

Chapter 31 Environmental Microbiology: Treatment of Water, Wastes and Polluted Habitats

Summary Outline

13.1 Microbiology of sewage treatment

- A. **Reduction of biochemical oxygen demand (BOD)** reflects the effectiveness of treatment.
- B. Multiple sewage treatment methods
 - 1. **Primary treatment** of sewage is a physical process designed to remove materials that sediment out.
 - 2. **Secondary treatment** is chiefly a process designed to convert most of the suspended solids to inorganic compounds and microbial biomass removing most of the BOD
 - 3. **Tertiary treatment** is generally designed to remove nitrates and phosphates.
 - 4. **Biosolids** that result from anaerobic digestion of **sludge** can be used to improve soils and promote plant growth.
- C. Individual sewage treatment systems -Rural dwelling rely on septic tanks for sewage disposal

13.2 Drinking water treatment and testing

- A. Water treatment processes
 - 1. Metropolitan water supplies are treated to remove **particulate** and **suspended matter**, various **microorganisms**, and **organic waste**.
 - 2. Water is treated using chlorine or other disinfectants to kill harmful bacteria and viruses.
- B. Water testing – **Coliforms** are used as **indicator organisms**, suggesting the possible presence of pathogens.

13.3 Microbiology of solid waste treatment

- A. Sanitary **landfills** for solid waste disposal – landfills are used to dispose of solid wastes near towns and cities; disadvantages include limited available sites and slow decomposition of wastes
- B. Commercial and backyard **composting** – an alternative to landfills – composting offers cities a way to reduce the amount of garbage sent to landfills.

13.4 Microbiology of **bioremediation**

- A. Pollutants
 - 1. **Pollutants** that are concentrated in a new environment can remain for years.
 - 2. Synthetic compound are more likely to be **biodegradable** if they have a chemical composition similar to that of naturally occurring compounds.
- B. Means of bioremediation include using nitrogen and phosphorus containing fertilizers to increase the effectiveness of oil degradation by naturally occurring bacteria.