



## ***Water pollution***

Water pollution is defined as, “*the alteration in physical, chemical and biological characteristics of water which may cause harmful effects on human and aquatic life.*”

### **sources(causes) of water pollution:**

- **Infectious agents:** Bacteria, viruses, protozoa and parasitic worms from human and animal wastes.
- **Oxygen demanding wastes:** Animal manure and plant debris that can be decomposed by aerobic bacteria. Oxygen demanding wastes from sewage, paper mills, and food processing facilities.
- **Inorganic Chemicals:** Water soluble inorganic chemicals from industrial effluents, household cleansers.
- **Organic chemicals** such as Oil, gasoline, plastics, detergent
- **Plant nutrients** such as phosphate, ammonium, nitrate from sewage, manure, fertilizers.
- **Radioactive materials** such as radon, uranium, thorium from nuclear power plant, mining.
- **Thermal pollution (Heat):** Water cooling of electric power plants and some types of industrial plants.
- **Point source:** Pollutant discharged at specific location through pipes, ditches into water bodies  
**ex:** factories, sewage treatment plants, oil tankers.
- **Non-point source:** Large land areas that pollute water by subsurface flow or deposition from atmosphere.  
**ex:** acid deposition, runoff chemicals.



### **Effects of water pollution:**

- Wastes can degrade quality by depleting water of dissolved oxygen.
- Affect aquatic life.
- Genetic mutations, birth defects and certain cancers.
- Lowers dissolved oxygen levels and makes aquatic organisms more vulnerable to disease and toxic chemicals
- unusable for drinking, skin cancer, harm aquatic life, lower crop yield
- When a power plant first opens or shuts down for repair, fish and other organisms adapted to a particular temperature range can be killed by the abrupt change in water temperature known as thermal shock.

### **Control measures:**

- Government action
- Recycling operation in industrial plants
- Trees & forest Control pollution
- Conservation of forest
- Plant more trees
- Avoid discharge of untreated water into rivers, lakes.
- Industries should develop close-loop water supply scheme.
- Consulted by experienced person
- Public awareness
- Suitable laws, standards & practice

### **Characteristics(testing) of river water(waste water):(2marks)**

#### **1. Dissolved oxygen (DO):**

- Amount of oxygen dissolved in quantity of water at particular pressure & temperature.
- Support aquatic life in river.
- control river pollution
- Minimum level of DO is 4 mg/lit.



## 2. Biochemical oxygen demand (BOD):

- Amount of oxygen required for decomposition of organic matter in water.
- The rate of oxidation & demand depends on amount & type of organic matter in water.
- Complete oxidation occurs in indefinite period.
- Reaction period is taken as 5 days at 20°C. It is written as **BOD<sub>5</sub>**.

## 3. Chemical oxygen demand (COD):

- Amount of oxygen required for chemical oxidation of organic matter.
- Using oxidizing agent like  $K_2Cr_2O_7$  &  $KMnO_4$ .
- Determine the pollutional strength of river water.
- Rapid process & take 3 hrs.