

SOLID WASTE

Solid waste refers to the range of garbage materials arising from animal and human activities that are discarded as unwanted and useless. Depending on the source and composition solid wastes can be categorized in several groups –a) municipal solid waste b) domestic or residential wastes c) commercial wastes d) industrial wastes e) agricultural wastes f) pathological or biomedical wastes g) radioactive wastes.

SOLID WASTE MANAGEMENT

The scientific, disciplined and effective process of disposal of solid wastes is known as solid waste management. Following steps are included in solid waste management ---

- Collection
- Storage
- Transportation
- Recycling
- Treatment
- Disposal

In most places door to door collection of solid wastes is organized. Biodegradable and non-biodegradable wastes can be collected in separate containers. Collected garbage is stored locally, for a short period of time and then transported to recycling unit. In recycling unit solid wastes are separated into biodegradable and non-biodegradable wastes. The biodegradable wastes are used in compost pit to produce fertilizer. Non-biodegradable non-toxic wastes are recycled to make new products. Before disposal, solid wastes are treated in order to reduce the total volume and weight of the waste. The wastes are pulverized or compacted by high pressure and baling for volume reduction is done. The ultimate waste can be disposed in several ways.

Common ways of disposal of solid waste are –

- Open dump
- Land fill
- Incineration
- Composting

Land fill --- Land-fills are sites designed to store wastes and minimize the effects of the wastes on human health and environment. An ideal site for land-fill should lie above ground water table. Modern land-fills are completely sealed. For this purpose the ground is lined with clay, a thin layer of flexible plastic is placed on clay. A drainage system is provided for collection of leachate. The waste material is placed in the lower part of the pit and spread homogenously in a layer of about 0.5m. This structure is generally called a cell. After several cell formation, the final cell is covered with soil of about 1m. height and again compacted.

Incineration --- It is the combustion solid waste in a specialized furnace under suitable temperature and other conditions. In incineration waste materials are converted to fly ash, ash, gases and heat. Some commonly used incinerators are – rotary kiln, open pit incinerator, controlled air incinerator.

Advantages of incineration ---

1. The energy generated in incineration can be utilized for many purposes, like space heating, steam generation etc.
2. Volume of waste can be reduced by 90% and weight is reduced by about 75%.

Disadvantages of incineration ---

1. Fly ash, toxic gases which are produced as a result of combustion cause air pollution.
2. Disposal of ash under the soil can contaminate ground water.

Composting--- It is a biological process in which the organic part of solid waste is allowed to decompose under carefully controlled conditions. Biological process involving composting includes three phases --- mesophilic phase, thermophilic phase and cooling and maturation phase. Composting can be done either by open windrow method or in an enclosed mechanical facility. It takes 5 to 8 weeks for complete decomposition of waste in open windrows where as in closed mechanical digester complete decomposition takes about one week time. After complete digestion the dark brown carbon-rich material is known as compost.

Advantages of composting ---

1. Compost is rich in carbon and nitrogen, so is used as fertilizer.
2. Production of pollutant gases is minimized.
3. Chance of production foul smell is reduced.
4. Reduces chance of breeding of insect vectors, thus spreading of diseases is prevented.
5. Help to retain moisture and nutrients in soil.
6. Reduces the need of chemical fertilizers, thus environment friendly.
7. Cost of the process and maintenance cost are low.

HAZARDOUS WASTE

The waste or combination of wastes, which because of its quantity, concentration, physical, chemical or infectious characteristics may cause or significantly increase in mortality or is a potential hazard to human health.

Characteristics of hazardous waste:

1. Reactivity – Due to instability the waste reacts vigorously with air or water and generates toxic gases. Eg. Gun powder, nitroglycerine, sodium, potassium etc.
2. Ignitability – The wastes are highly inflammable. They either initiate fire or enhance fire. Eg. Ether, methanol, gasoline, acetone etc.
3. Corrosivity – The wastes destroy materials and living tissue by chemical reaction. Eg. Sulphuric acid, nitric acid, sodium hydroxide etc.
4. Toxicity – The wastes are poisonous even in very small quantities. Eg. Benzene, cadmium, lead, mercury etc.

Two important hazardous wastes are radioactive waste and biomedical waste.

Radioactive waste –

Source:

- Nuclear power plant
- Nuclear weapon processing unit
- Radio-isotopes used in industries
- Radio-isotopes used in medicine and research work
- Mining and processing unit generating radio isotopes

Effects:

- Somatic effects of radioactive waste leads to nausea, vomiting, haemorrhage, damage to central nervous system and death.
- Genetic effects result in gene mutation, chromosomal aberration as well as change in chromosome number. These abnormalities pass from generation to generation and abnormal or deformed offspring are born.

Disposal of radioactive waste:

Radioactive wastes can be disposed of in ground or in ocean. Soil is however found to be a good absorber of radioactive materials. High level radioactive wastes are collected in container made of borosilicate glass or ceramic matrix. These containers are buried in suitably designed and constructed underground repositories, which remain free from all sorts of tectonic or seismic activity.

Biomedical waste

Solid or liquid waste containing infectious materials generated from biological and medical sources and activities are biomedical waste.

Source:

- Hospitals and medical colleges
- Pathological laboratories
- Pharmaceutical companies
- Research institutes
- Morgues and funeral homes

Effects:

- Spreading of infectious diseases
- Improper disposal results into air pollution
- Toxins can contaminate water and pose serious threats to ecosystem

Disposal of biomedical waste:

The normal way of disposal of biomedical waste is incineration. The ashes produced as a result of combustion are disposed of in a sanitary land fill. For liquid waste disinfection is done before disposal.

