

An Insight into Different Waste Types and Waste Segregation Methods

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Abstract - This paper highlights the various types of waste segregations and e-waste management techniques. The waste is, any garbage, refuse or rubbish which consists of domestic, commercial and industrial wastes. Such wastes should be handled properly and its disposal should be taken care of or else it can lead to numerous risks on human health and environment. Thus, so as to reduce the effects of waste on human health and environment waste management should be initiated. The waste which is of dry type can be classified as recyclable (i.e. paper, plastic, glass, metals) and non-recyclable. The dry type of waste includes the electronic waste or e-waste consisting of broken or unwanted electrical or electronic parts or equipment. The various electronic devices become obsolete after some duration due to the increasing technology nowadays. Discarding such e-waste is the major issue then with the industries. Hence managing this e-waste in a proper way is the crucial problem currently. E-waste including computers, refrigerators and televisions contain more than 1,000 different toxic materials and are non-biodegradable. Most of the e-waste is dumped in landfills and thereby releasing harmful toxins into air and soil. Management of such e-waste is imperative in order to avoid hazards to life on earth. The process of separation of such useless scrap can be proved efficient to decompose it in a right manner. A major portion of it can be always recycled and used for the right beneficial purpose and the others which can't be recycled constituting only small portion of total waste is necessary to be discarded.

Key Words: e-waste, landfills, incineration, pyrolysis, biological reprocessing, recycling

1. INTRODUCTION

There is rapid increase in volume and types of solid and hazardous waste in India as the result of continuous economic growth, urbanization and industrialization is becoming a biggest problem for

national and local governments to ensure effective and sustainable management of waste. The segregation, handling, transport and disposal of waste are to be properly managed so as to minimize the risks to the health and safety of patients, the public as well as the environment. The economic value of the waste is best realized when it is segregated. India is developing country with 16 per cent of the world population and having 2% of the total land area. The exponential increase in industrialization is not only consuming large areas of agricultural land but also simultaneously causing serious environmental degradation. Industrialization and urbanization have not only resulted on discharge of large wastes that are rich in organic matter but also in nutrients.

Waste is also defined that discarded material which has no value in normal use or for ordinary use. Solid wastes are those undesirable, useless and unwanted materials and substances that come from any human activity. Waste is generated in all sorts of ways such as dry, wet waste, etc. Its composition and volume largely depend on consumption patterns as well as the industrial and economic structures in place.

2. TYPES OF WASTE

Generally, waste can be classified into solid waste and liquid waste.

2.1 Solid waste:

Solid waste prominent, is any garbage, refuse or rubbish that we make in our homes and also other places. These includes the old car tires, old newspapers, broken furniture, unwanted electronics

parts and even food waste. Solid waste also can be classified into two different types depending on their source: 1) Household waste is generally classified as municipal waste, 2) Industrial waste as hazardous waste/ hospital waste as infectious waste.

1) Municipal solid waste:

Municipal solid waste contains the household waste, construction as well as demolition debris, sanitation residue, and waste from streets. Mainly, this type of garbage is generated from residential as well as commercial complexes.

2) Hazardous waste:

Industrial as well as hospital wastes are considered hazardous as they may consist of toxic substances. Hazardous wastes could be dangerous for the humans, animals, as well as plants. These are corrosive, highly inflammable, or explosive and react when exposed to certain things e.g. gases. In India, around 7 million tons of hazardous waste is generated every year.

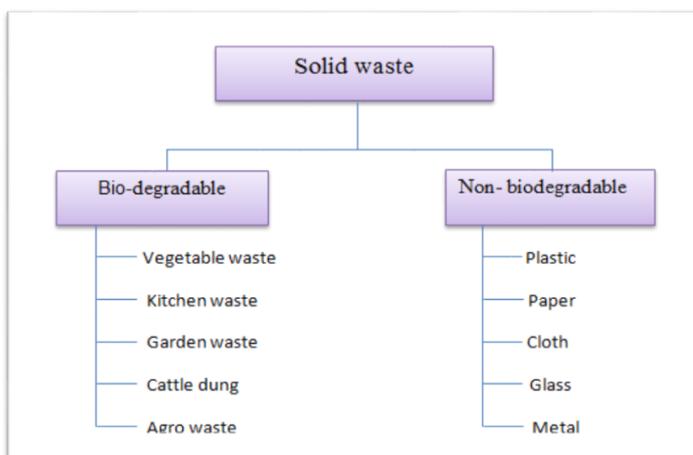


Fig -1: Classification of Solid Waste

2.2 Liquid waste:

Liquid waste is the waste generated in the kitchen, bathroom and laundry and also called the Grey water. Black water is waste water generated in the toilet is called “Black water”. It contains harmful pathogen.

Some solid waste can also be converted to a liquid waste form for disposal. The different sources include point source and non-point source discharges such as storm water and wastewater e.g. liquid waste include wash water from homes, liquids used for cleaning in industries and detergent waste.

3. NEED OF WASTE MANAGEMENT

The need of waste management is to gain an understanding of waste management planning concepts, frameworks, strategies, and also components that are emerging in the field. The sorting of waste is essential as the amount of waste being generated today causes immense problem. In fact, it is believed that a larger portion can be recycled, a part of it can be converted to compost and also only a smaller portion of it is real waste that has no use and has to be discarded.

