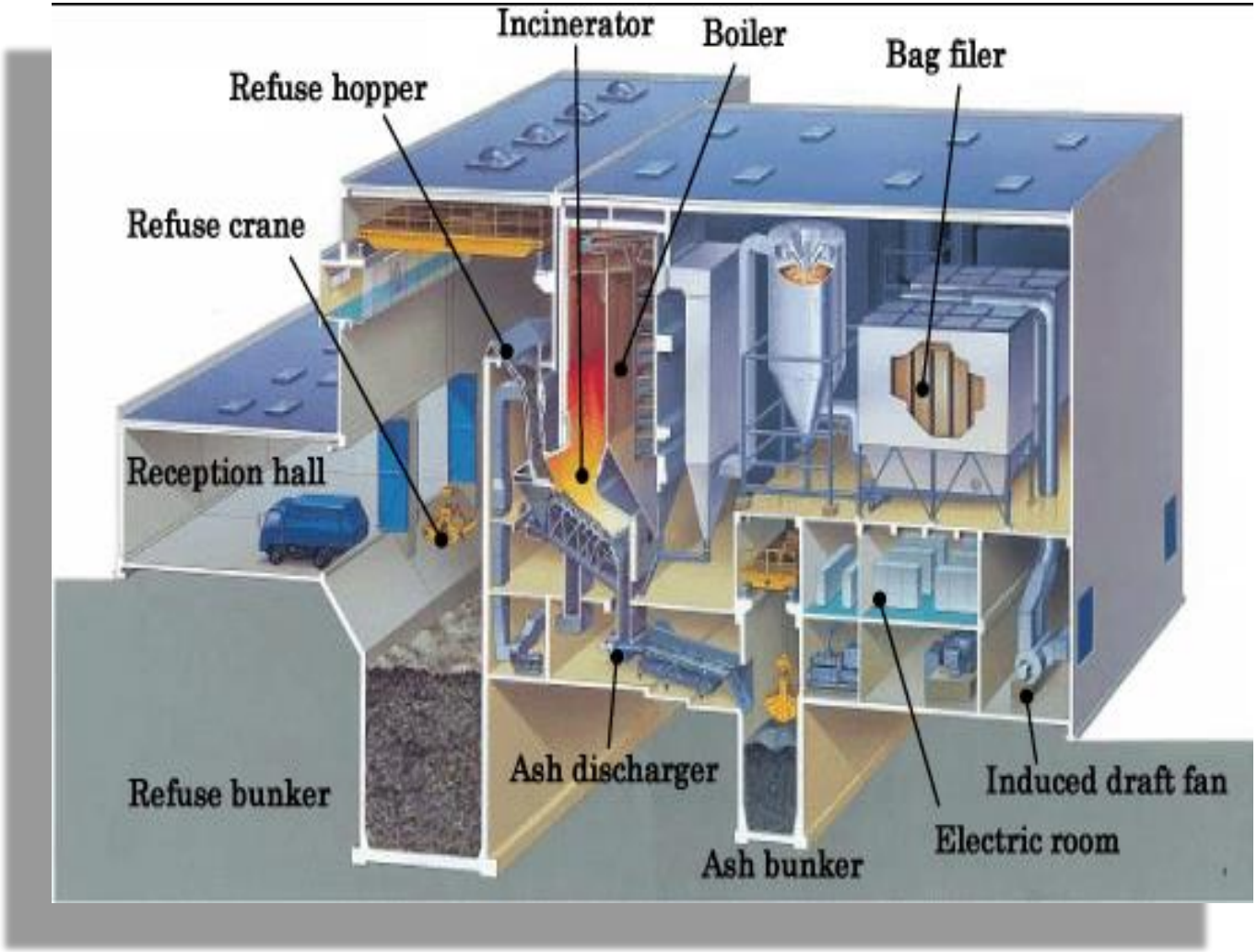
- **Open dumping**:- In this method the solid waste is dumped in to low lying areas and outskirts of the cities. Being relative cheaper.

Disposal of Solid waste:-

- **Sanitary landfill**:- in this method the solid waste is disposed or dumped either in naturally available low lying area or digging tranches or in open areas under an engineered operation, design and operated according to the acceptable standards not causing any nuisance or hazard to the public health or safety.

Disposal of Solid waste:-

- Incineration:-



Disposal of Solid waste:-

- Incineration can be defined as a controlled combustion process for burning solid, liquid and gaseous combustible wastes to gases and residue containing non combustible material.
- Incinerators are used for the process of incineration. Following important points should be observed carefully during incineration.
- Charging of solid waste should be continuous.

