Nalanda Open University, Patna

Course Name: MA/M.Sc. Environmental science
Coordinator: Prof. (Dr.) Bihari Singh
Mob. No. : +91 9546452116
          +91 9334331422
Email ID: bihari_singh2001@yahoo.com

E-Content II (i)
for
Part II Examination, 2020
Short description of the suggested Topics
THEORY PAPER
PAPER – X
(WASTE GENERATION AND MANAGEMENT)

1. **Introductory account of Solid Waste; Classification of wastes on the basis of their physical and chemical composition.**

Introductory account of waste

Waste is a generalised word used to include any material that is no longer needed for use to the owner and is thrown away uncared.

Almost all human activities generate some waste. In recent times industrialization, rise in demand for consumer goods due to the population explosion, rising standard of living and increasing urbanization have all contributed to the generation of more and more waste.

Accumulation of waste is always there irrespective of whether it is a developing country like India or a developed one like U.S.A.

With the 'thrown away concept'(i.e. throwing away anything and everything which is no longer needed for use), the generation of waste, particularly in developing countries including India has been increasing alarmingly both in quantity and complexity. We can see heaps of solid wastes accumulated along roadside, in street corners, nearer congested areas in hospital and school backyards, near water bodies and at almost all public places. Improperly managed waste-solid, liquid or gaseous, municipal or industrial-poses a risk to human health and the environment.

Today, potential environmental and human health effects resulting from waste generation has become a serious concern to one and all. In past few decades, numerous international bodies and national agencies have been formed which take stock of the problem and are working on scientific, feasible and economic methods of waste management and disposal.

Here, it may be mentioned that a section of economists and environmentalists emphasize that "Waste is a misplaced resource and unrecognised wealth abandoned in a wrong place."They suggest that "Don't waste money on waste, make money from waste." There is an element of truth in the claim. Waste produced by one person may be a source of wealth for someone else. Thus, yesterday's newspaper is a waste for buyer but it could be raw material for paper bag makers or for a paper mill.

Wastes are increasingly being used for generating fuel gas and power (electricity) and bio-composting to nutrient rich manures.

It can be recycled or reused for various purposes.

Thus, if managed properly, wastes can be a source of wealth and can generate employment for a good number of people.

Classification of Waste

I.   On the basis of source of origin, and

II.   On the basis of physical and chemical composition

Classification of Waste on the basis of source of origin:

Based on their source of origin, wastes are placed under the following broad categories

i. **Domestic Waste:-**

Waste generated from domestic activities is called domestic waste. It includes kitchen waste (waste food, fruit and vegetable peels, ashes produced in chulhas using firewood and coal as fuel etc.), waste paper and plastics, garden litter, glass pieces, cloth rags, bottles, cans etc. The composition of domestic waste generated in rural areas is very different from the waste generated in urban areas.

The per capita domestic waste generated varies between 2.5 and 4.0 Kg per day in low income countries. In India, the per capita domestic waste generation is about 400gm per day.

ii. **Industrial waste:**

Ours is the age of science and technology. Most of the things we use are produced in large manufacturing units called industries. Industries begin their production with raw materials and make them into finished products. In the process they release wastes of different types and toxicity into the air, water and soil. These wastes include coal ash, blast furnace slag, metallic scrap from power plants and steel industries, acids, oils, complex synthetic materials from chemical industries, paper scraps, alkali and bleaching powder from paper industries etc. The list of industries and the wastes generated by them is long and most of them are harmful to human beings and to the environment.

iii. **Agricultural waste:**

Wastes generated in farms and livestock is called Agricultural waste. This includes crop residues, animal dung and wastes from fruit and vegetable processing. Modern agricultural practice uses chemical fertilizers, pesticides and insecticides to enhance crop yield. Rainwater and runoff water from the fields carry these chemicals into nearby water bodies such as lakes, ponds and rivers, and pollute them.

iv. **Municipal waste:**

Municipal waste is the name given to the waste generated in a municipality or local government area and is called so because the waste management authority is the Municipal Corporation/Board of the concerned area. It includes domestic waste, community waste and commercial waste which are collectively called as Municipal Solid Waste (MSW).

Community Waste:

It includes solid waste from educational institutions, community worship places, community meeting places, offices etc. and sweepings from streets, lanes and roads.

