

B.Sc. Course(First Semester)**University of Babylon-College of Engineering****Environmental Engineering Department****Chapter One (Solid Waste Management)****Evaluation Of Solid Waste Management**

Solid waste comprises all the waste arising from human and animal activities that are normally solid and that are discarded as useless or unwanted.

Materials Flow and Waste Generation

An indication of how and where solid waste is generated in our technological society is presented in Fig. 1.1.

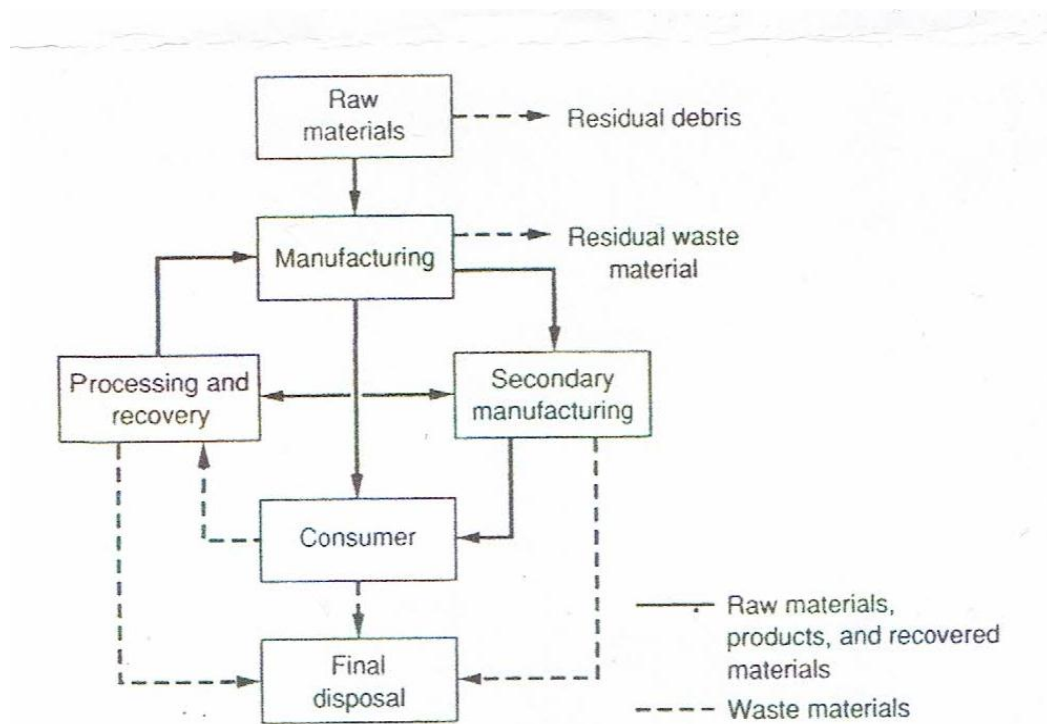


Figure 1.1 Materials Flow and Waste Generation in a technological society

One of the best ways to reduce the amount of solid waste that must be disposed of is to limit the consumption of raw materials and to increase the rate of recovery and reuse of waste materials.

Unlike water-borne and air-dispersed wastes, solid wastes, solid waste will not go away. Where it is thrown is where it will be found in the future.

Solid Waste Management***Q1: Define solid waste management***

May be defined as the activities associated with the control of generation, storage, collection, transfer and transport, processing, and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations.

Functional Elements/Definitions***Q2: State solid waste management functional elements and define each.***

Six functional elements (Fig.12):

1. Waste generation;
2. Waste handling and separation, storage, and processing at the source;
3. Collection;
4. Separation and processing and transformation of solid wastes;
5. Transfer and transport; and
6. Disposal

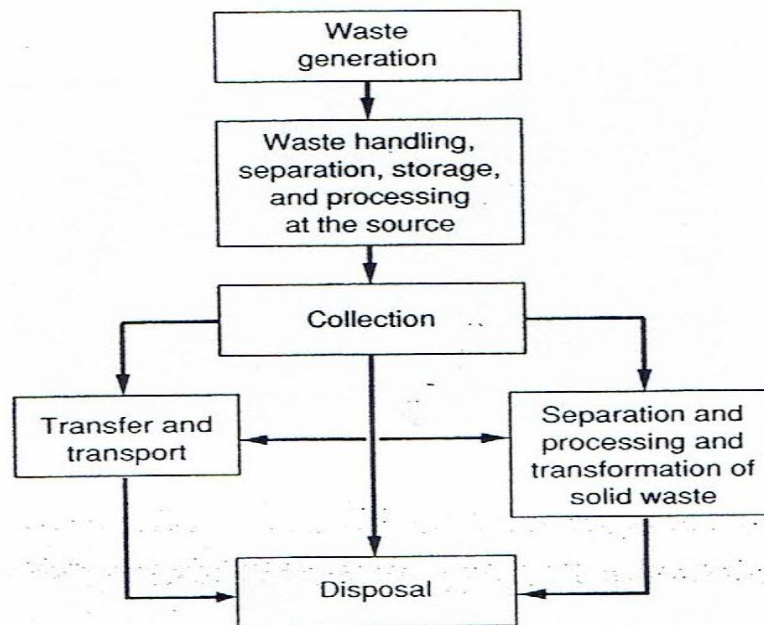


Figure 1.2 Functional elements of Solid Waste

Waste Generation

Encompasses activities in which materials are identified as no longer being of value and are either thrown away or gathered together for disposal. For example the wrapping of candy bar is usually considered to be of little value to the owner once the candy is consumed.

