

BT503 – ENVIRONMENTAL BIOTECHNOLOGY

ALL OBJECTIVES & SUBJECTIVES FROM PAST FILES FOR FINAL TERM

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OBJECTIVES

1. What is true regarding Zooplankton? **Relying on Tides and Currents as A Transport**
2. The presence of metal in the environment may be detected visually by the use of bacteria, one such example is vugesella Indigofera that gives an idea of metal contamination by producing _____ **Colored Pigmentation**
3. Which of the following substance cannot be used to make the vessel of a bio filter? **Formic Sheet**
4. Yeast cells are surrounded by a thick_____ which must be removed to permit entry of DNA in cell. **Cell Wall**
5. Unlike other marines' species, _____ are characteristically untroubled by biofouling and studies of their skin have established that its unique texture coupled with its inherent antimicrobial properties help keep them clean of fouling organisms. **Sharks**
6. The airflow in the submerged aerated biofilter is always_____, while the liquid flow can be up flow or_____. **Downflow, Upflow**
7. Plants containing the novel DNA grow, frequently a gene coding for ALL (Weed-Killer Or Antibiotic Resistance)
8. Greek word ‘xenos’ meaning _____. **Foreign**
9. Insect virus that causes over expression of genes in molecular biology_____. **Baculovirus**
10. Which enzyme are used in leather industry_____? **Traditionally, Pancreatic Enzymes Were Employed**
11. The purpose of genetic engineering in plants is_____ to protect from attack. (Reduce pesticides, reduce herbicides, Improve tolerance) **All**
12. _____ is the branch of biotechnology that addresses environment problems. **Environmental Biotechnology**
13. Which statement about chlorinated hydrocarbons is correct_____? **Fixation of Carbon by Phytoplankton**
14. Bacteria that thrive at temperature above 45°C_____. **Thermophiles**
15. The_____ Products of pollutant may be more harmful than original pollutant itself, therefore to understand chemistry of pollutants. **Breakdown**
16. Which statement is correct about Zooplankton? **They Are Microbial Bio indicators**
17. Bacteria can help in detoxification of Mercury based compounds since they possess codes for_____. **Mercuric Ion Reeducates**
18. Which of the following statement regarding disposal of sludge into oceans is false? **The Disposal Has Many Beneficial Uses**
19. Which of the following cannot be adopted to increase the efficiency of phosphorous removal by activated sludge treatment? **Uses of Inorganic Catalysts**
20. In the conventional activated sludge system. Continuous arrival of food in the form of BOD to the aeration tank, leads to rapid and continuous bacterial growth. All of the following problems caused by increased bacterial growth. Except **Overall Efficiency of The Product Is Enhanced**



21. Phasmarhabditis hermaphrodita has proven itself to be a highly effective against. **Garden Slug Garden Slug**
22. Which of the following is not a possible destination of the pollutants in soil? **Appearance in Surrounding Air**
23. Which of the following is true about preliminary treatment about wastewater? **It Is the Removal of Coarse Solids Only**
24. When facultative pond receives raw sewage, they are also Called_____ ponds. **Primary**
25. Phytoplankton may be used to indicate the presence of industrial effluents that do so because such effluents directly influence. **The Colored Pigments Produced by Phytoplankton**
26. The use of insecticides and herbicides in agriculture is known as _____. **Biological Control**
27. In wastewater treatment systems UASB reactor stands for_____. **Up Flow Anaerobic Sludge Blanket Reactor (UASB)**
28. Which statement about bio scrubber is false? **They are useful for the removal of toxic metals**
29. Which of the following is true about Imhoff tanks used in anaerobic filter system? **Septic tank can be single chamber and two compartment tanks**
30. Reintroduction of these _____ bacteria to the polluted sites should give them an advantage over the indigenous bacteria as they would be better suited to survive and remediate the contamination. **Trained**
31. The DNA construct contains _____ which are complementary to the plant DNA to enable the inserted piece to recombine into the plant genome. **Regions of DNA**
32. Attack by insects not only causes damage to the plant but also provides a route for _____ **Bacterial or Fungal Infection**
33. Bacteria which Thrive at temperatures above ~85°C is called as_____. **Hyper Thermophiles**
34. Which attribute of pollutant is not linked to bio magnification____? **(Long-lived, mobile, soluble in fats, biologically active) other than these option**
35. Toxicity represents the potential damage to life and can be both short and long term. It is related to_____. **Type of the Pollutant, Concentration, and the Time of Exposure**
36. Bio filters can reduce odor release by_____. **95% or More**
37. For higher efficiencies of phosphorus removal, effluent polishing methods can adopt _____. **Addition of Coagulants**
38. In the Inhoff tank, settling occurs in the_____. **Upper Compartment**
39. Water treatment accounts for ____ of the total global environmental market. **25%**
40. Basic equipment required in Preliminary treatment involves_____ Screen, **Grit Chamber and Flow Meter**
41. Western blotting is used to detect_____. **Proteins**
42. Due to continuous arrival of food in the form of BOD to the aeration tank, bacteria grow and reproduce continuously. If an indefinite population growth were allowed following problems arise except_____. **(The secondary sedimentation tank would become overloaded, the solids would not settle well, they would start to leave with the final effluent) other than these option**



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43. Wastewater is applied to the soil, supplying water and nutrients necessary for plant growth. Which is not true? **Generation of Aerosols**
44. Which statement is not true regarding desulphurization of oil and coal? (**Washing pulverized coal and the use of fluidized bed technology, Both organic and inorganic Sulphur is present in coal, Aerobic, acidophilic chemolithotrophs like Thiobacillus species, for desulphurization of the inorganic Sulphur in coal**) Other than these options
45. The metals release in air by all following process except _____. **Earthquake**
46. One such recombinant is a plant where the fatty acid composition in the seed has been modified to produce triacylglycerol's containing elevated levels of trierucinol acid suitable for use in the polymer industry. **Arabidopsis Thaliana**
47. Unlike other marines' species, sharks are characteristically untroubled by _____ and studies of their skin have established that its unique texture coupled with its inherent antimicrobial properties help keep them clean of fouling organisms. **Bio fouling**
48. Factors related to bio magnifications except. **Source**
49. By using recombinant technologies scientists are now producing _____. **Insulin**
50. _____ are combustible materials, containing within themselves all oxygen needful for their combustion, which burn but do not explode, and function by producing gas which produces an explosion. **Propellants or low explosives**
51. _____ is the branch of biotechnology that addresses environmental problems, such as the removal of pollution, renewable energy generation or biomass production, by exploiting biological processes (nature.com). **Environmental Biotechnology**
52. The goals of Environmental biotechnology can be achieved in ____ ways. **Two**
53. _____ key points for environmental biotechnology interventions. **Three (manufacturing process, waste management, pollution control)**
54. The market will have grown to ____ US dollars by 2025. **7400 Billion**
55. Water treatment accounts for ____ of the total global environmental market. **25%**
56. In general, the use of biotechnology for environmental management relies on _____. **Mesophilic Micro-Organisms**
57. Extremophiles could provide a way of developing alternative routes to many _____. **Conventional Chemicals or Materials**
58. Thermophile's organisms thrive at temperatures above _____. **45°C**
59. An optimal temperature for the existence of hyperthermophiles about _____. **85°C**
60. Taq Polymerase is a DNA Polymerase of _____. **Thermus Aquaticus**
61. Pfu Polymerase DNA Polymerase cloned from _____. **Pyro coccus Furiosus**
62. Average oceanic temperature is around _____. **1–3°C**
63. Pyrolobus fumarii optimum temperature for reproduction is? **105 Degrees**
64. Which of the following groups is now recognized as forming a distinct evolutionary line? **Archae Bacteria**
65. Bioindicators are _____. ? **Living Organisms**
66. Which of the following is not linked to biomagnifications? **Source**



