Waste Management-I

Waste

Waste refers to any discarded material which no longer remains useful. According to the Environment Protection Act, 1990, waste is any substance which constitutes a scrap material, or an effluent or an unwanted surplus which arises out of the application of any process.
There are three types of wastes—solid, liquid and gaseous wastes.
Solid Wastes: It include garbage, food leftovers, decaying fruits and vegetables, cans, bottles and ashes.
Liquid Wastes: It refers to sewage discharged from houses, hospitals, restaurants, offices and factories. Oil spill is also a liquid waste.
Gaseous Wastes: It includes fuel exhausts containing carbon dioxide, carbon monoxide, sulphur dioxide etc. Smog is an example of gaseous waste.

Wastes can also be classified into toxic and non-toxic wastes. Differences between them are

Toxic Wastes	Non-toxic Wastes
These are dangerous wastes which can pose grave health hazards to humans and animals.	These wastes do not cause any serious health hazards to humans and animals.
These wastes are produced as a result from industrial processes, use of chemical fertilisers, biomedical wastes generated from hospitals and nuclear activities.	These wastes are mostly domestic wastes.
These wastes include chlorinated solvents, asbestos, organochlorine pesticides, waste paints and release of large amounts of sulphur and nitrogen.	These include food leftovers, fruits and vegetable peels etc.

Sources of Wastes

Wastes are classified into the following categories depending on their source of origin:

Domestic Wastes

Wastes generated as a result of domestic activities are known as domestic wastes. It includes polythene bags, toilet sewage, batteries, expired medicines and scrap metals.

Industrial Wastes

Wastes emanating from various large and small-scale industries are known as industrial wastes. Industrial wastes can be categorised into the following groups depending on the nature of industry:
Mining: Wastes generated during mining activities are known as mining wastes. Many chemicals and liquids get discharged leading to the deterioration of land and water resources.
Cement Industry: These industries discharge fine dust particles which can cause serious health hazards.
Oil Refineries: These industries cause serious environment problems. They generate wastes such as organic sulphur compounds, hydrocarbons and organic acids.
Construction Sites: The wastes include bricks, plastics, pipes, roofing and insulating materials.
Paper Industry: The effluents of the industry include sulphur dioxide and chlorine which can endanger the lives of aquatic organisms.
Textile Industry: Its wastes include effluents resulting from boiling and processing of fibres.

Chemical Industries: These industries include manufacturing industries and fertiliser and pesticide industries.
Metal industries: These industries produce wastes containing copper, lead, acids, chromium and zinc which can affect the life of aquatic animals.

Agricultural Wastes

The following table shows the nature of agricultural wastes:

Classification of Wastes	Examples
Plant Remains or Crop Residues	**Field Residues:** Wastes left in agricultural fields after harvesting, straw of barley, wheat, sorghum and rye. **Process Residue:** These are the remains discarded after the crops are processed. It includes husks, seeds and bagasse.
Animal wastes	Slurry, poultry litters
Processing Wastes	Wastes produced by agro-based industries. It includes stalks and press mud (wastes produced during the process of purification of sugar to make it free from dirt and colour).
Fertilisers	Components of fertilisers such as nitrogen, phosphorus or potassium
Pesticides and Insecticides	Contains dangerous chemicals such as nitrogen. Sulphur and DDT affect humans by entering the food chain.

Municipal Wastes

Waste generated in a municipality or a local area is known as municipal waste. It is discharged by shops, offices, banks, hospitals and schools. It can be divided into the following categories:
Sewage: It is a liquid waste which is discharged from kitchens, bathrooms, lavatories, laundries and laboratories. It includes mineral and organic matter, wastewater and human excreta. As municipal sewage contains large quantities of nitrogen and organic matter, it can affect the ecosystem if it is not treated.
Degradable and Non-Degradable Wastes

Biodegradable Pollutants	Non-biodegradable Pollutants
Biodegradable wastes decompose into the soil.	Non-biodegradable pollutants take a fairly long time (or never) to decompose into the soil.
They do not pose a very serious challenge to the environment.	These wastes pose a serious challenge to the environment because they do not decompose into the soil.
Examples: Paper, egg shells	Examples: Metal cans, plastic products

Biodegradable wastes can be further classified into simple biodegradable wastes and complex biodegradable wastes. While biodegradable wastes can be easily broken down by natural processes (Examples: Leaves, vegetable peels), non-biodegradable wastes cannot be easily decomposed (Examples: Leather shoes, tin cans).

