

Chapter 12. Waste Generation and Management

Very Short Questions

Question 1: What is known as waste?

Answer: Waste is a thing is not required by the producer, processor or owner. It is generally discarded or thrown away by households, industries, etc.

Question 2: How many types of waste?

Answer: Wastes are of three types: Solid, liquid, or gaseous.

Question 3: What are sources of waste?

Answer: Waste is generated from a number of sources. The major sources of waste are domestic waste, industrial waste, agricultural waste, biomedical waste, municipal waste etc.

Question 4: What are the sources of agricultural wastes.

Answer: Fertilizers, pesticides and insecticides and other chemical agents.

Question 5: What is meant by domestic waste?

Answer: Wastes generated due to domestic activities are called domestic wastes. Fruits and vegetable peels, paper, polythenes, discarded clothes etc. are the sources of domestic waste.

Question 6: Define gaseous waste.

Answer: It includes fuel exhausts containing carbon dioxide, nitrogen oxides, carbon monoxide, etc., and smog which is formed as a hazy mixture of gases when fuel exhaust reacts with sunlight.

Question 7: What does industrial waste include?

Answer: Industrial wastes include any material that is rendered useless during a manufacturing process.
e.g. Metals, Chemicals, Gases.

Question 8: What is biomedical waste?

Answer: Biomedical waste generated from hospital activities, pathology, laboratory and other associated areas. e.g Blades, Needles, Body part etc.

Question 9: What form of waste is generated from the oil refineries?

Answer: Petroleum is found in raw form while refining, it releases a large amount of gaseous and liquid waste.

Question 10: What is hazardous waste? How is it generated?

Answer: Hazardous waste is waste material, often in chemical form that comes from agriculture, radioactive sources, and industries can pose a long term risk to health and environment.

Question 11: What is segregation?

Answer: Segregation is the initial stage of waste disposal. The waste can be segregated according to their features like sharp edged waste like blades, knives, plastic glass, bottles, etc.

Question 12: What is open dumping of wastes?

Answer: In these methods waste materials are dumped in open low lands far away from the city. It is a common and cheapest method of disposing waste on land. Nowadays, this method is improved and is called landfill.

Question 13: How is solid waste disposed of in an incinerator?

Answer: Solid waste disposal is its reduction in weight and volume. In the incinerator the waste is burned and it reduces by 90% in weight and volume.

Question 14: What do you understand by landfill?

Answer: Sanitary landfill is a way of disposing refuse on land without creating nuisances or hazards to public health or safety. The waste is packed and dumped at the site and is covered with earth daily to prevent insects or rodents from entering into the landfill.

Question 15: What is composting?

Answer: Composting is a natural degradation process in which biodegradable materials are decomposed by microbes and converted into manure.

Question 16: What do you mean by a scrubber?

Answer: Scrubbers are often used in waste disposal systems. Scrubbers along with condensers and traps are used to contain and collect waste solvents, toxic vapours or dust.

Question 17: What is recycling?

Answer: Recycling is the process of collecting, separating, processing, and selling recyclable materials so they can be turned into new products. Simply put, recycling is taking something old and worn-out and turning it into something new.

Question 18: What do you mean by reuse?

Answer: 'Reuse' of materials in their original form is practiced instead of throwing them away, or passing those materials on to others who could use them too!

Question 19: What is 'Source reduction'?

Answer: "Source reduction" is reducing waste before purchasing or by purchasing products which are not wasteful in their packaging or use.

Question 20: State the main objective of the treatment of gaseous waste.

Answer: The objectives of the treatment of gaseous waste is to drain the harmful particles and allow clean air to escape through chimneys.

Short Questions

Question 1: What is pollution? Define.

Answer: Pollution may be described as the unfavourable alteration of our surroundings which occurs mainly because of human activities. Pollution created by waste accumulation is mainly of three types – air pollution, water pollution and soil pollution.

Question 2: What do you mean by spoilage of landscape?

Answer: Spoilage of landscape is directly related to improper disposal of wastes. The waste accumulation not only ruins the natural beauty of the land but also provide a home to rats and other disease carrying organisms. Sources of these wastes may be paper mills, fertilizers manufacturing units, and mines etc.

Question 3: What is eutrophication?

Answer: It is the process of depletion of oxygen from water bodies occurring either naturally or due to human activities. The process of eutrophication takes place due to introduction of nutrients and chemicals through discharge of domestic sewage, industrial effluents and fertilizers from agricultural field. Algae and phytoplankton use carbon dioxide, inorganic nitrogen and phosphate from the water as food. This cause death of most of the aquatic organisms, draining water of all its oxygen.

Question 4: What is biomagnifications? What can be its effects on human beings?