Waste handling and separation, storage, and processing at the source

Waste handling and separation involves the activities associated with management of wastes until they are placed in storage containers for collection. Handling also encompasses the movement of loaded containers to the point of collection.

One site storage is of primary importance because of public health concerns and aesthetics consideration

Collection

The functional element of collection includes not only the gathering of solid wastes and recyclable materials, but also the transport of these materials, after collection, to the location where the collection vehicle is emptied. This location may be a materials processing facility, a transfer station, or a landfill disposal site. In small cities where the final disposal sites are nearby, the hauling of wastes is not a serious problem. In large cities, however where the haul distance to the point of disposal is often more than 15 miles (24.140 km) the haul may have significant economic implications. Where long distances are involved, transfer and transport facilities are normally used.

Separation and processing and transformation of solid wastes

The fourth of the functional elements is recovery of separated materials that occurs primarily in locations away from the source of waste generation.

Transfer and Transport

The functional element of transfer and transport involves two steps:

1. The transfer of wastes from the smaller collection vehicle to the larger transport equipment and
2. The subsequent transport of the wastes, usually over long distances, to a processing or disposal site.

Disposal

The final functional element in the solid waste management system is disposal. Today the disposal of wastes by land filling or land spreading is the ultimate fate of all solid wastes. A modern sanitary land fill is not a dump it is an engineered facility used for disposing of solid waste on land or within the earth's mantle without creating nuisance or hazards to public health or safety, such as the breeding of rats and insects and the contamination of ground water.

Q3: Define Integrated Solid Waste Management (ISWM):

Can be defined as the selection and application of suitable techniques technologies, and management programs to achieve specific waste management objectives and goals.

Q4: Define the word hierarchy and what are its components as adopted by the EPA, explain each

A **Hierarchy** (arrangement in order of rank) in waste management can be used to rank actions to implement programs within the community (Fig.1.3). The ISWM hierarchy adopted by the U.S. Environmental Protection Agency (EPA) is composed of the following elements: source reduction, recycling, waste combustion, and landfilling.

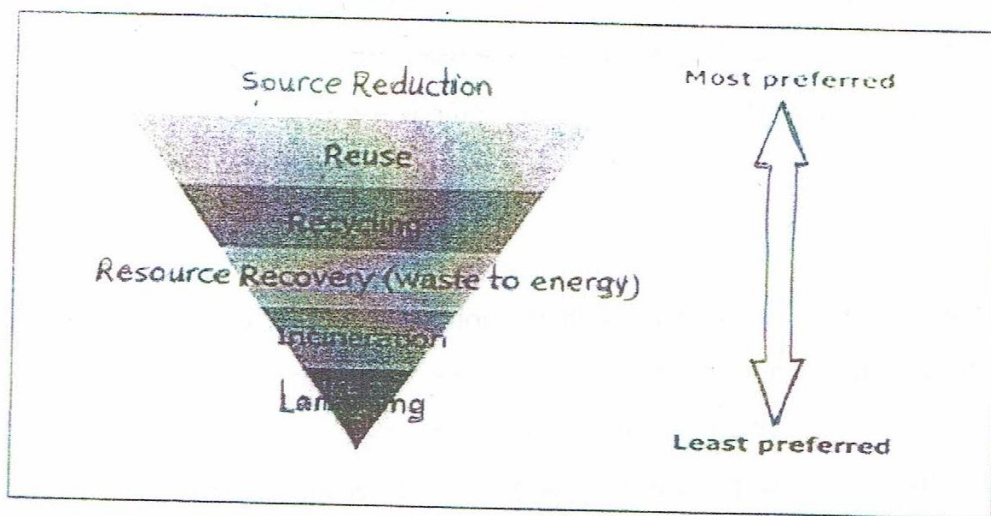


Figure1.3 Hierarchy of Processing Techniques of Solid Waste.

Source Reduction

The highest rank of the ISWM hierarchy, source reduction, involves reducing the amount and /or toxicity of the wastes that are now generated. Source reduction is first in the hierarchy because it is the most effective way to reduce the quantity of waste, the cost associated with its handling, and its environmental impacts. Waste reduction may occur through the design, manufacture, and packaging of products with minimum toxic content, minimum volume of material or a longer useful life and the reuse of products and materials.

Recycling

The second highest rank in the hierarchy is recycling. Recycling is an important factor in helping to reduce the demand on resources and the amount of waste requiring disposal by landfilling.

Waste Transformation

The third rank in the ISWM hierarchy, waste transformation, involves the physical, chemical, or biological alteration of wastes. The transformation of waste materials usually results in the reduced use of landfill capacity and offering useful by products. The reduction in waste volume through combustion is a well-known example.

Landfilling

Ultimately, something must be done with the solid wastes that cannot be recycled or reused and are of no further use. There are only two alternatives available for the long-term handling of solid wastes and residual matter: disposal on or in the earth's mantle, and disposal at the bottom of the ocean. Landfilling, the fourth rank of the ISWM hierarchy and it is the lowest rank in the ISWM hierarchy because it represents the least desirable means of dealing with society's wastes.