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67. The term "endophytes" is usually used to denote microorganism? **Non-Pathogenic**
68. In the conventional activated sludge system, Continuous arrival of food in the form of BOD to the aeration tank, leads to rapid and continuous bacterial growth. All the following problems caused by increased bacterial growth. Except? **Overall, The Process Is Enhanced**
69. If selective breeding is to be considered as manipulation, then? **Genes Have Been Manipulated By Man For A Very Long Time**
70. Cane Toad (Bufo marinus) to control the_____? **Cane Beetle**
71. Bryophytes are frequently used to monitor ____ contamination. **Air**
72. Horizontal gene transfer can occur with the help of the following methods? **Transformation, Transduction And Conjugation**
73. Oil spills have been considered as a major threat to world environment specially? **Marine Ecosystem**
74. What are jumping genes? **DNA Sequence That Can Change Its Position Within A Genome**
75. Biological systems may be used to clean up pollutants which of the following attributes must be present in the pollutant of it is to be degraded by a living organism. **It Should Be Present In An Aqueous Environment**
76. Planktons are often used as indicators of water pollution many planktons reproduce at an increased rate in lakes when there is high centralization of? **Phosphorus And Nitrogen**
77. Around_____ Of the input raw materials in leather manufacturing ultimately ends up being discarded and enzymes addition have long been used to help manage this waste. **60%**
78. In molecular technique vector is a molecule used as a vehicle to carry? **Foreign Genetic Material**
79. Genomic libraries are very useful to look for specific sequence of? **DNA**
80. Optimum pH for local environmental conditions lies in the range of? **6.5-7.5**
81. Which organisms can degrade polychlorinated biphenyls ? **Strain Of Pseudomonas Putida**
82. Which of the following contaminants are rich in trichopria tetrat. **Bioaccumulation**
83. Steinernema carpocapsae is a? **Nematode**
84. The most frequently talked about of all environmental? **Pollution**
85. Halophiles are extremely important in environmental biotechnology these are microorganisms that survive in highly saline environments they do so by ensuring that? **Cytoplasm Contains A Higher Concentration Of Solutes Than Their Surroundings.**
86. Denaturation step in PCR usually occur at which temperature? **95 Degree**
87. Salt tolerance in tomatoes has been established by introducing genes involved in _____Ions in opposite directions across a membrane. **Hydrogen And Sodium**
88. Bioaugmentation is _____? **The Introduction Of More Arches Or Bacterial Cultures To Enhance The Contamination Degradation**
89. Ralstonia eutropha contains which compound in its backbone? **Phosphorus**
90. A process of transformation in which cell is removed is known as? **Protoplast Fusion**
91. To Design production systems that avoid the potential environmental contamination is the challenge of? **Green Chemistry**
92. Why sand and gravels are best for land-Basel applications_____. **Because Sand And Gravels Are More Porous In Natural And There Is More Space Between Soil Particles**



93. Luciferase genes are also used at times for detection chooses the correct statement for them. **They Are Obtained From Fireflies Only.**
94. Those species Which live in higher KCl levels are known as? **Halophiles**
95. In overflow land the soils should have a _____ Permeability. **Low**
96. In rotating biological contactors disc are usually made up of which material _____ **Plastic**
97. The technique absorption is used in screening of which type of solid waste? **Coarse Solids.**
98. The first working draft of the human genome sequence was published in which year? **2001**
99. Used of dibenzothiophene is used for the removal of? **Organic Sulphur**
100. The processes of weathering erosion and volcanic activity lead to continues release forinto the environment. **Metals**
101. Enzymes used in PCR. **DNA Polymerase**
102. Bio stoning has been widely adopted to produce stone washed _____. **DENIM**
103. Constructed wetlands are _____. **Aquatic Based System**
104. Which of the following contaminants are rich trichopria tetratre. **Bioaccumulation**
105. For sludge stabilization chemical stabilization is accomplished by_____of an Organic matter. **Oxidation**
106. What is a genomics library? **It Is A Collection Of Total Genomics Dna From A Single Organism**
107. What will be the consequences of applications of wastewater in wetlands in rainy season? **Anaerobic**
108. Which of the following agents be removed from tertiary level of water treatment level ____ **Soluble Bod**
109. Isolated samples of common place proteins like eggs albumin inversibility denatured well at which temperature. **Below 100degree**
110. Which of the following media is removed from activated of sludge with biological nitrogen removal process _____ **Ammonia**
111. The retention of the solids in the system Is called Sludge Age
112. The _____ is collected in the upper part of the separator in the gas compartment form where it is removed in up flow. **Gas**
113. Which of the following phytoplankton facilitate the growth of fishes _____ **Chlorella Vulgaris**
114. High-rate ponds receive a high_____. **Load Per Unit Surface Area Organic**
115. Bacillus thuringlenissi tends to use codons richer in than the plant cells into which the gene is placed. **Thymine And Adenine**
116. Gene is expressed preceded by a strong promoter most commonly the 35S promoter obtained from _____ **Agrobacterium Tumefaciens**
117. The depth of the water is between_____ M for the vegetated zones in constructed wetlands. **0.6 And 0.9**
118. The attenuation of pollutants by permitting them to become physically speed out thereby reducing their effective point concentration Dilution And Dispersion
119. Release of free ammonia into the atmosphere under high PH conditions is known as__. **Denitrification**
120. Eutrophication is known as Nutrient Control