Answer: An important process by which chemicals can affect living organisms is bio-magnification. Many pesticides, such as DDT, aldrin and dieldrin have a long lifetime in the environment. They get incorporated into the food chain and ultimately reach all the tissues of plants and animals. They get modified into higher trophic levels. Bio-accumulation or biological magnification can also be seen in the case of heavy metals like lead, mercury, cadmium, etc.

Question 5: What is municipal waste?

Answer: Municipal waste is the waste generated in a municipality or a local government area. Such waste is produced by shops, offices, restaurants, schools, hospitals; etc. and is

collected from public waste bins.

Question 6: What is waste disposal?

Answer: Waste disposal is the management of waste to prevent harm to the environment, injury or long term progressive damage to health. Disposal of waste is where the intention is to permanently store, the waste for the duration of its biological and chemical activity, such that it is rendered harmless.

Question 7: Defines electrostatic precipitators.

Answer: Electrostatic precipitators have been the air pollution control technology of choice for power generation and industrial processes throughout the world. ESPs are highly efficient dust collectors with proven collection efficiencies of up to 99.99% with guaranteed outlet emissions with minimal pressure loss. In an electrostatic precipitator, particles suspended in the air stream are given an electric charge as they enter the unit and are then removed by the influence of an electric field.

Question 8: How does an incinerator work?

Answer: Waste material is brought to the incinerator facility where it is loaded into one of several burn chambers. The waste is burned for several hours until it is reduced to ashes and molten metal. The remaining ash is then transported to a landfill for final disposal.

Question 9: How can an incinerator help reduce pollution?

Answer: Incinerators are permitted to emit certain air pollutants within a range that is not harmful to human health and the environment. The incinerator must be designed with appropriate pollution control equipment that removes small particles from the emissions prior to the discharge into the atmosphere. In burning the waste, an incinerator reduces the volume of waste material going to the landfill by 80 to 90%.

Question 10: Can earthworms help in the composting process?

Answer: Earthworms are actually a good sign of healthy soil. Vermi-composting, which is the use of earthworms in composting, is very important in the composting process. In fact, earthworms can greatly speed up the composting process and the castings, earthworm poop, is high in nitrogen. Also, one pound of earthworms can devour up to 6 pounds of food waste a week.

Question 11: Is an incinerator good for the environment?

Answer: Incinerators can be good for the environment simply because they greatly reduce the volume of materials that go to the landfills. In some cases, incinerators are permitted to burn hazardous wastes which would otherwise be buried in the ground in a hazardous waste landfill.

Question 12: What are some items at your home that can be recycled?

Answer: There are many items in your home that can often be recycled in your community. These items include aluminium and steel cans, newspapers, corrugated boxes, telephone books, plastic and glass bottles, used motor oil, large appliances, rechargeable batteries, automotive batteries and tires, clothing and yard and food waste.

Question 13: What does the recycling symbol with the three arrows represent?

Answer: The recycling symbol with the three arrows represents the three steps in the recycling process, (i) Collection and processing of recyclable materials, (ii) Manufacturing of those materials into new products, and (iii) Products Sold to consumers which then starts the process over again.

Question 14: What are the three R's of waste management?

Answer: In the modern industrial world, the waste has become an environmental and public health hazard. Waste can be effectively managed by using the following three strategies:

(a) Reducing the waste (b) Reusing the waste and (c) Recycling the waste.

Question 15: Why are recycled plastic bags considered harmful for the environment?

Answer: Plastics are recycled by plastic manufacturers. Plastic is non-biodegradable. The bonds of carbon in plastic are impossible to break down through a physical or chemical process. They have to be incinerated, recycled or buried in landfills. The plastic bags which are extensively used in India are made from recycled plastic. The recycled plastic bags are harmful because the melting of plastic and plastic products breaks some polymer chains into smaller units which are harmful.

Question 16: Is source reduction good for the environment?

Answer: Source reduction is definitely good for the environment. It is actually a better alternative than recycling, incineration and land filling. In the case of source reduction, if you don't produce the waste in the first place then there is nothing to recycle, incinerate or landfill. Source reduction means fewer resources are used in the production of a product.

Question 17: Explains the role of an individual in maintaining environmental standards.

Answer: The role of every individual in environmental protection is of great importance because if every individual contributes substantially, the effect will be visible not only at the community, city or national level but also at the global level. Each individual should change his or her life style in such a way as to reduce environmental pollution. It can be done by following ways:

(i) Use carry bags made of paper or cloth instead of polythene.

(ii) Use eco-friendly products.

(iii) Use CFC free refrigerators.

(iv) Use organic manure instead of commercial inorganic fertilizers.

