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### **Department of Employment and Training**

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Topic : Solid and Hazardous waste management

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# SOLID AND HAZARDOUS WASTE MANAGEMENT

## SOLID AND HAZARDOUS WASTE MANAGEMENT:

It is our duty to reduce creating waste and protect environment. 3R's are important in protecting environment. The first R is Reduce and the second R is Reuse and the last R is Recycle.

### **Solid waste:**

Solid waste is discarded (abandoned or considered waste like) materials. solid waste means any garbage, refuse, sludge from a wastewater treatment plant or air pollution control facility and other discarded materials including solid, liquid, semi solid, or contained gaseous material resulting from industrial, commercial, mining, and agriculture operation and from community activities.

The solid waste does not include solid or dissolved materials in domestic sewage or solid or dissolved materials in irrigation return flows or industrial discharges.

### **Solid Waste Management**

Solid Waste management includes the activities and actions required to manage waste from its inception to its final disposal. This includes the collection, transport, treatment and disposal of waste, together with monitoring and regulation of the waste management process. It is all about how solid waste can be changed and used as a valuable resource.

Every day, tones 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.

**Case Study:** The Corporation of Chennai looks after clearance and management of solid waste in Chennai. Every day around 5400 Metric Tonnes (MT) of garbage is collected from the city. Door to door collection of garbage is done in most zones apart from sweeping, collecting, and storing the waste in the specified bins. At present garbage generated in Chennai is dumped at two sites. Proposals are there for remediation of the existing landfill or scientific closure and to have integrated waste processing facilities with waste to energy plants as one of the components at the existing Kodungaiyur and Perungudi sites.

### Waste management practices

- a) Source segregation
- b) Composting
  - 1. Aerobic      2. Anaerobic
- c) Vermicomposting
- d) Biogas generation
- e) Incineration

| Waste category                     | Source  |
|------------------------------------|---|
| <b>Residential</b>                 | Food wastes, plastics, paper, glass, leather, cardboard, metals, yard wastes, ashes, tires, batteries, old mattresses |
| <b>Industrial</b>                  | Packaging wastes, ashes, chemicals, cans, plastics, metal parts   |
| <b>Commercial</b>                  | Thin and thick plastics, food wastes, metals, paper, glass, wood, cardboard materials                                 |
| <b>Institutional</b>               | Wood, paper, metals, cardboard materials, electronics   |
| <b>Construction and Demolition</b> | Steel materials, concrete, wood, plastics, rubber, copper wires, dirt and glass.                                      |

|                    |  |
|--------------------|--|
| <b>Agriculture</b> | Agricultural wastes, spoiled food, pesticide containers  |
| <b>Biomedical</b>  | Syringes, bandages, used gloves, catheter, urine bags, drugs, paper, plastics, food wastes, sanitary napkins and diapers, chemicals.                     |
| <b>E-waste</b>     | Electronic items like used TVs, transistors, tape recorders, computer cabinets, mother boards, CDs, cassettes, mouse, wires, cords, switches., chargers. |

## 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.

**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.

### 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, glassware, bandages, gloves, discarded needles, scalpels, swabs and tissues.

If it is not managed properly it can cause serious threat to the humans.

**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.

## ●.....● **Solid Waste Management Rules 2016:**

1. These rules replace the Municipal Solid Wastes (Management and Handling) Rules, 2000, are now applicable beyond municipal areas and have included urban agglomerations, census towns, notified industrial townships etc.
2. They focus on segregation of waste at source, responsibility on the manufacturer to dispose of sanitary and packaging wastes, user fees for collection, disposal and processing from the bulk generator.
3. It has also been advised that the bio-degradable waste should be processed, treated and disposed of through composting or bio-methanation within the premises as far as possible and the residual waste shall be given to the waste collectors or agency as directed by the local authority.
4. The rules promote the use of compost, conversion of waste into energy, revision of parameters for landfills location and capacity.
5. The government has also constituted a Central Monitoring Committee under the chairmanship of Secretary, MoEF&CC to monitor the overall implementation of the rules.
6. The Rules for the Safe Treatment of Legacy Waste prescribe bio-remediation and bio-mining in all open dumpsites and existing operational dumpsites in India.

Apart from this, Article 51 A (g) of the Constitution of India makes it a fundamental duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers, and wildlife, and to have compassion for living creatures.

## **Hazardous Waste**

Hazardous waste is the waste that poses substantial or potential threats to public health or the environment. Industrial and hospital waste is considered hazardous as they contain toxic substances hazardous wastes can be highly toxic to humans, animals, and plants and are corrosive highly inflammable or explosive.