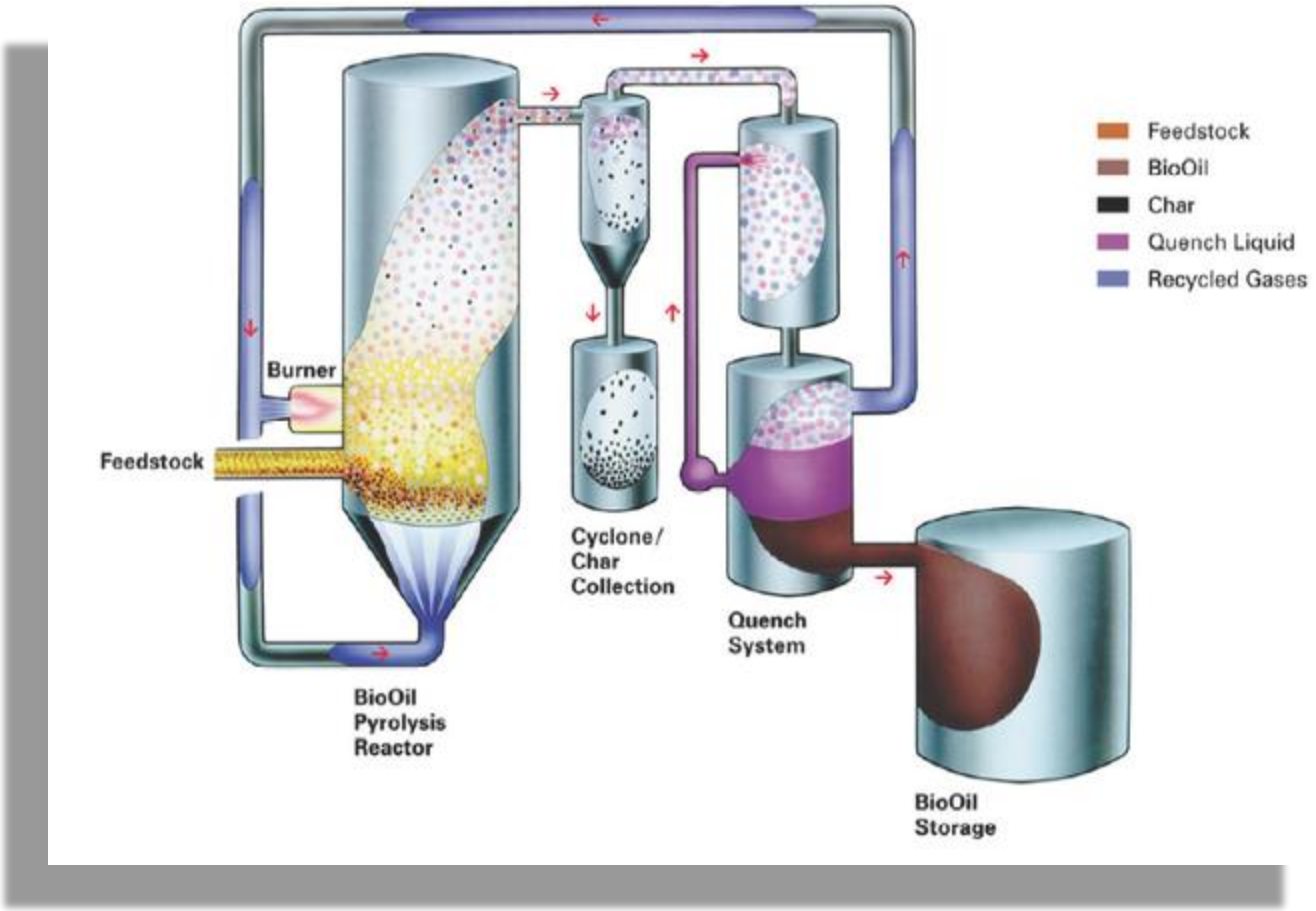
Disposal of Solid waste:-

- Composting as defined earlier is a process in which organic matter of the solid waste is decomposed and converted to humus and stable mineral compounds. The end product of composting process is called compost which is rich fertilizer.
- There are three methods of composting:
- (1) Composting by Trenching
- (2) Open window composting
- (3) Mechanical Composting

