

Solid Waste Management

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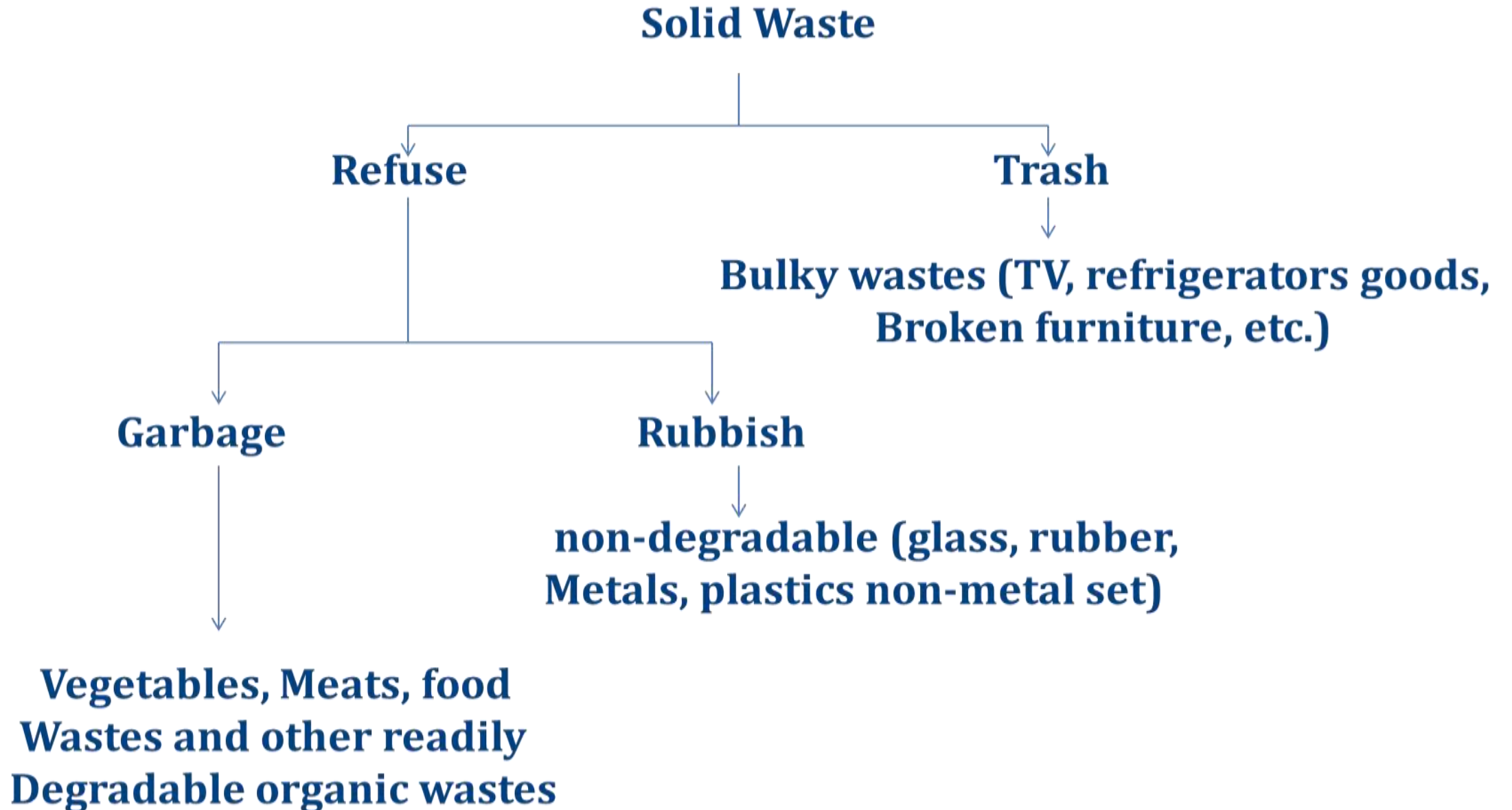
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Solid Waste

- ❖ **Solid or semi-solid materials come as waste from** domestic area, commercial place, institution, agriculture sector, hospitals, laboratory, construction area, dairy, fishery, different Industries etc. are known as Solid waste.
- ▶ **Municipal Solid wastes:** Household garbage, rubbish, construction & packaging materials, trade refuges etc. are managed by any municipality.
- ▶ **Bio-medical wastes:** Containers, products generated during diagnosis, treatment & research activities of medical sciences.
- ▶ **Industrial wastes:** Materials used in manufacturing & processing units of various industries like chemical, petroleum, coal, metal gas, sanitary & paper etc.
- ▶ **Agricultural wastes:** Wastes generated from farming activities. These substances are mostly biodegradable.
- ▶ **Fishery wastes:** Wastes generated due to fishery activities.
- ▶ **E-wastes:** Electronic wastes generated from any modern establishments e.g., from discarded electrical or electronic devices such as wires, circuits, mobile, computers etc.

