

Chapter 7 - Environmental biotechnology

71 Introduction

- A.Waste generation trends
- B.Treatment in the past
- C.Environmental biotechnology
 - 1.definition
 - 2.microbes involved
 - 3.current research
 - 4.regulatory constraints

72 Microbial ecology / environmental biotechnology

- 1.definition
- A.Biodegradation
 - 1.definition
 - 2.microbes involved
 - 3.microbial initial step
- B.Biotech processes developed
 - 1.current focus
- C.Recalcitrant
- D.Xenobiotics
- E.Biodegradable
 - 1.conditions

73 Waste water and sewage treatment

- A.Cholera
- B.Treatment systems
 - 1.cesspits
 - 2.septic tanks
 - 3.sewage farms
 - 4.gravel beds
 - 5.percolating filters
 - 6.activated sludge process with anaerobic digestion
- C.Aim
- D.Organisms
- E.Size
 - 1.recognition
- F.Digestion reactor stages
- G.Percolating or trickling filter bioreactor
- H.Water
- I. Treatment of liquid wastes vocabulary - Table 7.2
 - 1.BOD
 - 2.Mixed liquor
 - 3.Sludge
 - 4.Nitrification
 - 5.Denitrification
 - 6.Anoxic
 - 7.Anaerobic

74 Landfill technologies

- A.Solid wastes
 - 1.decomposition
- B.Strategies
 - 1.primary recycling
 - 2.secondary recycling
 - 3.tertiary recycling
 - 4.landfilling
- C.Anaerobic landfill technology
 - 1.methane
- D.Current Regs.
 - 1.sealed
 - 2.monitoring
 - 3.bioreactor vessels

75 Composting

- 1.definition
- A.Process
- B.Biomass / substrate
- C.Product uses
- D.Process
 - 1.arrangements
 - a. static piles
 - b. aerated piles
 - c. covered tunnels
 - d. rotating bioreactors
 - 2.pretreatment
 - 3.biological reactions
- E.Goals
 - 1.problem
 - 2.moisture level
- F.Criteria for future expansion
- G.Anaerobic composting
 - 1.process

76 Bioremediation

- A.Contaminations
 - 1.contaminated soils
 - a. definition
- B.Compounds
 - 1.biomagnification
- C.Environmental forensics
 - 1.definition
 - 2.why do
- D.Biotech involvement
- E.Approaches
- F.Soil remediation
 - 1.on-site
 - 2.off-site
 - 3.past strategies
 - 4.biological methods
 - a. bioremediation, biorestitution, bioreclamation or biotreatment
 - b. microbes used

- G.Applications
 - 1.promotion of growth
 - 2.enrichment
 - 3.addition of microbes
 - a. difficulties
 - 4.genetically engineered microorganisms
 - a. problems
 - b. examples
- H.Plant remediation
 - 1.why use
 - 2.what removed
- I. Land mine detection story

77 Detection and monitoring of pollutants

- A.Traditional
- B.Microbial biosensors
- C.Immunoassays
- D.DNA

78 Microbes and the geological environment

- A.Why identify microbes present
- B.Acid mine drainage
- C.Bleaching
 - 1.definition
 - 2.minerals isolated
 - 3.process goal
 - 4.other name
 - 5.oxidation of mineral sulfides
 - 6.organism example
 - 7.Process
 - a. disadvantage
 - 8.potential use
- D.Prospecting using microbes
- E.Oil removal
 - 1.secondary removal techniques
 - 2.tertiary removal techniques
- F.Metal (bio)accumulators
 - 1.definition
 - 2.process
 - 3.phytomining

79 Environmental sustainability and clean technology

- A.Application levels
 - 1.Pollution clean-up
 - 2.Pollution control
 - 3.Pollution protection
- B.Attention shift
- C.Questions