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121. What is the BOD removal efficiency **_70**
122. The _____ Communities feed on substances in the solution passing over them biodegrading the constituents of the smell. **Biofilm**
123. Which of the following method may be employed to improve the efficiency of pollutants degradation by a bacterium without the use **Culture The Bacterium In Growth Medium Increasing Concentrations Of The Pollutants**
124. Diameter of bio discs **_____ Less than 3.6 meter**
125. Which of the following is not an important factor to be considered when evaluating for waste water treatment? **Sterilization of Vessels**
126. Which of the following coagulants are used in sludge dewatering? **Polyelectrolytes**
127. The sludges production is a function of the wastewater treatment system used for the? **Liquid Phase**
128. Marine phytoplankton utilize **_____ dissolved in the water during photosynthesis.** **Carbon**
129. Which of the following process does not introduce chemical products into the liquid **_____ Membrane**
130. How to reduce frost damage in plants by using mutant form of pseudomonas syringae Free water in the sludge can be removed by **Gravity**
131. Which of the following is the most abundant biopolymer on this planet as well as major product of photosynthesis **_____ Cellulose**
132. Which kind of filter used in septic tanks **_____ Membrane Filters**
133. In UASB + polishing dry solid level ranges between. **3-4%**
134. A process is sludge management for the preparation for dewatering is known as **Conditioning.**
135. Which of the following technique required the deliberate introduction of selected microbes to bring about the required clean up? **Bio Augmentation**
136. **_____** are the principal components to inactivate the pathogenic microorganisms in the composting. **UV radiation**
137. Most frequently used unit for concentration of sludge is **_____?** **%the most** 138. Famous eukaryotic vector is **_____ Yeast**
139. If liquid content in the waste water is 89% then dry content will be? **11% (fluid sludge)**
140. Which techniques are best suited to instances of relatively localized pollution within a site, typically in 'hot-spots' of medium to relatively high concentration which are fairly near to the surface? **Ex Situ**
141. What are the key factors of the intensive technologies? **Fast Response and Low Treatment Time**
142. Liquid bio fuels are of considerable importance due to **_____** and inherent. **The Relative Ease of Transport and Handling**
143. Which of the following factor has no effect on execution and implementation of environmental biotechnology? **Health of General Population**
144. Which of the following have the innate ability to degrade hydrocarbon contaminants through metabolic action and biosurfactant production? **Hydrocarbonolastic Bacteria (HCB)**
145. Which statement is true about Site monitoring analysis sampling? **Characterize the samples in terms of description, location, batch number, size,**
146. Bioremediation is suited to **_____ Organic Substances**
147. In which of the following technique of bioremediation contaminants is used as a food by the microbes? **Mineralization.**



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148. _____ uses High temperature for fuse contaminated material. **Vitrification**
149. _____ involves heating of the sludge to 70 degree for 30 minutes. **Pasteurization**
150. The term used for the gradual accumulation of substances or toxins is an organism is _____. **Bioaccumulation**
151. Slower response and a higher treatment time are characteristics of which technology _____. **Extensive Technology**
152. The process of expression of foreign genes in a plant is called _____. **Genetic Transformation**.
153. The oxygen required in the facultative ponds by the aerobic bacteria is supplied by algae _____. **Photosynthesis**
154. There are Major routes of bioremediation. **3(Mineralization Co-Metabolism, Immobilization)**
155. Time period required to carry out composting through in vessel biological reactors is normally _____. **14-21 Days**
156. To design production system which avoid potential to environmental is the challenge of _____. **Green Chemistry**
157. Which term explain biomethane best. **Sustainable Energy**
158. Bioremediation relies on the inherent abilities and characteristics of following _____. specie's. **Indigenous Bacterial**
159. In _____ technique air extraction rate is adjusted to maximize underground decomposition. **Bioventing**
160. Name the process by which lands resources are restored to their former state or baseline condition in known as _____. **Land Remediation**
161. Which kind of techniques is suitable for phytoremediation? **In Situ**
162. How much arsenic can be accumulated by using Pteris vittata? **2.3%**
163. Which of the following metal is extracted by indica rice cultivators MORETSU? **Cadmium**
164. Rhizodegradation refers to the biodegradation of contaminants in the soil by _____. Character of the rhizosphere itself. **Edaphic**
165. Which of the following approaches do not remove the pollutants but only immobilize the pollutants? **Phyto stabilization**
166. Which of the following statement about ` collection stage of solid waste is not correct? **This is the stage when solid waste is transported to the final disposal site.**
167. Which of the following is considered as carbon sink at commercial level _____. **Algae**
168. Genetic modification of which tree enabled mercury to be removed from the soil converted to a form able to the release to the _____. **Poplar Tree**
169. In immobilization removal of contaminants typically, **Metals Occur By Mean Of Absorption**
170. The plant variety yellow popular liriodendron tulipifera engineered by the introduction of phytozotalization _____. **Mercuric Reductase Gene**
171. Rhizofiltration is typically used to deal with the contamination _____. **Groundwater**
172. Some other plants species enable the biodegradation of relatively; large _____. **Organic Molecules**
173. Toxic byproducts can be generated in which the following system. **Chlorination**
174. Removal of CO₂ from generator emissions is known as _____. **Bio Coil**



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175. The technique which chooses the permit plants to grow for a suitable Length of time _____. **Bioaccumulation**
176. Certain strains of alpine pennycress can bioaccumulation about _____ cadmium? **1.5%** 178. An aquatic plant? _____ **Macrophyte**
179. Which statement about on-site disposal of waste is incorrect? **It Can Be Used When Waste Volume Are Large**
180. Which statement about biodiesel is correct? **It Is Mostly Derived from Vegetable Oils** 181. Thermal decomposition process by oxidation is known as _____. **Incineration**
182. In Term' endophytes is usually used to denote ____ Organisms. **Non-Pathogenic**
183. A tumor-like growth, seen as a crown gall in plants. is induced by bacterium which is called. **Acrobacterium Tumefaciens**
184. Among the first synthetic organic chemicals to create environmental problems were synthetic _____. **Detergents**
185. Large hydrocarbons with much branching or containing many ___ are difficult to degrade. **Aromatic Rings**
186. Two characteristics of chlorinated pesticides that led to great harm are their resistance to _____. **Biodegradation and Their Hydrophobicity**
187. With reference to co-metabolism excellent examples of non-specific enzymes are ____ hydrocarbons such as methane or toluene. **Oxygenase**
188. One of the main uses of DDT other than fighting crop insects was its efficiency in control. **Anopheles Mosquito**
189. Which statement about chlorinated aliphatic hydrocarbons is correct? **They Usually Act as Proton Donors.**
190. What is false about poor biodegradation of hydrocarbons? **Easily Degraded by Enzymatic Attack**
191. _____ can transfer genetic material between susceptible cells. **Eukaryotic Viruses.**
192. Explosives of characterized by presence of _ group? **Nitro**
193. Dioxins have many congeners. The most toxic is _____. **TCDD**
194. Enzymatic biosensors are based on the _____ of specific enzyme by different classed of compounds. **Selective Inhibition**
195. Aerobic Co-metabolism of CAHs-II requires NADH to provide the _____. **2H**
196. Which of the following is not fate of water_____ **Generation Of Aerosol**
197. Name any endocrine disruptors _____ **Dioxins**
198. The pH of the medium will be when lime added to the digested sludge _____. **Basic**
199. Some plants act as pumps or siphons removing contaminants form the _____. **Soil**
200. Bacteria that thrive at temperature above 45oC _____. **Thermophiles**
201. Which of the following substance cannot be used to make the vessel of a bio filter? **Formic Sheet**
202. Unlike other marines' species, ____ are characteristically untroubled by biofouling and studies of their skin have established that its unique texture coupled with its Inherent antimicrobial properties help keep them clean of fouling organisms. **Sharks**
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228. Which statement about chlorinated aliphatic hydrocarbons is correct? **They Usually Act As Proton Donors.**