Commercial Wastes:

Waste generated due to activities at commercial places such as shops, stores, restaurants, market places etc. are called commercial wastes. These wastes include waste paper and plastic wrappers, used soft drink cans, food left over from restaurants, packing materials, wood pieces etc.

v. Biomedical waste:

Wastes generated in hospitals, pathological laboratories and clinics are called biomedical wastes. They include syringes, blades, bandages, saline bottles, blood stained cotton pads, dead body parts- tissues, flesh and blood etc.

Biomedical wastes fall under two broad categories- Infectious wastes and non-infectious wastes. Infectious wastes are those that contain large number of pathogens. They are dangerous as exposure to them could cause diseases. Most biomedical wastes are non-infectious. But infectious wastes are often mixed with non-infectious wastes. This turns the entire lot into a hazardous heap. Biomedical wastes are more dangerous than most of the other wastes.

vi. E-waste:

E-waste or electronic waste consists of discarded electronic parts from computers, televisions, music systems and other household electronic articles. These wastes include cassettes, ribbons, cartridges, discarded computer parts etc.

vii. Radioactive waste:

These wastes, which are highly hazardous, arise primarily from nuclear power plants, nuclear research laboratories and from military sources.

Classification of wastes on the basis of physical state, biological characteristics and chemical nature:

i. Classification on the basis of physical state:

On the basis of physical state wastes are classified as solid, liquid and gaseous wastes.

Solid waste:

Most building and demolition materials, mining wastes, agricultural wastes, industrial wastes, commercial wastes and municipal wastes are solid. Some domestic wastes are semi solid.

Liquid waste:

Liquid wastes include effluents from various industries, for example - fertilizer industry, tanneries, distilleries, textile industries, chemical and pharmaceutical industries, paper and pulp industries etc. and oil spills. Sewage sludge and waste water from kitchens and toilets are also examples of liquid wastes.

Gaseous waste:

Many chemical industries, metallurgical furnaces and chimneys, and fertilizer and medicine industries generate various toxic and nontoxic gases. The gases include oxides of nitrogen, oxides of sulphur, hydrogen sulphide and ammonia. Exhausts from automobiles and harmful gaseous wastes from refrigerators are some other gaseous wastes. All animals including human beings release carbon dioxide as gaseous waste during respiration.

ii. Classification on the basis of biological characteristics:

On the basis of biological characteristics wastes are classified as biodegradable wastes and non-biodegradable wastes.

Biodegradable waste:

The wastes which can decompose and break up into simpler substances by the action of micro-organisms are called biodegradable wastes. Biodegradable wastes consist mainly of organic matter. When it is decomposed it becomes manure.

The garbage from kitchens, plant and crop residues, animal dung and waste paper are common examples of biodegradable wastes. Faecal matter, dead and decaying remains of animals and plants and the major proportion of sewage sludge are other important examples of biodegradable wastes.

Non-biodegradable waste:

Wastes which cannot be decomposed into simpler substances by micro-organisms are called non-biodegradable wastes. These wastes are mainly inorganic in nature. Wastes like metals and metal compounds, glass, plastic goods, mercury, lead, tin, arsenic, coal ash, sand and dust are the common examples of non-biodegradable wastes.

iii. Classification on the basis of chemical nature:

On the basis of chemical nature wastes are classified as hazardous waste and non-hazardous waste.

Hazardous waste:

The wastes which are toxic in nature and are harmful to human being, animals, plants and the environment are called hazardous waste. The bulk of hazardous and toxic wastes are generated by process industries which include chemical industries, mineral and metal process industries and the engineering industry. In addition, washing machines, refrigerators and air conditioners emit small quantities of chemicals such as chlorofluorocarbons (CFCs) which are hazardous as they affect the ozone layer: Biomedical wastes and Radioactive wastes are other categories of hazardous waste which must be dealt with and disposed with a lot of care.

Non-hazardous waste:

The wastes which are not toxic and are not harmful to human beings, animals, plants or the environment are called non-hazardous waste. Paper, cotton rags, vegetable and fruit peelings, kitchen wastes, dust, crop residues, garden litter and ash are examples of non-hazardous waste.

NOTE: Description on the topic is exhaustive. Answer may be shortened/modified according to the question which may be asked to answer.