(v) Plant more trees, as trees can absorb many toxic gases and can purify the air by releasing oxygen.

Long Questions

Question 1: How is soil pollution caused?

Answer: Soil pollution usually results from the disposal of solid and semi-solid wastes in agricultural practices, industrial processes and insanitary habits.

Some Major Causes of soil pollution:

Industrial waste: Industrial wastes are mainly discharged from coal and mineral mining, metal processing and engineering industries.

Agricultural practices: Though fertilizers are used to increase the fertility of soil, they often contaminate the soil with impurities present in them. When the fertilizers are contaminated with other synthetic organic chemicals, the soil water gets polluted.

Question 2: Defines the effect of waste accumulation on human health.

Answer: Several incidents around the world have demonstrated the potential harm of accumulation of waste to human health. Some materials are as follows which harm people every day:

Lead: affects blood system, behavioural disorders and can also cause death.

Cadmium: cardiovascular diseases and hypertension, kidney damage Mercury: Nerve and brain damage, kidney damage.

Question 3: Explain the effect of accumulation of solid waste on aquatic and terrestrial life.

Answer: (i) Ammonia seems to be an internal poison to fish as it gets into the body through the gills.

(ii) Bio-accumulation in sea-birds and marine mammals has been linked to reduced breeding success.

(iii) In aquatic ecosystems, cadmium can bio-accumulate in mussels, oysters, lobsters and fish.

(iv) Air contaminated with ozone has irritant qualities and is responsible for pulmonary changes, edema and haemorrhage in dogs, cats and rabbits.

(v) Oil is reported to coat the gills of fish which affects their respiration.

Question 4: What is incineration? Give advantage and disadvantage of incineration.

Answer: Incineration is the process of destroying waste materials by burning. Incineration is carried out both on a small scale by individuals, and so on a large scale industries.

Advantages:

(i) It is a useful technology to deal with large quantities of organic hazardous wastes that have high calorific value and cannot be dealt with by other methods.

(ii) Incineration kills pathogenic organisms and reduces the volume of the waste up to 50 percent.

Disadvantage:

- (i) Incineration equipment has high maintenance requirements.
- (ii) Incineration consumes significant amount of energy to achieve high temperature.

Question 5: Explain the role of government in waste management.

Answer: The government is not just the protector of the country's environment but also has a major responsibility for sustaining environmental conscience. The government's environmental policy focusses on the following areas:

- (i) To check degradation of land and water through wasteland management and restorations of river water quality programmes.
- (ii) To monitor development through environmental impact assessment studies of major project proposals; and
- (iii) To make laws and acts for environment protection and to initiate penal measures against those who violate these laws.

Question 6: Explain the stages involved in secondary treatment of water.

Answer: Water treated by primary treatment is not fit for drinking. Therefore, it undergoes the process of secondary treatment. Secondary treatment has the following two steps:

- (i) Softening: The hard water has actions of calcium and magnesium. To soften water lime and soda ash are added to the water to precipitate calcium and magnesium ions as carbonates. The precipitate is then filtered out. The water so treated goes through porous actions exchanger in which water becomes action free.
- (ii) Aeration: In order to make the water fit for drinking some amount of oxygen is forced into it. Aeration of water is carried out by forcing air through water in the form of air bubbles. This process adds oxygen and other gases and reduces the content of carbon gases and reduces the content of carbon dioxide and hydrogen sulphide in the water.

Question 7: What happens to the garbage after it is put into a landfill?

Answer: After the garbage is buried in the landfill it will begin to breakdown as aerobic and anaerobic micro-organisms decompose the garbage. This activity causes methane gas to be created, which is collected and burned off at one or more points on the landfill. Over time most biodegradation slows down dramatically. This happens because the anaerobic micro. organisms act much more slowly on materials. If these same materials were exposed to oxygen, water and sunlight the aerobic micro-organisms would decompose the waste materials much faster.

Question 8: How does composting work?

Answer: When grass, leaves, food waste, manure and woody material are placed on the ground, micro-organisms from the ground begin to eat the material. The breakdown of this

material is speed up with assistance from air (oxygen), water, and sunlight. Generally it will take several months for the material to become compost and that will also depend on how often you turn the pile of material.

Question 9: Discuss the functioning of air scrubber.

Answer: The air scrubbers are the anti pollution devices which are visible as metal pipes which are used to trap the particles from the emissions of gaseous waste. The scrubbers prevent these pollutants from entering into the atmosphere. In the air scrubber the pollutants are removed from the gas emissions by spraying the scrubber liquid directly into the emissions. The dirty particles are surrounded by the scrubbers liquid which are then carried with the gas emissions into the cylinder. As the gas is cycled upwards through the cylinder the liquid covered particles drop from the gas in the contaminated liquid reservoir.

