ENVIRONMENTAL MICROBIOLOGY

(MCB 306)

MICROORGANISMS AND THEIR HABITATS

Microbial Interactions in their environment

- Mutualism
- Synergism
- Commensalism
- Competition
- Amensalism
- Parasitism
- Predation

Microbe-Plant interaction

- Rhizobia and legumes
- Mycorrhiza fungi
- Plant pathogens

Microbe-animal interaction

- Luminescent bacteria
- Hawaiian bobtail squid
- Pathogenic interactions

BIOGEOCHEMICAL CYCLING

- Biogeochemical cycle as the movement of elements and compounds among biological, geological and chemical reservoirs

- The importance of this cycle in sustenance of life, regulating the climate and maintenance of the ecosystem

The major elements

- Carbon
- Nitrogen
- Phosphorus
- Sulphur

Carbon Cycle

- Photosynthesis
- Respiration
- Decomposition
- Fossil fuel combustion

The role of the carbon sinks (forests, oceans) and sources.

The impacts of anthropogenic activities on the carbon cycle and the implication on the environment (climate change and global warming)

Nitrogen Cycle

- Nitrogen fixation
- Nitrification
- Assimilation
- Ammonification
- Denitrification

Effects of excessive nitrogen in the environment from agricultural run-off and industrial pollution on ecosystems (eutrophication and dead zones)

Phosphorus Cycle

- Weathering of rocks
- Uptake by plants
- Return to the soil through decomposition

Phosphorus as a limiting nutrient in many ecosystems

Sulphur Cycle

- Natural activity
- Anthropogenic activities

WASTE MANAGEMENT: SOLID WASTE MANAGEMENT AND DISPOSAL

- What is waste management?
- What is solid waste management?
- Different types of solid waste based on the source
- Challenges faced in the proper disposal of solid waste

Waste Disposal Methods

- Landfilling
- Incineration
- Composting
- Vermicomposting
- Anaerobic digestion

LIQUID WASTE MANAGEMENT

- Wastewater management
- Objectives of wastewater management and treatment
- Steps in wastewater treatment
- Non-conventional methods

MICROBIAL BIOREMEDIATION

- What is microbial bioremediation?
- Factors affecting microbial bioremediation
- Principle of bioremediation

Types of bioremediation methods

- Biostimulation
- Bioattenuation
- Bioaugmentation
- Bioventing
- Biopiles

Traditional remediation methods

vs

Bioremediation

- The merits of bioremediation
- The demerits of bioremediation

WATER POTABILITY

- What is water potability?

- Steps in water treatment

  Sedimentation

  Coagulation

  Filtration

  Disinfection

Methods to detect potability of water

- Heterotrophic Plate Count
- Membrane filter technique
- Epifluorescence microscopy
- Multiple tube fermentation test

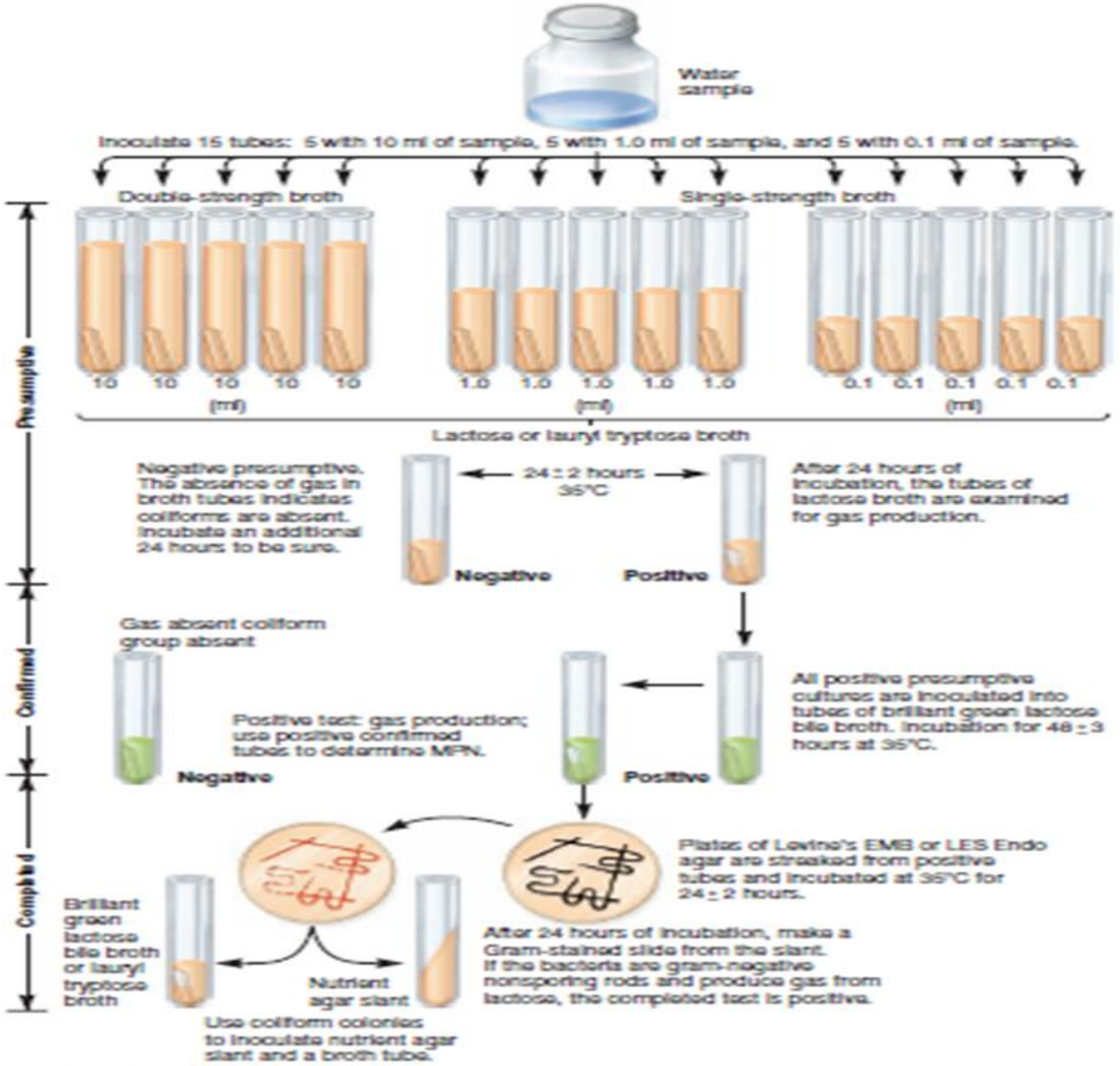

Figure 35.2 The Multiple-Tube Fermentation Test. The multiple-tube fermentation technique has been used for many years for the sanitary analysis of water. Lactose broth tubes are inoculated with different water volumes in the presumptive test. Tubes that are positive for gas production are inoculated into brilliant green lactose bile broth in the confirmed test, and positive tubes are used to calculate the most probable number (MPN) value. The completed test is used to establish that coliform bacteria are present.