

Review Article

Green Solution For Solid Waste Management

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A B S T R A C T

Solid waste is the discarded solid materials produced from domestic, residential, commercial or industrial activities. On the basis of types of material such plastic, paper, metal organic waste, glass, toxic, industrial waste, domestic waste etc. Over population, industrialization, urbanization are mainly responsible for increasing rate of solid wastes. About 7.8 million tonnes of wastes have been produced worldwide and out of which 11-15% of which have been recycled. The solid waste Figure 1 management includes the generation of waste, storage, collection, transportation, processing and disposal. Improper solid waste management degrades people health, environmental pollution, depletion of natural resources, climate change which greatly impacts the quality of life on this earth. In this article, the solid waste types and the methods of solid waste disposal were discussed in detail.

Keywords: Solid Waste Management, Generation of Waste, Collection, Disposal, Possible Solutions

Introduction

This term describes the procedure for gathering and handling solid wastes Figure 1. In emerging nations, there has been a rapid increase in the population and urbanisation, which has resulted in massive waste generation and environmental damage. In developing nations, an estimated 7.6 million tonnes of municipal solid garbage are produced daily. Solid waste is any item that results from different human activities and is typically thrown away as undesired or worthless, such as household trash, garbage, and scrap metal. It is the cause of land contamination in industrial and urban regions. These could be health and environmental hazards resulting from poor solid waste management. As a result, managing solid waste has become crucial to reducing the negative effects of solid wastes. The primary

goal of solid waste Figure 2 management is to reduce these negative consequences before they become too big to fix later.¹⁻³



Figure 1. Solid Wastes



Figure 2. Solid Wastes generation

Types and Sources of Solid Wastes

Depending upon the nature, solid wastes can be broadly classified into three types Table 1:

1. Urban or Municipal wastes.
2. Industrial wastes.
3. Hazardous wastes.

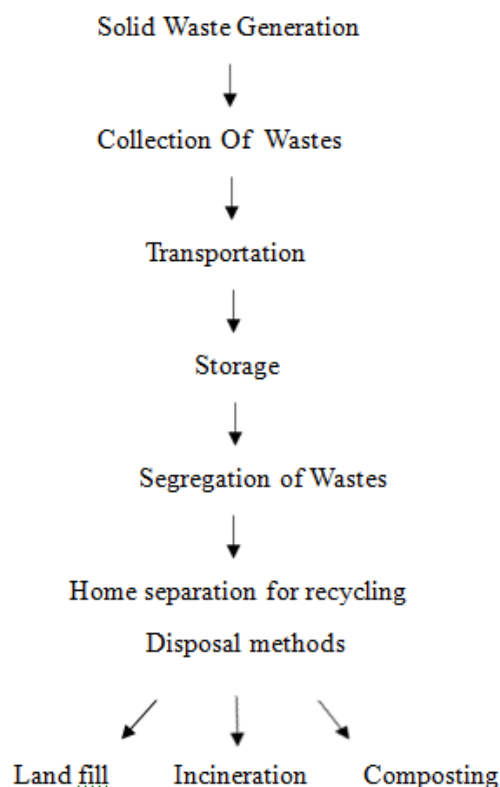
Table 1. Sources for urban and industrial wastes

Sources of Urban Wastes	Sources of Industrial Wastes
Domestic wastes (food waste, cloth, paper, glass, metal)	Nuclear power plants (radioactive wastes)
Commercial wastes (can, packing material, polythene bags)	Thermal power wastes (fly ash)
Construction wastes (wood, concrete, debris)	Chemical industries (hazardous and toxic wastes)
Biomedical wastes (anatomical wastes, infectious wastes)	Other industries (rubbish, oil, dyes, alkalis, scrap metals)

Objectives of Solid Wastes Management (Scheme I)

- To ensure the protection of the environment Figure 3.
- To grow the contribution of the waste sector of the GDP.
- To ensure the design and manufacture of the product.
- To protect the health and well-being of people.
- To support the diversion of high calorific waste from landfill.
- To implement contaminated hand measures in the waste act.

Process of Solid Waste Management



Scheme I. Process for solid waste management



Figure 3. Effective Solid Waste management

Effects of Improper Solid Waste Management

1. Biodegradable materials decompose as a result of incorrect municipal solid waste dumping on the roadside and in the vicinity. This degrades the value of the land by creating an unpleasant stench and attracting different kinds of insects.

