SOLID WASTE MANAGEMENT

At all levels of development human being produce certain wastes. These may comprise of kitchen wastes, ashes from fire, broken utensils, agricultural residues to industrial wastes.

Solid wastes is the term used to describe non liquid waste material arising from domestic, commercial, industrial, agriculture, mining activities and form the public service.

Source of Solid Wastes

- **Waste Arising from Homes:** Also called as domestic waste. It contains biodegradable substance like vegetable and fruit peels, flesh, bones, spoiled food, egg shells, etc.

  It may also include non biodegradable substances like Crockery, metals, Tin can, Aluminum cans glass bottles, etc.
- **Waste Arising from Agricultural Farms:** These may include the crop residue, manures, straw, husk of wheat, paddy, litter, coconut fibers, etc.
- **Waste Arising from Construction / Demolition :** While demolishing or constructing a lot of debris, concrete, wood etc is generated.
- **Waste Arising from Local Shops:** These consist of waste paper, cans, bottles, packaging material, polythene bags, etc.
- **Wastes from Industries:** These may include substances like chemicals, toxic and heavy metals, chemicals, paints, etc.
- **Wastes from Hospitals:** Also called as biomedical wastes. It may consist of surgical dressing, amputated body parts, unborn foetus, disposed syringes, etc.
- **Wastes from Radioactive Substances:** It is also called as 'hazardous wastes'. It may include waste form nuclear power plants, explosive chemicals, etc.

Cause of Solid Waste Pollution

Certain main causes for rapid and excessive generation of solid wastes are:

- **Overpopulation:** As the people living in an area increase, the goods and resources used by them show an increase in generation of solid wastes.
- **Affluence:** With increasing in buying power, people buy more things, discard old things at a rapid pace resulting in generation of more wastes.
- **Technology:** With increasing technology and industrialisation more products are being made packed and sold leading to excessive generation of solid wastes.

Effects of Solid Wastes

Certain major effects of solid waste generation are:

- Health Hazards: The accumulation of solid wastes result in various health hazards. Heaps of solid wastes are kept on the nooks and corners of road. People clean their homes and throw wastes on roads. This dumping results in decomposition of biodegradable wastes in unhygienic conditions, leading to foul smell and transmission of diseases. Variety of diseases like typhoid, cholera, dysentery, jaundice, plague, salmonellosis are caused due to heaps of solid wastes.
- Solid wastes thrown on roads and backlanes can also choke the sewerage pipes resulting in choking of water. It can result in breeding of mosquitoes thus increase the danger of malaria and dengue.

- Garbage collected on roadside, may allow the leachate to percolate in underground aquifers thus contaminating the underground water.
- Heaps of collected garbage on roads may attract a variety of stray animals and predator birds to invade, resulting in loss of aesthetic value and accidents.
- Hazardous wastes collected may concentrate and travel up in food chains may accumulate in body parts of higher organisms thus making these food laden with hazardous wastes unfit for human consumption.
- Health risk concern is a big issue associated with workers working in this field, they need to be protected from skin contact with waste.
- Improper disposal of solid wastes can also result in deaths of humans and animals through contamination of crops or water supplies.

Control Measures of Urban and Industrial Solid Wastes

To solve the problem of solid waste pollution various methods have been developed. Some of them are:

- By minimum generation of solid wastes.
- Recycle the solid wastes wherever possible. For example: paper, plastics, metals can be used after recycling.
- Public awareness should be created through seminars, NGO's and teaching students. Media can play a big role in creating this awareness.
- Segregation of solid waste into 'biodegradable' and 'non biodegradable'.
- By enforcing strict laws to throw solid wastes on roads.
- By incorporating various methods of solid waste disposal.

Certain Methods of Solid Waste Disposal are as follows:

1 **Sanitary Landfill Disposal:** Land disposal or more accurately, the burying of wastes, is the only approved method of disposal which is performed at single site.

Sanitary landfills can be defined very simply as the use of solid wastes for land reclamation, by filling the land to the original level, of man made dereliction such as disused surface minerals excavation.

In landfills engineering techniques are used to control the manner in which wastes are deposited so as to pose minimum threat to environment and public health.

- Landfills have liners to avoids the ground water contamination
- The wastes are deposited and levelled in layers not exceeding 2 meters in thickness.
- The whole of surface of each layer of wastes is covered with soil or other suitable material to a depth of 15-25 cm, on the same day as the wastes are delivered on site and repeated till the excavated site is filled.
- Covering the wastes serve several purpose, it protects the attack of flies, rats, rodents, odorous smells are avoided and also heat, from decomposition of organic matter is retained resulting in destruction of flies, larvae and pathogenic organisms in the wastes.
- While decomposition of solid wastes gases mainly carbon monoxide, carbon dioxide, methane, hydrogen sulphide are emitted which can be harnessed as a renewable source of energy.

This method does not cause environmental damage by causing health problems as the solid wastes are covered and prevents breeding of pests. Air pollution can be controlled and even the underground water pollution can be checked, by lining the bottom of excavated site by liners or plastic membranes.

2 **Incineration:** Incineration is a method of solid waste disposal that helps in volume reduction. Burning solid waste at a high temperature reduces waste volume and generates electricity. In incineration, waste reduces by upto 90% in volume and 75% in weight. It is valuable if space in limited.

In incineration highly combustible wastes like paper, rubber, plastics, carbons are burned at a very high temperature of more than 670°c to incinerate all the organic mater and oxidise the foul smelling gases produced. Ashes produced are useful material in road construction. Incineration breaks down some hazardous, non metallic organic wastes are destroys bacteria and virus.

3. **Composting:** Composting involves the biological stabilisation of solid matter either under aerobic or anaerobic conditions into organic material compost or humus, which shows beneficial values for plants.

Composting results in volume reduction of solid wastes. In this method a compost pile is constructed by making alternate layers of organic matter and soil which acts as a source of micro-organisms. Some water and fertilizer is periodically added to compost pile to stimulate the microbial activity and retain the moisture.

The refuse is often turned over to allow aeration, to allow oxygen entry to all parts to promote aerobic decomposition.

This method is best suited for developing countries like India as it solves problems of disposal of solid wastes, disposal of night soil and production of manure for crops.

4. **Pulverisation:** This is one of the most expensive method of waste disposal. In this method solid waste is converted into powdery form by grinding thus helps in volume reduction of solid wastes. This powdered form obtained can be used for land filling the excavated sites and land levelling.

5. **Pyrolysis:** In this method solid wastes are heated under anaerobic conditions that is absence of air. In this method, destructive distillation of solid wastes is done in a chamber known as pyrolysis reactor at a temperature of 650-1000°C in absence of air.

The end products obtained after destructive distillation of solid wastes are CO, CO_2, CH_4, tar, etc. and is a endothermic process.