A study says that 1,60,000 metric tons is the amount of garbage India generates every day! Most of this is wet waste, which can be used to produce fertilizer and generate electricity. Studies say that waste which is segregated is very valuable which can be then used to produce fertilizers, generate biogas and electricity. Whereas, waste dumped unsorted in open, produces harmful liquids and gases that spread diseases and also make that land barren on which it is dumped. So, effective and reliable waste management has become a need of the hour.

4. E-WASTE MANAGEMENT

Electronic waste defined as broken or unwanted electrical or electronic parts or equipment as a whole. E-waste consists of computers, refrigerators, televisions and more than 1,000 such different electronic materials which are non-biodegradable. Bangalore, a major city in India, the home of over 1,200 overseas as well as domestic technology firms, figures prominently in the danger list of cities that face e-waste hazard. In Bangalore, e-waste is dumped in landfills as well as is incinerated, releasing harmful toxins into air and soil.

5. TYPES OF WASTE SEGREGATION

The different types of waste segregating methods are:

5.1 Incineration

Incineration is a one of the disposal method of solid waste in which waste is subjected to combustion of organic substance which contained in the waste and also high temperature treatment system as known as “thermal treatment”. It converts the waste into ash and gaseous products. This method also useful for disposal of residue of both solid waste management as well as solid residue from waste water management and also this process reduces the volumes of solid waste to 20 to 30 percent of the original volume. Incineration is used in both on a small scale by individuals and on a large scale by industry. This method also recognized as a practical method of disposing of certain hazardous waste materials including biological medical waste. Incineration method commonly used in countries such as Japan where land is more scarce, as these facilities generally do not require as much area as landfills.

5.2 Landfill

Landfill is most common method of waste treatment around the world. Landfill consists of burying the waste and also remains a common practice in most countries. If landfills are properly designed and well-managed, then a landfill can be a hygienic as well as relatively inexpensive method of disposing of waste. In older days, poorly managed landfills and waste dumped in open areas created a number of adverse environmental impacts like wind-blown litter, attraction of vermin, as well as generation of liquid leachate. Landfills generate gas mostly composed of methane and carbon dioxide which kills the surface vegetation and also is a greenhouse gas.

Modern landfill design techniques include methods to limit the leachate such as use of clay or plastic lining material. Basically, its deposited waste is normally compacted to increase its density as well as stability and also covered to prevent attracting vermin. Many

landfills also have landfill gas extraction systems installed to extract the landfill gas.

5.3 Recycling

Recycling means the materials from which the new items are made or the materials which can be reprocessed into new products. Firstly, waste material is collected separately from general waste using dedicated bins like dry waste, wet waste and plastic and collection vehicles, a procedure also known as kerbside collection. In different communities, different method like all recyclable materials are placed in a single bin for collection, and the sorting and this method is known as ‘single-stream recycling’.

Consumer products are the most common recycled materials which include aluminum materials such as beverages cans, copper materials such as wire, steel from food and aerosol cans, old steel furnishings or equipment, rubber tyres, polyethylene bottles, glass bottles and jars, paperboard cartons, newspapers, magazines and light paper, and corrugated fiberboard boxes. In various cities and countries, different type of materials are accepted for recycling which is reflected in the resale value of the material once it is reprocessed.

5.4 Re-usage of Waste

The waste re-usage refers to using waste for generating useful things like biogas, manure etc. Some of the waste re-use methods are:

5.4.1 Pyrolysis

Pyrolysis is defined as thermochemical decomposition of organic materials by heat in the absence of oxygen which produces various hydrocarbon gases. During pyrolysis, the molecules of object are subjected at a very high temperatures leading to very high vibrations. Hence, every molecule in the object is stretched and shaken to an extent that molecules starts breaking down and also rate of pyrolysis increases with temperature. Temperatures are above 806°F used in industrial applications. There are two type of pyrolysis

fast pyrolysis and slow pyrolysis which produces liquid fuel for feed stocks like wood. Slow pyrolysis produces gases and solid charcoal. Pyrolysis holds promise for conversion of waste biomass into useful liquid fuel. It is used for plastic waste disposal to produce liquid fuel similar to diesel.

5.4.2 Biological Reprocessing

Recyclable materials that are organic in nature, such as plant material, food scraps, and paper products, can be recovered through composting and digestion processes to decompose the organic matter. The result of organic decomposition is then recycled as compost for agricultural or landfill purposes. In addition to compost, waste gas from organic decomposition such as methane can be captured and also used for generating electricity with maximizing efficiencies. The purpose of biological processing in waste management is to control as well as accelerate the natural process of decomposition of organic matter.

Table -1: Different methods of waste disposal

Types of Waste	Disposal Methods
Solids	- Landfill
Semi-solids	- Waste encapsulation
Powders	- Medium and high temperature incineration
Paper	- Recycling
Cardboard	- Burning - Landfill
PVC plastic	- Landfill
Glass	
Liquids	- Sewer - High temperature incineration

6. CONCLUSIONS

This paper emphasizes on the current scenario of waste production and the need of the hour is to manage this waste in a proper way so as to avoid its grievous effects on life. There are various types of wastes produced which can be efficiently handled by segregating them. The solid and liquid garbage can be separated. Some waste regulation methods are encapsulation, incineration, landfill, recycling, pyrolysis, biological reprocessing. These techniques are best suitable to grapple with the increasing production of waste. This paper gives an idea of all these approaches thereby creating an awareness among readers on this current issue faced by the world.

Currently the most hazardous waste type can be flammable waste like lead acid batteries, fuels and oil paints. These are mostly disposed off by landfilling or else are recycled to be used in the industries.

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