Question 10: Explain Why is it so important to recycle?

Answer: Recycling is important for several reasons:

(i) Recycling conserves natural resources. Some of these natural resources such as oil, natural gas and minerals are non-renewable resources. Simply put, they don't get replaced as we pull them out of the ground. Once they're gone, they're gone forever.

(ii) Recycling conserves landfill space. Landfill space will last longer if we only put items that are not recyclable into them. It costs a great deal of money to build a landfill and we need to be careful how much and how fast we fill them up.

(iii) Recycling employs people. Recycling employs people who

- (a) collect the recyclable material,
- (b) process the material or get it ready to sell to a manufacturer,
- (c) transport the materials to factories where it will be turned into new products,
- (d) take the material and manufacture it into new products,
- (e) manufacture equipment and products used by the recycling industry, and
- (f) manage local, state and federal government recycling programs and private and non-profit recycling programs.

(iv) Recycling conserves energy. Without question, recycling conserves the energy that would be necessary to create the same product from its raw resource.

(v) Recycling reduces our dependence on overseas natural resources. This is important in two very important ways,

- (a) it reduces our dependence on overseas oil and gas which has national security implications and
- (b) it reduces our foreign trade deficit which is important to the strength of our economy.

Question 11: Discuss the processes of common recyclable items.

Answer: Aluminium: Many beverage containers are aluminium made which can be melted and recycled. They are crushed and baled before sending them to the reclamation plant.

Here they are put into furnace and melted to form ingots or sheets.

Glass: scrap glass is called 'cullet' which melts at lower temperature than other raw materials thus saving fuel and money. Scraped glass is sorted by colour and made free from impurities. The cullet is melted in a furnace to make new glass.

Question 12: What is made from recyclable materials?

Answer:

(i) Aluminium cans are melted down and recycled into new aluminium cans and other products made of aluminium.

(ii) Newspapers and telephone books are ground up and made into newsprint, cereal boxes, cellulose insulation for keeping homes warm, paper egg cartons, and ceiling tiles.

(iii) Glass bottles are crushed, melted and recycled into more glass bottles, or used along with sand and gravel in asphalt roads.

(iv) Automobile scrap tires are generally chipped and burned as a fuel in place of or in addition to coal. Scrap tires are also manufactured into numerous rubber products including rubber mats and rubber bumpers.

(v) Yard and food waste can be composted in your backyard. Since the compost contains plenty of nitrogen and other organic nutrients, it is great in gardens and flower beds.

Give Reasons

Give Geographical Reasons for the following:

Question 1: What are the reasons for spoilage of landscape?

Answer: Spoilage of landscape is due to improper disposal wastes, especially solid waste, it may include slag heaps from paper mills, waste from mines, fertilizer, etc. Even our household contributes a large no. of solid wastes like paper, plastic, vegetable waste, etc.

Question 2: Why is composting important?

Answer: Composting is important because it puts organic materials back into the ground which is necessary for a naturally healthy lawn and garden. In addition, composting is important because it's a better alternative than sending these natural organic materials to the landfill.

Question 3: Why do we have landfills and are they really necessary?

Answer: The garbage that is disposed of each day by municipalities, counties, government, business and industries must be done so in an environmentally safe way in order to protect human health and the environment. Landfills are one way to dispose of our solid waste in a safe way. We have landfills because not every item thrown out or discarded can be recycling or reused.

Differentiate

Question 1: Biodegradable and Non-biodegradable waste.

Answer:

Biodegradable	Non-biodegradable
The biodegradable wastes break down and decompose by microorganism like bacteria and fungi in the soil. e.g. Wood, Paper etc.	Non-biodegradable waste includes that material which does not breakdown or decompose in the soil. e.g. Plastics, Poly-bags etc.

Name the Following

Question 1: Name three diseases which occur because of waste accumulation on land.

Answer: Diarrhoea, cholera, viral hepatitis.

Question 2: Name the methods for disposal of solid, liquid and gaseous waste.

Answer: Solid waste disposal methods: dumping, incineration, composting.
Liquid waste disposal methods: grit chamber, sedimentation, digestion and drying.
Gaseous waste disposal methods: air scrubbers and electrostatic precipitators.

Question 3: Name the four stages of primary treatment of water.

Answer: Primary treatment for removal of gross impurities involves four stages:
(a) Sedimentation,
(b) coagulation or flocculation,
(c) filtration,
(d) disinfection

Question 4: Name two common diseases caused as a result of gaseous pollution.

Answer: Two diseases are lung cancer and asthma.