

Lesson at a Glance

- **Wastewater:** It is the used dirty water which may be black-brown, rich in lather, mixed with oil, discharged from sinks, showers, toilets, laundries etc.
- **Clean water:** Water that is fit for use and safe for drinking is known as *clean water*.
- **Cleaning of water:** It is a process of removing pollutants from water before it is released into a water body or is reused.
- **Sewage treatment:** This refers to the process of rendering the dirty water from households and industries harmless. The treated water is released to water bodies, such as streams and rivers. This water can be used again for supplying drinking water, irrigation of crops and for aquaculture.
- **Sewage** is waste water discharged from industries, hospitals, offices, homes and rainwater that washes off roads and rooftops. *Sewage* is a liquid waste that may contain organic impurities (such as urine, faces), inorganic impurities, nutrients (e.g., phosphates), diseases causing bacteria and other microbes.
- **Sewers:** A network of big and small pipes that carries waste water (sewage) is called *sewers*, forming the *sewerage*. Sewers carry sewage from the point of being produced to the point of disposal-treatment plant.
- **Contaminants:** The dissolved and suspended impurities present in water are called *contaminants*.
- **WWTP:** It stands for *Waste Water Treatment Plant*. Here by physical, chemical and biological processes contaminants of waste water are removed.

- **Sludge:** Wastewater solids, like faeces, which settle down at the bottom of a large tank and are removed with a scraper are called *sludge*.
 - **Clarified water:** Water which is cleared from the floatable solids like oil and grease by a skimmer is called *clarified water*.
 - **Anaerobic Bacteria:** Bacteria which can grow and multiply in absence of free oxygen are called *anaerobic bacteria*.
 - **Biogas:** The gas that is produced by decomposition of sludge by the anaerobic bacteria is known as *biogas*.
 - The biogas produced by decomposition of sludge can be used as fuel or to produce electricity.
 - **Aerobic bacteria:** Bacteria which require free oxygen (air) for their growth and multiplication are called *aerobic bacteria*.
 - **Function of aerobic bacteria:** Air is pumped into the clarified water which helps growth of aerobic bacteria. These aerobic bacteria consume human wastes, food wastes, soaps and other unwanted matter that still remained in clarified water.
 - **Activated sludge:** After the action of aerobic bacteria for several hours, the suspended microbes settle at the bottom of the tank as activated sludge. The water is then removed from the top.
 - **Sanitation:** It is the disposal of sewage and refuse from houses and other public places. Sanitary means conditions that affect health, especially with regard to dirt and infection. In other words hygienic conditions that are free from or designed to kill germs and infection comprise sanitation.
 - A large number of economically weaker people defaecate in the open like fields, railway tracks and many a time directly in water.
- Untreated human excreta is a health hazard. It may cause soil pollution, surface water pollution and also ground water pollution.

- Pollution of surface water and ground water pollution by human excreta may cause water borne disease in the community. For example, *Cholera*, *typhoid*, *polio*, *meningitis*, *hepatitis* and *dysentery*.
- Alternative arrangement for sewage disposal:
 - (i) To improve sanitation, low cost onsite sewage disposal systems are recommended. Examples are septic tanks, chemical toilets and composting pits.
 - (ii) Septic tanks are suitable for places where there is no sewerage system, for example hospitals.
 - (iii) Toilets which do not require scavenging. Excreta from the toilet seats flow through covered drains into biogas plant. The biogas produced is used as a source of energy.
- **Sanitation at Public Places:** Thousand of people visit public places like railway stations, bus stops, airports and hospitals daily. Waste there must be disposed of properly otherwise epidemics could break out.
- The government has laid down certain standards of sanitation, but they are not strictly followed.
- We should not scatter litter anywhere if there is not dustbin in sight. We should carry the litter home and throw it in the dustbin.
- Experts have suggested that we should plant *Eucalyptus* trees all along the sewage ponds. Because these trees absorb all surplus wastewater rapidly and release pure water vapour into the atmosphere.

TEXTBOOK QUESTIONS SOLVED

Q.1. Fill in the blanks:

- (a) Cleaning of water is process of removing _____.
- (b) Wastewater released by houses is called _____.
- (c) Dried _____ is used as manure.
- (d) Drains get blocked by _____ and _____.

- Ans.** (a) pollutants (b) sewage
(c) sludge (d) chemicals, kitchen waste

Q.2. What is sewage? Explain why it is harmful to discharge untreated sewage into rivers or seas.

Ans. Sewage is a liquid containing wastes which is disposed by households, industrial and agricultural activities in water. It is harmful to discharge untreated sewage into rivers or seas because it can pollute the whole sources of water. Sewage contains harmful substances and disease causing organisms. It is therefore dangerous to release untreated sewage in water.

Q.3. Why should oils and fats be not released in the drain? Explain.

Ans. Oils and fats should not be released in drains because they harden the soil in the pipes and block them. Fats get clogged in holes of the soil in the drain and block it. It does not allow the water to flow.

Q.4. Describe the steps involved in getting clarified water from wastewater.

Ans. Following steps are involved in the purification of water:

- (i) Firstly all the physical impurities like stones, plastic bags, cans etc. are to be removed. It is done by passing the water through bar screens.
- (ii) Then water is taken to grit and sand removal tank where impurities are removed by sedimentation.
- (iii) Solid impurities and faeces etc. are collected from bottom of water. These impurities collected are called sludge.
- (iv) Clarified water is cleaned of other impurities by aerator. All disease causing bacteria are removed by chlorination.

Q.3. Visit a sewage treatment plant.

It could be as exciting and enriching as a visit to a zoo, a museum, or a park. To guide your observation here are a few suggestions.

Record in your notepad:

Place _____ Date _____ Time _____

Name of the official at the plant _____

Guide/Teacher _____

- (a) The location of the sewage plant.
- (b) Treatment capacity.
- (c) The purpose of screening as the initial process.
- (d) How is air bubbled through the aeration tank?
- (e) How safe is the water at the end of the treatment?
How is it tested?
- (f) Where is the water discharged after treatment?
- (g) What happens to the plant during heavy rains?
- (h) Is biogas consumed within the plant or sold to other consumers?
- (i) What happens to the treated sludge?
- (j) Is there any special effort to protect nearby houses from the plant?
- (k) Other observations.

Ans. Do it yourself with the help of your teacher/parents.