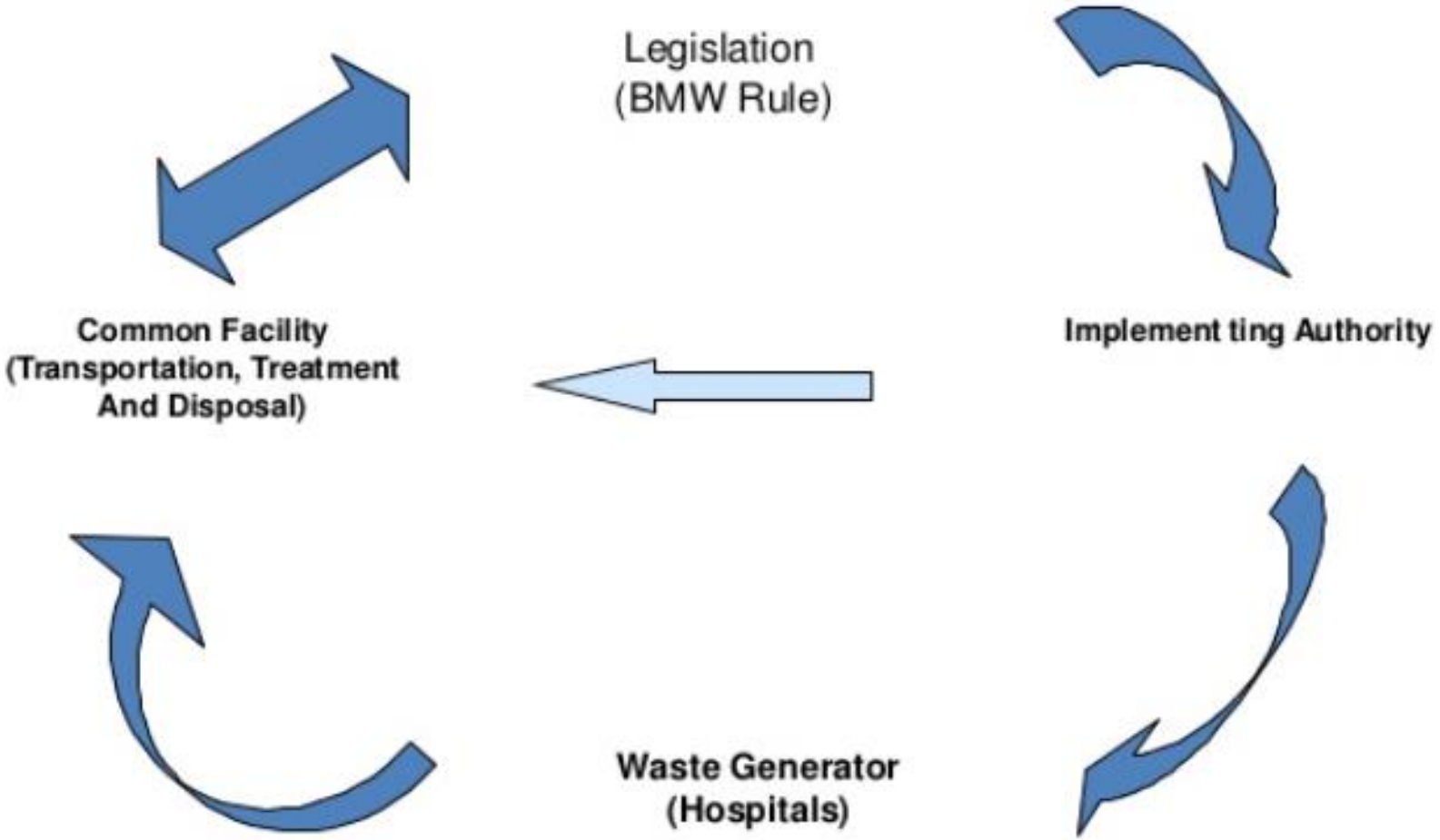
Disposal of Solid waste:-

- **Pyrolysis:**
- It is defined as heating the solid waste at very high temperature in absence of air.
- Pyrolysis is carried out at a temperature between 500 ^{0} C to 1000 ^{0}C to produce three component streams.
- Gas: It is a mixture of combustible gases such as hydrogen, carbon dioxide, methane, carbon mono-oxide and some hydrocarbons.
- Liquid: It contains tar, pitch, light oil, and low boiling organic chemicals like acetic acid, acetone, methanol etc.
- Char: It consists of elemental carbon along with inert material in the waste feed.
- The char liquid and gases have high calorific values.
- It has been observed that even after supplying the heat necessary for pyrolysis, certain amount of excess heat still remains which can be commercially exploited.

