

PG Sem 2 Notes

SOLID WASTE MANAGEMENT

Solid Waste Management

Every day, tonnes of solid wastes are disposed off at landfill sites. This waste comes from homes, offices, industries and various other agricultural related activities. These landfill sites produce foul smell if waste is not stored and treated properly. When hazardous wastes like pesticides, batteries containing lead, cadmium, mercury or zinc, cleaning solvents, radioactive materials, e-waste and plastics are mixed up with paper and other scraps and burnt, they produce gases such as dioxins. These gases are toxic and carcinogenic. These pollute the surrounding air, ground water and can seriously affect the health of humans, wildlife and our environment. The following are major sources of solid waste .

Sources of Solid Wastes

- Solid domestic garbage.
- Solid waste material from various industries.
- Solid agricultural waste.
- Plastics, glass, metals, e-waste, etc.
- Medical waste.
- Construction waste, sewage sludge



The process of waste handling and disposal varies in different countries. In India, the processes differ according to the source of solid waste. They can be classified as:

- Municipal Solid Waste.
- Hazardous Solid Waste.

Municipal solid waste can further be divided into biodegradable, recyclable and hazardous domestic wastes. The biodegradable waste includes rotten food, vegetable peel and mostly wet kitchen waste. The recyclable waste includes plastic and the hazardous wastes include, bulb, batteries, etc.

The industry generated like chemical factories, medical waste from hospitals are considered as Hazardous Solid Waste and needs special settings to dispose them.

In any region, solid waste management is very important for the safe disposal of wastes and to reduce environmental pollution and avoid any health hazards that it may cause.

Landfills are the most common methods of disposing solid wastes. Modern-day landfills are designed by taking care of various environmental factors and types of wastes, so as to minimise pollution and health risks.

Effects of Poor Solid Waste Management

Due to improper disposal of solid waste particularly by waste management organizations, the collected wastes gets heap up and become a problem for both the environment and also for the public.

By dumping of huge garbage, drives biodegradable materials to decay and decompose under the abnormal, uncontrolled and unhygienic conditions. After a few days of decomposition, it becomes a breeding ground for different types of disease-causing insects as well as infectious organisms. A foul smell is produced and it also spoils the aesthetic value of the area.

The solid wastes collected from different industries include toxic metals, chemicals, and other hazardous wastes. When these wastes are released into the environment, it can produce biological and physicochemical problems to the environment, the chemicals may drain into the soil and pollute the groundwater and also alter the productivity of the soils in that particular area.

In rare cases, the hazardous wastes may get mixed up with the ordinary garbage and other combustible wastes causing the disposal process even harder and risky.

By burning the paper and other scraps along with the hazardous wastes, dioxins and poisonous gasses are produced and released into the air which results in causing various diseases including chronic disease, skin infections, cancer, etc.

1. Waste management practices

a) Source segregation

b) Composting

1. Aerobic 2. Anaerobic

- c) Vermicomposting
- d) Biogas generation
- e) Incineration

2. Radioactive waste

Radioactive wastes are generated during various operations of the nuclear power plant. Radioactive waste can be in gas, liquid or solid form, and its level of radioactivity can vary. The waste can remain radioactive for a few hours or several months or even hundreds of thousands of years. Depending on the level and nature of radioactivity, radioactive wastes can be classified as exempt waste, Low and Intermediate level waste and High Level Waste.

Radioactive waste management

Radioactive waste management involves the treatment, storage, and disposal of liquid, airborne, and solid effluents from the nuclear industry.

Methods of disposal of radioactive wastes are

1. Limit generation - Limiting the generation of waste is the first and most important consideration in managing radioactive wastes.
2. Dilute and disperse - For wastes having low radioactivity, dilution and dispersion are adopted.
3. Delay and decay - Delay and decay is frequently an important strategy because much of the radioactivity in nuclear reactors and accelerators is very short lived.
4. Concentrate and confine process - Concentrating and containing is the objective of treatment activities for longer-lived radioactivity. The waste is contained in corrosion resistant containers and transported to disposal sites. Leaching of heavy metals and radionuclides from these sites is a problem of growing concern.

Control and Management

Three ways are employed to manage nuclear wastes

- **Spent Fuel Pools** - The spent fuel discharged from the reactors is temporarily stored in the reactor pool. The Spent fuel rods are used in stored cooling ponds. They protect the surroundings from radiation and absorb the heat generated during radioactive decay.

- **Vitrification method** – This prevents reaction or degradation of nuclear waste for extended periods of time and encased in dry cement caskets.

- **Geological Repositories** - A deep geological repository is a nuclear waste repository excavated deep within a stable geologic environment. It is suited to provide a high level of long-term isolation and containment without future maintenance. In India at Tarapur and Kalpakkam, a wet storage facility of Spent Fuel is the main mode of storage.

3. Medical waste

Any kind of waste that contains infectious material generated by hospitals, laboratories, medical research centers, Pharmaceutical companies and Veterinary clinics are called medical wastes.

Medical wastes contain body fluids like blood, urine, body parts and other contaminants, culture dishes, glasswares, bandages, gloves, discarded needles, scalpels, swabs and tissues.

Management: The safe and sustainable management of biomedical waste is the social and legal responsibilities of people working in healthcare centers.

Waste disposal: Involved by incineration, chemical disinfection, autoclaving, encapsulation, microwave irradiation are methods of waste disposals. Final disposal includes landfill and burying as per norms inside premises.

4. E-Waste

Electronic waste or e-waste describes discarded electrical electronic devices as well as any refuse created by discarded electronic devices and components and substances involved in their manufacture or use. Their disposal is a growing problem because electronic equipment frequently contains hazardous substances. In a personal computer, for example, there may be lead (Pb) in the cathode ray tube (CRT) and soldering compound, mercury (Hg) in switches and housing, and cobalt (Co) in steel components, among other equally toxic substances. E-wastes are basically PCB (Polychlorinated biphenyl) based, which are non-degradable .



Used electronics which are destined for reuse, resale, salvage, recycling, or disposal are also considered e-waste. Unauthorized processing of e-waste in developing countries can lead to adverse human health effects and environmental pollution.

Recycling and disposal of e-waste may involve significant risk to the health of workers and communities in developed countries and great care must be taken to avoid unsafe exposure in recycling operations and leaking of materials such as heavy metals from landfills and incinerator ashes.

5. Plastic Waste – Solutions and Remedies

Plastics are low molecular weight organic polymers that are non-degradable in the natural environment. They are used in several items, including cars, bulletproof vests, toys, hospital equipment, carry bags and food containers. Packaging materials used in supermarkets, retail outlets, manufacturing industries, households, hotels, hospitals, restaurants and transport companies are major contributors to plastic waste generation. Plastic waste constitutes a major part of municipal solid waste.

References :

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