

Pg. Semester - II
Paper - CC - V
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Advances in Chemistry

Name - Dr Vandana Kumari
Asst Professor
Dept. of Chemistry

WASTE MANAGEMENT

[1] Introduction to waste management:

"Waste management strategies are the methods and practices used to handle waste in an environmentally responsible and sustainable manner."

Main objectives:

- Minimize waste generation
- Maximize resource recovery
- Reduce harmful impacts on human health and environment.

[2] What is E-waste?

- E-waste (WEEE - Waste electrical and electronic equipment) refers to electrical and electronic devices that are discarded or near the end of their life.

✓ Examples:

- Computers, Laptops
 - Mobile phones
 - Televisions and monitors
 - Washing machines
 - Household appliances
- Rapid technological development and frequent replacement have increased e-waste globally.

[3] Causes of increasing E-waste :

- Short lifespan of electronic devices
- Rapid technological advancement.
- overconsumption of raw materials.
- Increased household and industrial usage

→ Growth rate : E-waste is increasing by approximately 3-5% per year.

[4] Environmental and Health Impacts :

E-waste contains both valuable and toxic materials.

→ Risk include :

- soil and water contamination
- Air pollution
- Harmful effects on human health
- Toxic compounds causing long term environmental damage.

→ Improper disposal can lead to severe ecological consequences.

[5] Economic Importance of E-waste

- contains recoverable precious metals and reusable materials.
- Has the potential to generate significant revenue if properly managed.
- Requires careful and systematic recycling processes.

[6] Circular Economy (CE) in E-waste Management

Circular Economy: A sustainable model that promotes reuse and recycling to extend product life.

[7] Hazardous waste and Toxic materials Management;

certain wastes must ~~not~~ never be disposed of randomly, such as:

- Toxic electronic waste
- Batteries
- waste oil and fluids
- Automotive shredder residue

✓ Solution:

Establish hazardous waste processing centres in major cities to:

- safely treat toxic materials.
- prevent environmental pollution.
- Improve waste segregation.

[8] Global scenario of E-waste:

- Around 53.6 million metric tons of e-waste generated worldwide.
 - Less than 20% is managed under environmentally safe policies.
- shows an urgent need for improved recycling systems.

[9] Building Blocks for sustainable E-waste Management:

Important factors enabling circular transition:

- Government policies
- Environmental awareness
- Health and safety measures

- Financial support
- Digitalization
- Reverse logistics
- closed-loop supply chains (CLSC)

[10] CLSC

A system where products move from :
 Manufacturing → consumer use → Recycling
 → Disposal.

Benefits :

- Efficient Resource utilization
- Reduced waste generation
- Eco-friendly forward and backward flow of materials.

[11] Research Areas in E-waste :

Major themes include :

- Recycling technologies
- Sustainability
- Consumer recycling behaviour
- Reverse supply chain
- Recovery techniques from circuit boards.
- Profitability challenges.