Structure of Solid Waste



Consequences of solid waste

- Exposure to hazardous waste can affect human health, children being more vulnerable to these pollutants; diarrhea, plague, cholera etc..
- Improperly operated plants cause air pollution and improperly managed and designed landfills attract all types of insects that spread disease.
- Direct handling of solid waste results in chronic diseases with the waste workers.

How solid waste affected us in recent years?

In Mumbai (2005) blocked the **sewage line** due to large no. of plastic bags.

Blast in the Bhusan Steel factory at Noida, caused due to imported scrap from Iran

Reduction in the number of migratory birds due to consumption of contaminated foods

Animals dying on streets and farmland due to consumption of plastic bags, which blocks the food movement in their stomach

Objectives of Solid waste Management

- To minimize the adverse effects caused by solid wastes
- To reduce wastes at the source point
- To REDUCE, REUSE and RECYCLE
- Once the problem intensifies, it becomes too difficult to rectify.

Stages of Waste Treatment Methods

- Collection
- Transportation
- Sorting
- Treatment
- Disposal



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Collection

- ❑ Waste is collected from storage bins (capacity 100 – 500 liters) which are placed at intervals of 50 – 200m.
- ❑ Usually waste is collected daily as organic wastes tend to decompose.
- ❑ Vehicles are used to collect the solid waste and transport them to the required location.



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Transportation

- ❑ Various types of vehicles are used for transport of waste materials.
- ❑ There will be collection centers for receiving the waste from the individual vehicles.
- ❑ The waste will then be sorted out and sent to the disposal site.



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Sorting

- ❑ The waste before being taken to the disposal site must be sorted.
- ❑ All those which can be recycled will be sent for recycling.
- ❑ Depending on the type of waste present, they will be sorted out and sent to the respective centers for processing or disposal.



Solid-waste treatment and disposal

Once collected, municipal solid waste may be treated in order to reduce the total volume and weight of material that requires final disposal. Treatment changes the form of the waste and makes it easier to handle. It can also serve to recover certain materials, as well as heat energy, for recycling or reuse.

Disposal Methods

Open dumping

- ❑ Wastes are usually taken to a spot in the outskirts and dumped in an open area.
- ❑ This causes many environmental problems and health issues.
- ❑ Indiscriminate open dumping leads to bad odour due to the decay of organic matter, air and water pollution, spreading of infectious diseases, etc.



Disposal Methods

Landfill

- It is the **most traditional method** of waste disposal.
- Waste is directly dumped into empty **pits, mining voids or borrow pits**.
- Disposed waste is compacted or compressed and covered with soil
- Gases generated by the decomposing waste materials are often burnt to **generate power** e.g., Methane production from cow dung.
- It is generally used for **domestic waste**.



Modern municipal landfill is called “ Sanitary landfill”

- ❑ It is selected in a suitable site with minimum impact on the environment. They are specially designed and carefully supervised. Mostly they do not contain hazardous waste.
- ❑ Sanitary landfills are sites where waste is isolated from the environment until it is safe. It is considered when it has completely degraded biologically, chemically and physically. In high-income countries, the level of isolation achieved may be high.
- ❑ Sanitary landfills work by layering waste and soil in a large hole in the ground that is lined with plastic and clay. The waste is allowed to decompose and the linings help prevent contamination. When **landfills** are full, they are often capped and transformed into parks or natural areas.



Disposal Methods

Composting

- This involves aerobic decomposition of organic constituents of wastes under controlled conditions.
- The organic matter is converted into a solid compound called **compost**.
- For successful completion, the water content in the waste should be around 40 – 60%.
- The waste is placed in a trench or in a mound called the **windrows**.
- It is stirred regularly to ensure air circulation.
- Bacteria decompose organic matter and liberate CO₂ which raises the temperature of the mixture to about 45 – 60 °C.

Disposal Methods

Incineration

- Incineration is a waste treatment process that involves the combustion of solid waste at **1000°C**.
- It is a process of burning the most combustible wastes to yield mineralized products.
- Waste materials are converted into ash, flue gas, and heat.
- Organic and biological materials are combusted to get CO₂ and H₂O.
- The ash is mostly formed by the **inorganic** constituents of the waste and gases due to **organic waste**.
- The heat generated by incineration is used to generate electric power.

3R Principle

- **REDUCE**
 - You can help by *RECYCLING* 1/3 of all garbage is packaging.
 - Buy things that are in packages that can be recycled or are made of recycled materials.
 - When you buy something small, say no thanks to a bag.
- **REUSE**
 - Many things can be reused before you throw them out.
 - Use coffee cans and cottage cheese containers for storage
 - Use backs of paper or backs of used envelopes for jotting notes
 - Put leftovers in resalable containers instead of using wraps and foil
 - Use old clothes as rags for cleaning instead of paper towels
 - Have a garage sale or donate clothes, books or toys that you don't use anymore
- **RECYCLE**
 - Each year we use:
 - 25 billion plastic containers
 - 30 billion bottles & jars
 - 65 billion aluminum cans
 - 100 billion pounds of paper