SUBJECTIVEs

1. What Is Waste Water And Enlist It's Level?

Wastewater is water that has been used and contaminated through various human activities. There are three main levels of wastewater:

- ❖ Domestic Wastewater
- ❖ Industrial Wastewater
- ❖ Stormwater

2. Phyremediation And It's Two Modes?

Direct in situ use of living green plants for the treatment of contaminated soil, sludges or ground Water, by the removal, degradation, or containment of the pollutants present". Moreover, the role of phytotechnology is not limited solely to phytoremediation. Removal and accumulation of unwanted substances within the plant tissues themselves, Their Removal and subsequent volatilization to atmosphere, or The facilitation of in-soil treatment.

Two general sections

- ❖ Terrestrial Phyto-Systems (TPS),
- ❖ Aquatic Phyto-Systems (APS),

3. Plant Gained 3 Benefits By Fungi Association?

- ❖ Improved Water Uptake:
- ❖ Nutrient Absorption
- ❖ Disease Resistance

4. Intial Steps In Solid Waste Management?

- ❖ Identify the types of waste.
- ❖ Identify the sources of waste.
- ❖ Determine the potential health hazards from waste.
- ❖ Determine the volume of waste generated
- ❖ Identify safe collection method/s.
- ❖ Identify safe transportation method/s.



- ❖ Identify safe disposal method/s.

5. What are applications of biosensors in detection of biocides?

Enzymatic sensors, based on the inhibition of a selected enzyme, are the most extended Biosensors used for the determination of these compounds. Various biosensors, based on the Inhibition of acetyl cholinesterase (AChE) and colin oxidase, for the detection of organo Phosphorous and carbamate pesticides. Although sensitive, biosensors based on AchE Inhibition are not selective. One approach to solve the lack of specificity of AchE involves the Genetic engineering of cholinesterase enzyme

6. Two Sources Of Dioxins

Dioxins are chemicals of significant environmental concern. Although not produced commercially as marketable products. Formed as unwanted by-products of pesticide manufacturing, combustion and Incineration, chlorine bleaching, disinfection, and controlling dust and sediments.

Sources

Dioxin in the environment comes from

- ❖ Waste-burning incinerators of various sorts
- ❖ Also from backyard burn-barrels

7. THERMOPHILES AND HALOPHILES?

Halophiles

Survive intensely saline environments, such as exist in natural salt lakes or salt Evaporation ponds. Normal cells lose water and dehydrate in hypertonic saline environments. Halophiles deal with this Problem by ensuring that their cytoplasm contains a higher solute concentration than is present in Their surroundings.

Two distinct mechanisms:

Either manufacture or concentrate large quantities of solutes for Themselves. E.g., a number of halophile species accumulate KCl , and thus their extremozymes work only in the Presence of KCl

Thermophiles

- ❖ Thrive at temperatures above 45°C.
- ❖ Hyperthermophiles... ~85°C.
- ❖ Thermus aquaticus...
- ❖ Hot-springs, deep sea-vents, geothermal fluids, etc.
- ❖ Potential for the industrial exploitation...
- ❖ Temperatures where other organisms do not survive.



A good understanding of the way in which extremophile molecules are able to function at high Temperatures essential for any future attempt at harnessing the extremozymes for industrial Purposes.

8. Consequence of OECD About 2001 Global Biotechnology

The **OECD (2001)** concluded that the industrial use of biotechnology commonly leads to increasingly environmentally harmonious processes and additionally results in lowered operating and/or capital costs.

9. What gene introduced in Chinese Cabbage?

A synthetic *B. thuringiensis* δ-endotoxin gene transferred by *A. tumefaciens* into Chinese cabbage (Cho et al., 2001).

10. Two Main Ways to Reduce SO₂ Emissions

The **first** is to lessen the Sulphur content of the fuel in the first place, while the **second** involves removing it from the flue gas.

11. Driving Factors of Global Environmental

- ❖ Greater general awareness,
- ❖ Widespread adoption of sustainable best practice by industry,
- ❖ Geo-political changes,
- ❖ Clean manufacturing applications, etc.

12. 5. Enlist Any Three Main Focus Areas In The Global Environmental Market

- ❖ Energy Production,
- ❖ Waste Management,
- ❖ Land Remediation,
- ❖ Water Treatment

13. Types Of Pollution

There are different types of the pollution which are given below: Air pollution

- ❖ Water Pollution
- ❖ Land Pollution
- ❖ Environmental Pollution
- ❖ Light Pollution
- ❖ Noise Pollution



14. What Is Glycophates?

Glycophate is a broad-spectrum systemic herbicide and crop desiccant. It is an organo phosphorus compound, specifically a phosphonate, which acts by inhibiting the plant enzyme 5-enolpyruvylshikimate- 3-phosphate synthase. It is used to kill weeds, especially annual broadleaf weeds and grasses that compete with crops.

15. Write the Fundamental Requirements for All Cloning Processes.

Fundamental requirements of all cloning procedures: the enzymes, solutions and equipment necessary to perform the procedures; the desired piece of DNA to be transferred; a cloning vector; and the recipient cell. It is also essential to have some means of determining whether or not the transfer has been successful. This is achieved by the use of marker genes.

16. What Is Biodegradation?

Biodegradation is the breakdown of organic matter by microorganisms, such as bacteria and fungi.

17. Acidophile?

Acidophiles or acidophilic organisms are those that thrive under highly acidic conditions (usually at pH 2.0 or below). These organisms can be found in different branches of the tree of life, including Archaea, Bacteria, and Eukarya.

18. Write A Note on cDNA Libraries?

cDNA libraries in eukaryotes, the first product of transcription from DNA is not messenger RNA (mRNA) but heterogeneous nuclear RNA (hnRNA). This is mRNA prior to the removal of all the non-coding sections, or introns, which are discarded during the processing to produce the mature mRNA. cDNA is DNA which has been artificially made using the mature mRNA as a template (through Reverse Transcriptase enzyme). It is then used as the template for the second strand. Thus, the synthetic DNA product is simply a DNA version of the mRNA and so should overcome the problems of expression mentioned ago.