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Rapidly growing industries in the country have contributed in the production of large part of hazardous waste material. The sources of hazardous waste are basically agricultural and agro-industries, medical facilities, commercial centres, household and the informal sectors. Households waste that can be categorized as hazardous waste include old batteries, shoe polish, paint tins, old medicines and medicine bottles.

In the industrial sector the major generators of hazardous waste are the metal, chemical, paper, pesticides, dye, refining, and rubber goods industries. Direct exposure to chemicals in hazardous waste such as mercury and cyanide can be fatal. Therefore, to reduce environmental hazardous proper attention is required during disposal of such waste, because it cannot be disposed of by common means like other by products of our daily lives.

The Hazardous and Other Wastes (Management & Transboundary Movement) Amendment Rules, 2019 are as follows:

1. Solid plastic waste has been prohibited from import into the country including in Special Economic Zones (SEZ) and by Export Oriented Units (EOU).
2. Exporters of silk waste have now been given exemption from requiring permission from the Ministry of Environment, Forest and Climate Change.
3. Electrical and electronic assemblies and components manufactured in and exported from India, if found defective can now be imported back into the country, within a year of export, without obtaining permission from the Ministry of Environment, Forest and Climate Change.
4. Industries which do not require consent under Water (Prevention and Control of Pollution) Act 1974 and Air (Prevention and Control of Pollution) Act 1981, are now exempted from requiring authorization also under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016, provided that hazardous and other wastes generated by such industries are handed over to the authorized actual users, waste collectors or disposal facilities.



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## **Treatment and disposal of solid waste management:**

### **1. Avoid**

Avoid the usage of unwanted materials which create more debris. Before you buy anything, think that “Do I really need it?” (e.g) Avoid buying packaged foods. Refuse to buy use and throw plastic products.

### **2. Reduce**

Reduce the waste by using durable goods that last longer instead of things that are used once and thrown away. (e.g) Write on both sides of papers. Instead of unnecessary printing, use electronic facilities. Share newspapers, magazines and other things with others.

### **3. Reuse**

Reusing means using a thing again and again, rather than using and throwing after a single use. (e.g) Instead of using plastic bags, use and throw pens and batteries, use cloth bags, fountain pens and rechargeable batteries. Reuse glass bottles for other purposes. Repair foot wears and use them.

### **4. Recycle**

The process by which waste materials are used to make new products is called recycling. (e.g) Using old clothes to make paper and melting some plastics to make floor mats, plastic boards and hose pipes.

### **5. Compost**

The process of degradation of organic wastes into manure by the action of microorganism mainly fungi and bacteria are called composting. The manure thus obtained becomes natural fertilizer for the plants as well as increases the soil fertility.

### **6. Incineration plants:**

The burning of solid waste in large furnaces at high temperature is called incineration. In these plants the recyclable material segregated and the rest of the material is burnt and ash is produced. Human anatomical wastes (discarded medicines, toxic drugs,

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blood, pus) are disposed by means of incineration. During incineration, the enormous heat kills all contagious disease-causing germs. We can also produce electricity with the help of this heat. So, the incineration is kept as the last resort and is used mainly for treating the infectious waste.

## **7. Landfill**

Landfilling is a method in which wastes are dumped into naturally occurring or man-made pits and covered with soil. Mostly prevailed in urban areas. Garbage buried inside landfills remain here for a long time as they decompose very slowly and become manure. These places can be converted into parks, gardens, etc.,

## **8.Sanitary landfills:**

Sanitary landfill is more hygienic and built in a methodical manner to solve the problem of leaching. These are lined with materials that are impermeable such as plastics and clay, and also built over impermeable soil. But constructing sanitary land fill is very costly.

## **9.Pyrolysis:**

It is alternative to incineration. It is a process of combustion in absence of oxygen or material burnt under controlled atmosphere of oxygen the gas and liquid thus obtained can be used as fuels.

## **10.Vermiculture:**

It is also known as earthworm farming. In this method the earth worms are added to the compost. These worms break the waste and the added excreta of the worms makes the compost very rich in nutrients.

## **Waste separation exercise**

The Solid Waste Management (SWM) rules, 2016 say that,

1. Every Household should segregate and store the waste generated by them in three separate streams – namely bio-degradable, non-bio-degradable and domestic hazardous waste in suitable bins and handover segregated wastes to authorized

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waste pickers or waste collector as per the direction or notification by the local authorities from time to time.

2. No body shall throw, burn, or bury the solid waste on streets, open public spaces outside his premises or in the drain or water bodies.

Domestic hazardous waste means discarded paint drums, pesticide cans, CFL bulbs, tube lights, expired medicines, broken mercury thermometers, used batteries, used needles and syringes and contaminated gauge, etc., generated at the household level.

**Question:**

1. Enumerate the measures taken by the government to reduce the solid and hazardous waste management wastes through policy.