Biomedical Wastes

Wastes which are generated during medical treatment, diagnoses and immunisation of humans and animals are known as biomedical wastes. It also includes wastes generated during research and experiments conducted in laboratories. These wastes include needles, syringes, tissues, parts of the body, chemicals used during pathological tests and polythene bags.

Nuclear Waste

Radioactive wastes which are generated from nuclear reactors, nuclear power plants, trident submarines and X-ray machines are known as nuclear wastes. They are the most hazardous of all as they emit radiation which can cause several diseases, cancer and genetic disorders.
Medical X-rays constitute about 18% of artificial radiations used in radiotherapy for diagnostic purposes.

Need for Management of Wastes

It is important to dispose wastes safely and scientifically. This is because wastes can result in the spread of many diseases.

Waste on Lands

There are dangers of spreading many diseases when wastes get accumulated on land and water bodies. The following table shows the lists of common diseases spread by various insects and organisms:

Insect/Organism/Animal	Diseases Spread
Housefly	Typhoid, diarrhoea, dysentery, cholera
Sand fly	Kala-azar, sand fly fever
Tsetse fly	Sleeping sickness
Mosquitoes	Malaria, yellow fever, chikungunya, dengue
Rodents	Plague, salmonellosis
Dog	Rabies, hydrated diseases

Wastes in Water

Industrialisation and urbanisation pollute water in the following ways:

- Sewage has pathogenic agents. A pathogen is a microorganism which can cause disease.
- Effluents discharged by water include metal salts and complex organic chemicals.
- Fertilisers and pesticides can pollute water resources.
- Radioactive substances can affect reproductive organs in humans and can cause several diseases, cancer and genetic disorders.

Greenhouse Effect and Global Warming

The Earth receives sunrays which keep it warm. The Earth does not absorb all the heat but emits a part of the heat back into space. This helps in maintaining uniform temperature on the surface of the Earth.
A greenhouse is a building made of glass in which plants are grown. The building made of glass absorbs the heat of the Sun but does not allow it to go out. This increases the temperature inside the glass building. Similarly, many greenhouse gases present in the atmosphere (such as carbon dioxide) absorb the Sun's energy and do not reflect it into space, leading to the increase in the temperature of the Earth.
Four gases are mainly responsible for creating the greenhouse effect on the Earth. These gases are carbon dioxide, methane, nitrogen oxide and chlorofluorocarbons (CFCs).

Many human activities such as burning of fossil fuels and deforestation have resulted in global warming.

Effects of Global Warming

- The temperature of the Earth is likely to increase by 2°C to 5°C in the next hundred years.
- This increase in temperature will result in the melting of snow in the polar regions of the Earth. This will result in the rise of the sea level leading to the submergence of coastal lands.
- Increase in temperature will result in changes in climatic conditions all over the world by influencing the wind and rain patterns.
- Rise in temperature will result in an increased rate of transpiration which will lead to the depletion of the groundwater table.

Depletion of the Ozone Layer

The ozone layer lies in the stratosphere. It absorbs the ultraviolet rays of the Sun and protects the Earth from its harmful effects.
The ozone layer has been depleting because of the emission of nitrogen oxide and CFCs. Supersonic jets release nitrogen gas which depletes the ozone layer. CFCs are used in many countries today. During the use of materials such as paints, foam and thermal insulating materials, CFCs escape into the atmosphere and harm the ozone layer.
A hole in the ozone layer has been discovered over Antarctica. Without the ozone layer, exposure to sunrays can cause diseases such as skin cancer and cataract in humans. Ultraviolet rays can cause genetic disorders. It also disturbs the ecological balance in the marine ecosystem.

Acid Rain

Pollutants present in the air such as sulphuric acid and nitrogen oxides (released by burning of fossil fuels and industrial emissions) combine with the droplets of water in the air and come down as rain; this is known as acid rain.
Effects of acid rain are

- Affects the human nervous system by causing neurological diseases
- Affects the lives of aquatic animals
- Leads to the corrosion of buildings, monuments and bridges
- Increases acidity of soil, leading to reduced fertility

Soil Pollution

Acid rain can cause soil pollution. Soil pollution leads to reduction in mineralisation and decomposition. It also reduces soil fertility and soil aeration. Further, it is important to check the accumulation of wastes and reduce soil pollution.

Waste Management

It is thus required to effectively manage wastes. One of the easiest ways of managing wastes is following the 3-R system—reduction, reuse and recycle. We should reduce the use of resources by not overusing and overexploiting them. Materials should also be used several times to conserve resources. Materials such as glass and paper should be recycled to make new materials. This helps in protecting our environment.