19. What Is T-DNA?

Wild type plasmid contains genes which causes the transfer of a piece of DNA, 'T-DNA', into a plant cell, causing crown gall disease. This piece is flanked by 24 bp direct repeats. These genes may be cut out and replaced by DNA containing the gene of choice to be introduced into the plant.

20. Halophiles



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They survive intensely saline environments, such as exist in natural salt lakes or salt evaporation ponds. Acidophiles thrive in the conditions of low pH, typically below 5.

21. Genomic Library?

Genomic library's Collection of total Genomic DNA from an organism. The genomic DNA is isolated, purified and cut up into pieces of a size suitable to be inserted into a cloning vector, following by ligation and transformation into a host cell. These DNA pieces may either be ligated as a total mixture, into a suitable vector to produce a genomic library, or a specific piece may be isolated and prepared as described ago. Genomic libraries are very useful, as they may be amplified, and accessed almost limitlessly, to look for a specific DNA Sequence. If the genomic library is of a eukaryotic origin the genes will contain non-coding regions, called introns. (Prokaryotes do not contain introns). This is a problem if the gene is to be expressed. This problem can be avoided by using cDNA.

22. Quorum Sensing?

Bacteria communicate with each other by way of small diffusible molecules such as the Nacylhomoserine lactones (AHLs)... ‘quorum sensing’.

23. What Is Cyanophyta?

Cyanophyta, a type of phytoplankton, is one particularly powerful bioindicator which is known to indicate rapid eutrophication of water bodies such as reservoirs, lakes, etc. via the creation of bloom formations.

24. Stress Proteins.

Some microorganisms when exposed to cadmium and benzene contaminants develops new proteins known as stress proteins which can be used as early warning signs.

25. How Plat Develop Immunity Against TMV?

Introduction of the genes expressing antibodies to the coat protein of Tobacco Mosaic Virus (TMV) by *A. tumefaciens*. Expression of these in the plant lead to complete immunity against TMV.

26. How Microbes Degrade Polycyclic Aromatic Hydrocarbons?

Bacteria against PAHs (polycyclic aromatic hydrocarbons, e.g., naphthalene and phenanthrene). Bacteria isolated from the same environments may vary in their abilities to degrade PAHs indicative of diverse catabolic pathways.

27. Catabolic Expansion



Catabolic expansion: Improving microbe's ability to degrade a contaminant by culturing the bacteria in growth medium in which the contaminant is supplied as an essential part of the nutrition.

Only bacteria which have undergone a mutation enabling them to utilize this food source will be able to survive.

28. Wastewater Treatment?

Wastewater treatment is the process of converting wastewater – water that is no longer needed or is no longer suitable for use – into bilge water that can be discharged back into the environment. It's formed by a number of activities including bathing, washing, using the toilet, and rainwater runoff.

29. How Plant Can Use Be Reduced Pollution?

Plants improve air quality through several mechanisms: they absorb carbon dioxide and release oxygen through photosynthesis, they increase humidity by transpiring water vapor through microscopic leaf pores, and they can passively absorb pollutants on the external surfaces of leaves and on the plant root-soil system.

30. Advantages of Yeast in Recombinant?

Yeasts have been used for thousands of years in food and fermentation processes to produce alcoholic beverages and breads. In recent times, the industrial importance of yeasts has extended beyond its traditional use in fermentation into various healthcare sectors, such as in the production of therapeutic recombinant proteins. Yeast cells are particularly advantageous as hosts for biopharmaceutical production in that they are generally recognized as safe (GRAS) organisms.

31. What Is Toxicity Of Metals And Their Relationship With Time Of Exposure?

The toxicity of metals is related to their place in the periodic table, and reflects their affinity for amino and sulphydryl groups (associated with active sites on enzymes). Broad terms, type-A metals are less toxic than type-B, but this is only a generalization and a number of other factors exert an influence in real-life situations

32. What Are Qualities of Pollutant That Are Intended Target in Bio Processing?

The intended target of the bio-processing must generally be both susceptible and available to biological attack, in aqueous solution, or at least in contact with water, and within a low to medium toxicity range. For land-based applications, the soil types best suited to biotechnological interventions are sands and gravels. Moreover, nutrient availability, oxygenation and the presence of other contaminants can all play a role too.

33. What Is Recombinant?



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Recombinant DNA molecules are DNA molecules formed by laboratory methods of genetic recombination to bring together genetic material from multiple sources, creating sequences that would not otherwise be found in the genome

34. Difference Between Transformation, Transduction and Conjugation?

In transformation, a bacterium takes up a piece of DNA floating in its environment. In transduction, DNA is accidentally moved from one bacterium to another by a virus. In conjugation, DNA is transferred between bacteria through a tube between cells.

35. Applications of Cloning Vectors?

Method of gene cloning is useful in studying the structure and function of genes in detail. Medical Applications: In medicine, cloned bacteria play important role for the synthesis of vitamins, hormones and antibiotics. Agricultural Applications: cloning in Bacteria facilitates nitrogen fixation in plants.

36. What Is Wastewater and Enlist Its Level?

Wastewater is "used water from any combination of domestic, industrial, commercial or agricultural activities, surface runoff or storm water, and any sewer inflow or sewer infiltration". Wastewater treatment levels

- ❖ **Preliminary Treatment:** the removal of coarse solids only.
- ❖ **Primary Treatment:** Primary treatment includes screens, sedimentation and grit removal.
- ❖ **Secondary Treatment:** Secondary treatment process removes carbonaceous organic matter and nutrients (nitrogen and phosphorus) from wastewater
- ❖ **Tertiary Treatment:** tertiary treatment includes filtering, disinfecting and preparing wastewater for recycling.

37. What Is Cloning Factor? Why Important in Genetic Engineering?

Cloning allows for the creation of multiple copies of genes, expression of genes, and study of specific genes. Plasmids have been highly engineered as vectors for molecular cloning and for the subsequent large-scale production of important molecules, such as insulin.

38. Manipulation of Bacteria Without Genetic Engineering

A general procedure is to take a sample of bacteria from, at, or near, the site of contamination from which a pure culture is obtained in the laboratory and identified, using standard microbiology techniques. The 'training' may be required either to improve the bacterium's tolerance to the pollutant or to increase the capabilities of pathways already existing in the bacterium to include the ability to degrade the pollutant, or a combination of both.



39. Bio SCRUBBERS

The bio scrubber is not itself truly a biological treatment system, but rather a highly efficient method of removing odour components by dissolving them. Most appropriate for hydrophilic compounds like acetone or methanol.