2. Toxic metals and hazardous wastes are found in industrial solid wastes, and when these materials are dumped on soil, they alter its properties and productivity.
3. Contaminants have the potential to seep into the ground and contaminate ground water.
4. Certain household and industrial wastes, such as cans, pesticides, plastics, radioactive materials, and batteries, can be burned to produce compounds that are hazardous to humans, such as furans, dioxins, and polychlorinated biphenyls.⁴⁻⁸

Methods of Disposal of Solid Wastes

- **Landfill:** Land filling is the most common method of waste disposal in many parts of the world. It involves burying waste in designated landfill sites. Properly engineered landfills minimize environmental impacts.
- **Incineration:** Incineration is the controlled burning of waste at high temperatures. It reduces the volume of waste and can generate energy in the form of heat or electricity. Modern incineration plants have advanced emission control systems to reduce air pollution.⁹
- **Composting:** Composting is the biological decomposition of organic waste (e.g., food scraps and yard waste) into nutrient-rich compost. Compost can be used as a soil conditioner or fertilizer.
- **Vermi-Composting:** Vermicomposting is a sustainable and eco-friendly method of converting organic solid waste into nutrient-rich compost using earthworms. This process is particularly effective for managing organic waste such as kitchen scraps, yard waste, and certain paper products.^{10,11}
- **Biogas Generation:** Biogas generation from solid waste, also known as anaerobic digestion, is a sustainable and environmentally friendly method of managing organic waste while producing renewable energy. This process involves the breakdown of organic materials by microorganisms in the absence of oxygen, resulting in the production of biogas, which is primarily composed of methane (CH₄) and carbon dioxide (CO₂). Biogas can be used as a source of renewable energy for electricity generation, heating, and even as a vehicle fuel.¹²

Refuse
Reduce
Reuse
Recycle
Repair

Steps Involved in Solid Waste Management

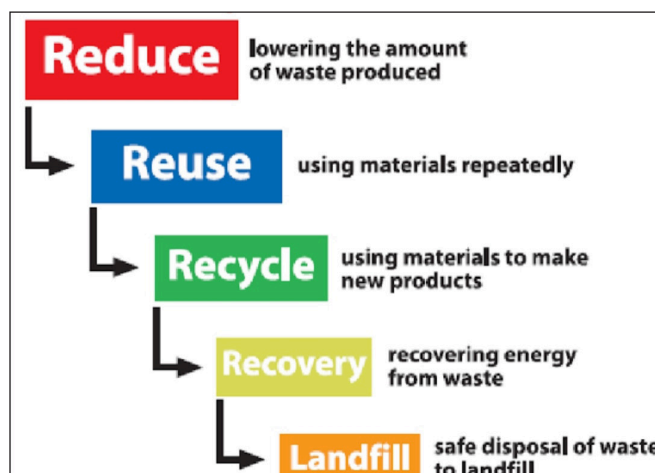


Figure 4.Solid Wastes process

1. **Refuse:** In the context of solid waste management, “refuse” refers to the portion of waste materials that are discarded, rejected, or disposed of. Refuse includes all waste items and materials that are discarded by individuals, households, businesses, and communities. It encompasses a wide range of materials that have reached the end of their useful life and are no longer needed, as well as items that people choose to dispose of.
2. **Reduce:** This first principle emphasizes the importance of reducing waste generation at the source. It involves practices that help decrease the amount of waste produced in the first place. Using products with minimal packaging. Avoiding single-use or disposable items. Reducing energy and water consumption. Practicing responsible consumption and making conscious choices to buy only what is necessary Figure 4.
3. **Reuse:** Repairing and refurbishing products. Donating or selling items instead of discarding them. Using refillable containers for beverages and personal care products. Choosing durable and long-lasting products.
4. **Recycle:** Separating recyclable materials from non-recyclables. Participating in curb side recycling programs or taking materials to recycling centres. Supporting businesses and products that use recycled materials.
5. **Repair:** Repair in the context of solid waste management generally refers to the maintenance, restoration, or improvement of waste management infrastructure, equipment, and systems to ensure their continued functionality and efficiency. Repair activities are essential to prevent breakdowns, reduce environmental and health risks, and extend the lifespan of waste management facilities Figure 5 and 6.¹³⁻²⁰



Figure 5.3R for Solid Waste management



Figure 6. Sustainable Solid Wastes for a Green Planet

Conclusion

With the advent of urbanization waste solid waste management disposal has become a serious problem. The waste is disposed off at the landfill site is improper method of dumping. Successful Solid Waste Management depends on financial support, implementing legislation and policy from government. Solid waste management is a vital component of modern urban living. By addressing the challenges and adopting possible solutions²²⁻²⁴, we can minimize the adverse impacts of waste on people health, environment and climate change by following 3R approach. As our cities continue to grow and our planet faces environmental challenges, efficient solid waste management a path to a sustainable future. Effective solid waste management is not only crucial for maintaining public health and the environment but also for conserving resources and reducing the carbon footprint.

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