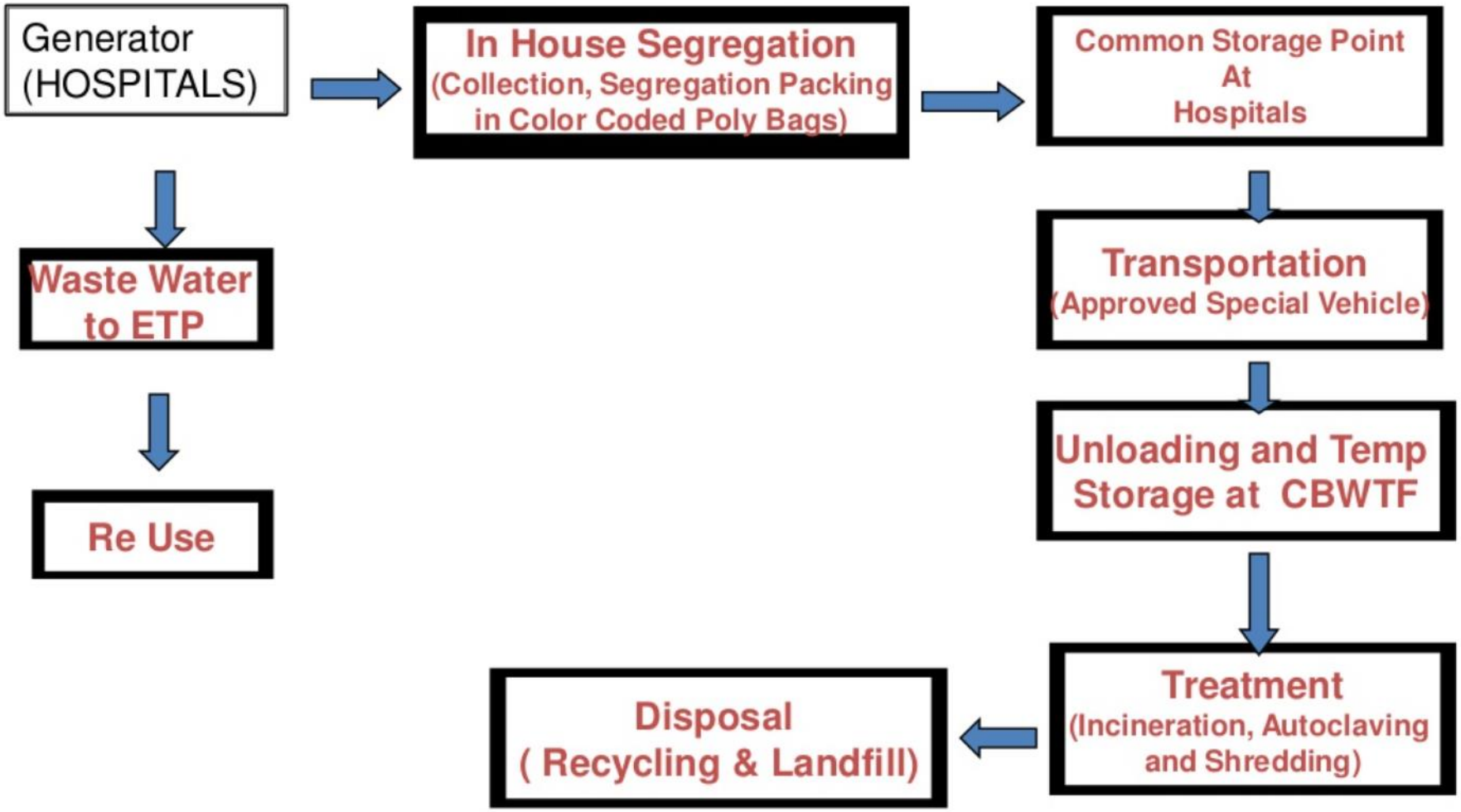
Disposal of Solid waste:-



Bio-Medical Waste Disposal Cycle



Bio-Medical Waste Flow Chart



COLOR	WASTE	TREAT
Yellow	Human & Animal anatomical waste / Micro-biology waste and soiled cotton/dressings/linen/beddings etc.	Incineration/DB/
Red	Tubings, Catheters, IV sets.	Autocl/microwav /chemical treatment
Blue / White	Waste sharps (Needles, Syringes, Scalpels, blades etc.)	Autocl/microwav /chemical treatment/destr uction/shredding
Black	Discarded medicines/cytotoxic drugs, Incineration ash, Chemical waste.	Disposal in land fields