40. Phytoplankton

Phytoplankton's also known as microalgae, are similar to terrestrial plants in that they contain chlorophyll and require daylight to live and develop. Most are light and swim in the upper portion of the sea, where light infiltrates the water.

41. Submerged Bio Filter?

Besides being a support medium for biomass growth, the granular material acts also as a filter medium. Periodic washings are necessary to eliminate the excess biomass accumulated.

42. Bioaccumulation

Some pollutants, even when present in very small amounts within the environment, can be taken up by living organisms and become concentrated in their tissues over time. This is a major consideration, since even relatively low background levels of contamination may accumulate up the food chain.

OR

The collection of substances e.g., toxins and chemicals, in an organism 's body is called bioaccumulation. Sources: substances from any source e.g., air, water, soil, could be stocked through bioaccumulation.

43. Role of Filter Medium in Boiler Also Name the Compound of The Filter Medium.

The first methods to be developed. Consists of a relatively large vessel or container, typically made of cast concrete, metal or durable plastic, which holds a filter medium of organic material such as peat, heather, bark chips and the like.

The gas to be treated is forced, or drawn, through the filter. The medium offers good water holding capacity and soluble chemicals within the waste gas dissolve into the film of moisture around the matrix. Bacteria, and other micro-organisms present, degrade components of the resultant solution, thereby bringing about the desired effect. The medium itself provides physical support for microbial growth, with a large surface area to volume ratio, high in internal void spaces and rich in nutrients to stimulate and sustain bacterial activity. Bio filters need to be watered sufficiently to maintain optimum internal conditions, but waterlogging is to be avoided as this leads to compaction, and hence, reduced efficiency. Properly maintained, bio filters can reduce odor release by 95% or more.



44. Give Five Advantages of Bio Filter

The medium itself provides physical support for microbial growth, with a large surface area to volume ratio, high in internal void spaces and rich in nutrients to stimulate and sustain bacterial activity.

45. Give Five Properties of Soil

In case of soil particularly, properties such as

- ❖ Texture,
- ❖ Porosity,
- ❖ Humus Content,
- ❖ Moisture,
- ❖ Microbial Complement,

46. How We Can Improve Qualities of Fruits?

Plant bioregulators (PBRs) can improve fruit size, appearance and internal fruit quality by direct effects on fruit growth and development or indirectly by regulating crop load, tree or vine vigor, and canopy architecture. Inherent fruit quality parameters, such as sugar and acid content, ripening and storability, and external fruit quality parameters, such as color, form, stage of growth and firmness, are closely correlated to the main nutrients: nitrogen, phosphorus, potassium, calcium and magnesium.

47. Describe the Importance of Anaerobic Zone in Biological Process of Phosphorus Removal in Activated Sludge Treatment.

It is essential to have anaerobic and aerobic zones in the treatment line for the biological removal of phosphorus. The anaerobic zone gives good conditions for the development or selection of a large population of phosphorus accumulating organisms.

48. What Is Activated Sludge?

The activated sludge process is a type of wastewater treatment process for treating sewage or industrial wastewaters using aeration and a biological floc composed of bacteria and protozoa.

49. Describe Natural Process to Remove Pathogenic Environment.

Maturation Ponds, Land treatment

- ❖ **Maturation Ponds:** Shallow ponds, where the penetration of solar UV radiation and unfavorable environmental conditions causes a high mortality of the pathogens.



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The maturation ponds do not need chemical products or energy, but require large areas. They are highly recommended systems.

- ❖ Land Treatment (Infiltration in Soil)

The unfavorable environmental conditions in the soil favors the mortality of the pathogens. Chemical products are not needed. Requires large areas.

50. What Are Three Phases Present in Aerated Bio Filter?

- ❖ **Solid phase:** consists of a support medium and biofilms,
- ❖ **Liquid phase:** consists of the liquid in permanent flow through the porous medium
- ❖ **Gas phase:** formed by artificial aeration and by the gaseous by-products of the biological activity

51. What Is Biomimetic?

Biomimetics is an interdisciplinary field in which principles from engineering, chemistry and biology are applied to the synthesis of materials, synthetic systems or machines that have functions that mimic biological processes.

52. Write A Note on Zooplankton?

The word "zooplankton" is derived from the Greek zoon, meaning "animal", and planktos, meaning "wanderer" or "drifter".

Zooplanktons are microscopic animals living near to the surface of the water body. They are poor swimmers, instead relying on tides and currents as a transport mechanism. They feed upon phytoplankton, bacterioplankton, or detritus (i.e. marine snow). Zooplankton constitute a vital food source for fish. They also play an important role as Bioindicators and help to evaluate the level of water pollution.

53. Sludge Treatment Stages

The main stages in sludge management:

- ❖ **Thickening:** removal of water (volume reduction)
- ❖ **Stabilization:** removal of organic matter (mass reduction)
- ❖ **Conditioning:** preparation for dewatering
- ❖ **Dewatering:** removal of water (volume reduction)
- ❖ **Disinfection:** removal of pathogenic organisms
- ❖ **Final disposal:** final destination

54. Process of Thickening of Sludge



The main processes used for sludge thickening are:

- ❖ Gravity Thickeners
- ❖ Dissolved Air Flotation
- ❖ Centrifuges
- ❖ Belt Presses

55. Classes of Sludge?

Water in the sludge can be divided into four distinct classes.

- ❖ Free water,
- ❖ Adsorbed water,
- ❖ Capillary water,
- ❖ Cellular water

56. Write A Note on Oil Spill Bioremediation

Remediation could be done ex situ or in situ through various technologies. The ex-situ method involves the removal of the contaminated soil and/or water to clean up on another surface, while the in-situ method refers to decontaminating the soil and/or water at the site of pollution.

- ❖ Bioremediation is the process through which native oil-degrading microorganisms consume or break down various components of oil spilled in marine environments.
- ❖ Bioaugmentation for oil spills is a method for enhancing bioremediation of oil spills through the addition of cultured oil-degrading microbes.

57. Mention the Most Common Metallic Coagulants for Sludge Dewatering.

The most common metallic coagulants are:

- ❖ Aluminum Sulphate
- ❖ Ferric Chloride
- ❖ Ferrous Sulphate
- ❖ Ferric Sulphate
- ❖ Quickslime/ Hydrated Lime

58. Difference Between Physical and Mechanical Sludge Dewatering Process.

Sludge is separated in a solid and a liquid part with the help of a physical process such as filtration, squeezing, centrifugal separation or compaction.

Mechanical dewatering is mostly applied for the treatment of residual sludge in largescale centralized wastewater treatment plants.



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59. Difference Between Natural and Conventional Sludge Dewatering Process.

Natural sludge dewatering processes:

- ❖ Drying beds
- ❖ Sludge lagoons

Mechanized sludge dewatering processes:

- ❖ Centrifuges
- ❖ Vacuum filters
- ❖ Belt presses
- ❖ Filter presses

60. Write Two Advantages Of The Conventional Biological Sludge Dewatering Process.

Advantages of Conventional Dispersed Plug Flow Process

- ❖ Allows smaller volume than CSTR
- ❖ Flexible operation, zone aeration, step feeding options, accommodates anoxic and aerobic processes with single biomass for biological nutrient removal
- ❖ Less aeration than CSTR

61. Biological Remediation

This involves the transformation or mineralization of contaminants to less toxic and more mobile, forms. This can include fixation or accumulation in harvestable biomass crops.

Advantages:

- ❖ Can destroy a wide range of organic compounds,
- ❖ Can cause benefit to soil structure and fertility,
- ❖ Are non-toxic.

Disadvantages:

- ❖ The process end-point can be uncertain and difficult to gauge
- ❖ Treatment can be slow
- ❖ Not all contaminants are conducive to treatment by biological means

62. What Are the Environmental Factors That Affect the Bioremediation Describe Briefly?

Environmental Factors:

Most significant are:

- ❖ **Temperature:** 0 and 50 °C. Most efficient: 20–30 °C



- ❖ **pH:** pH range of 5.0-9.0, however, 6.0-8.0 being most efficient.
- ❖ **Soil type:** sands and gravels are the most suitable soil types for bioremediation.

Other Factors:

Nutrient availability, oxygenation, presence of other inhibitory contaminants whether the site is contained or if the groundwater runs off, what contaminants are present, what is their concentration and whether they are biodegradable, etc.

63. Explain Verification

Solidification / Vitrification:

- ❖ It is the encapsulation of contaminants within a monolithic solid of high structural integrity, with or without associated chemical fixation.
- ❖ Vitrification uses high temperatures to fuse contaminated materials.

Advantage:

Toxic elements and/or compounds which cannot be destroyed, are rendered unavailable to the environment.

Disadvantages:

Contaminants are not actually destroyed. Significant amounts of reagents are required and not suitable for organic contaminants.

64. Factors Affecting the Technique in Situ and Ex Situ.

IN SITU TECHNIQUE	EX SITU TECHNIQUE
Time relatively unrestricted	Less than a free year
Widespread contamination	Localized contamination
Low to medium concentration	Medium to high concentration
Deep within site	Relatively near surface

65. Intensive Technologies.

Intensive Technologies can be characterized as fast acting, high intervention strategies, with a heavy demand for resources and high initiation, running and support costs. Their key factors are a fast response and low treatment time, which makes them excellent for heavy contamination conditions. E.g., Soil washing and thermal treatments.

66. Advantages of Conventional Sludge



- ❖ Low land requirements
- ❖ Ease of installation
- ❖ Operation under high loading rates
- ❖ Requirement of low attention from operators
- ❖ Requirements of small quantities of polymers for conditioning

67. Difference Between Bio-Enhancement and Bio-Augmentation.

- ❖ **Bio-Enhancement** concentrates solely on the existing micro-fauna, stimulating their activity by the manipulation of local environmental conditions.
- ❖ **Bio-Augmentation** requires the deliberate introduction of selected microbes to bring about the required clean-up.

68. What Is Sustainable Bioremediation or Six ‘Key Principles of Sustainable Remediation?

Sustainable Remediation Forum (SuRF) UK framework document identified six ‘key principles of sustainable remediation’, namely

- ❖ Protection of human health and the wider environment.
- ❖ Safe working practices.
- ❖ Consistent, clear and reproducible evidence-based decision making.
- ❖ Record keeping and transparent reporting.
- ❖ Good governance and stakeholder involvement.
- ❖ Sound science.

69. 62. Advantage And Disadvantage Of Incineration?

Advantages:

- ❖ Drastic volume reduction

Sterilization Disadvantages:

- ❖ High costs
- ❖ Ash disposal
- ❖ Atmospheric pollution

70. Phytodegradation

Biological breakdown of contaminants by plants.

Two forms:

- ❖ **Internally**, having first been taken up by the plants
- ❖ **Externally**, using enzymes secreted by them

71. Phytoremediation.



“Direct in situ use of living green plants for the treatment of contaminated soil, sludges or ground water, by the removal, degradation, or containment of the pollutants present”.

72. Organic Phytoremediation?

Organic molecules enter plant roots via simple diffusion. Phytoremediation basically refers to the use of plants and associated soil microbes to reduce the concentrations or toxic effects of contaminants in the environment.

Typical mechanisms of organic phytoremediation are:

Phytodegradation,

Phytodegradation Biological breakdown of contaminants by plants. Either Internally, having first been taken up by the plants, or Externally, using enzymes secreted by them.

Rhizodegradation

Also described as phytostimulation or enhanced rhizospheric biodegradation. . Rhizosphere supports high microbial biomass. Mycorrhizae fungi is also there...

Phytovolatilisation.

Involves the uptake of the contaminants by plants and their release into the atmosphere, typically in a modified form..

73. Enlist the Type of Solid Waste.

- ❖ **Organic waste:** Waste from preparation of food, market places, etc.
- ❖ **Combustibles:** Paper, wood, dried leaves, packaging, etc. (high organic and low moisture content)
- ❖ **Different categories of solid waste include:**
- ❖ **Non-combustibles:** Metal, tin cans, bottles, stones, etc.
- ❖ **Ashes/dust:** Residue from fires used for cooking.
- ❖ **Bulky waste:** Tree branches, tyres, etc.
- ❖ **Different categories of solid waste include:**
- ❖ **Dead animals:** Carcasses of domestic animals and livestock.
- ❖ **Hazardous waste:** Oil, battery acid, medical waste.
- ❖ **Construction waste:** Roofing, rubble, broken concrete, etc.

74. Sources of Solid Waste:

- ❖ Medical centers
- ❖ Food stores
- ❖ Feeding centers
- ❖ Food distribution points



- ❖ Slaughter areas
- ❖ Warehouses
- ❖ Markets
- ❖ Domestic areas

Sources of Solid Waste:

Solid waste management strategies may vary for institutional, communal and domestic sources; and depends on the types and volumes of the waste

75. Initial Steps in Solid Waste Management

Identify the types of waste.

- ❖ Identify the sources of waste.
- ❖ Determine the potential health hazards from waste.
- ❖ Determine the volume of waste generated
- ❖ Identify safe collection method/s.
- ❖ Identify safe transportation method/s.
- ❖ Identify safe disposal method/s.

76. Explain Phytovolatilization 10

Involves the uptake of the contaminants by plants and their release into the atmosphere, typically in a modified form.

Relies on the transpiration pull of fast-growing trees, which accelerates the uptake of the pollutants in ground water solution, which are then transformed and released through the leaves.

E.g., genetically modified variety of the Yellow Poplar, *Liriodendron tulipifera* Engineered by the introduction of mercuric reductase gene (*mer A*). This confers the ability to tolerate higher mercury concentrations, and removal of the pollutant from the soil and volatize it. In a number of studies, poplars have been shown to be able to volatilize around 90% of the TCE (Trichloroethylene) they take up.

77. Is any danger from this kind of pollutant release into the atmosphere???

Phytoremediation tends to be limited to sites where the pollutants are located fairly close to the surface. However, recent research has shown that deeply penetrating roots of trees allow deeper contamination to be treated.

78. Dental Not Sludge Treatment Stage Before Final Disposal Steps. 10 Main final disposal alternatives for the sludge:

Ocean disposal:



- ❖ After pre-conditioning, the sewage is disposed in the sea, through ocean outfalls or barges.
- ❖ Disposal without beneficial uses.

Advantages:

- ❖ Low cost

Disadvantages:

- ❖ Ocean water, flora and fauna pollution

Incineration:

Thermal decomposition process by oxidation, in which the volatile solids of the sludge are burnt in the presence of oxygen and are converted into carbon dioxide and water. The fixed solids are transformed into ashes. Disposal without beneficial uses.

Advantages:

- ❖ Drastic volume reduction,
- ❖ Sterilisation.

Disadvantages:

- ❖ High costs,
- ❖ Ash disposal,
- ❖ Atmospheric pollution.

Sanitary Landfill:

Disposal of the sludges in ditches or trenches, with compaction and covering with soil, after which they are sealed. (can be co-disposed with urban solid wastes).

Disposal without beneficial uses.

Advantages:

- ❖ Low cost

Disadvantages:

- ❖ Requirement of large areas,
- ❖ Problems with locations near urban centres,
- ❖ Requirement of special soil characteristics,
- ❖ Gas and leachate production,
- ❖ Difficulty in reintegrating the area after decommissioning.

Landfarming:

Land disposal process, in which the organic substrate is biologically degraded in the upper layer of the soil and the inorganic fraction is transformed or fixed into this layer. Disposal without beneficial uses.



Advantages:

- ❖ Low cost
- ❖ Disposal of large volumes per unit area

Disadvantages:

- ❖ Accumulation hardly decaying constituents...
- ❖ Possible groundwater contamination,
- ❖ Odor release and vector attraction,
- ❖ Difficulty in reintegrating the area after decommissioning

Land reclamation:

Disposal of sludge in areas that have been drastically altered, such as mining areas, where the soil does not offer conditions for development and fixation of vegetation, as a result of the lack of organic matter and nutrients.

Advantages:

- ❖ High application rates,
- ❖ Positive results for the recovery of the soil and flora.

Disadvantages:

- ❖ Odors,
- ❖ Composition and use limitations,
- ❖ Contamination of the groundwater, fauna and flora.

Agricultural reuse:

Disposal of the sludge in agricultural soils, in association with the development of crops. Beneficial use of the sludge (which, in this case, is named as a biosolid).

Advantages:

- ❖ Large area availability,
- ❖ Positive effects on soil,
- ❖ Long term solution,
- ❖ Potential as a fertilizer,
- ❖ Positive outcome for crops.

Disadvantages:

- ❖ Limitations regarding composition and application,
- ❖ Contamination of the soil by metals,
- ❖ Food contamination with toxic elements pathogens
- ❖ Odors.

79. Biodiesel & Its Advantages



Biodiesel is derived mostly from vegetable oils...

Transesterification

It can be used directly, in unmodified engines, with the additional bonus that it can perform as a single, pure fuel or as part of a mix with its traditional counterpart. Good evidence that particulate emissions are significantly reduced. Biodiesel exhaust is generally less harmful to both human health and the planet. Contains significantly lower levels of polycyclic aromatic hydrocarbons (PAHs) and nitrite polycyclic aromatic hydrocarbons (nPAHs).

80. Measures For Off-Site Disposal Solid Waste?

For off-site disposal, the following measures should be taken:

- ❖ Locate sites at least 500m downwind of nearest settlement.
- ❖ Locate sites downhill from groundwater sources
- ❖ Locate sites at least 50m from surface water sources.
- ❖ Provide a drainage ditch downhill of landfill site.
- ❖ Fence and secure access to site.

Advantages of association of fungi with plants

- ❖ **Mycorrhizae:** Associations of fungi with roots of vascular plants quite common and in some cases be very beneficial to the plant.

They may be

- ❖ External, ectomycorrhizal,
- ❖ Internal, endomycorrhizal.

81. Advantages or Role of Endophytes.

- ❖ PGRP production,
- ❖ Antimicrobial compounds production,
- ❖ Nitrogen fixation

82. Commensals:

Neither benefits nor harm the plant, but there are also those which are beneficial to plant growth.

83. Plant Microbe Interactions?

All plant forms have interactions with microbes. Most important biotechnologically is the interaction of microbes with higher plants.

Two Categories:



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- ❖ Microbes external to the plants (epiphytes) e.g. soil bacteria and soil fungi.
- ❖ Microbes internal to the plants (endophytes) e.g., nitrogen fixing bacteria, internal fungi.
- ❖ Positive interaction Mutualism > Syntrophism > Proto-cooperation > Commensalism
- ❖ Negative interaction Amensalism > Competition > Parasitism > Predation

84. What Is Microbial Pesticides Name Microbial Biopesticides?

Pesticides based on microorganisms and their products have proven to be highly effective, species specific and ecofriendly in nature, leading to their adoption in pest management strategies around the world.

Name:

Biofungicides, bioherbicides, bioinsecticides (Internet)

85. What Is Symbiosis And Symbiotic Nitrogen Fixation? 10

Symbiosis interaction between two different organisms living in close physical association, typically to the advantage of both. Nitrogen fixation is a process by which nitrogen in the air is converted into ammonia (NH_3) or related nitrogenous compounds Atmospheric nitrogen, which is molecular dinitrogen (N_2), is relatively nonreactive and is metabolically useless to all but a few microorganisms. The fixation process converts N_2 into ammonia, which is metabolized by most organisms. Nitrogen fixation is essential to life because fixed inorganic nitrogen compounds are required for the biosynthesis of all nitrogen-containing compounds. As part of the nitrogen cycle, it is essential for agriculture and the manufacture of fertilizer. It is also, indirectly, relevant to the manufacture of all chemical compounds that contain nitrogen, which includes explosives, most pharmaceuticals, and dyes. Symbiotic nitrogen fixation occurs in plants that harbor nitrogen-fixing bacteria within their tissues. The best-studied example is the association between legumes and bacteria in the genus *Rhizobium*. Each of these is able to survive independently (soil nitrates must then be available to the legume), but life together is clearly beneficial to both. Only together can nitrogen fixation take place. A symbiotic relationship in which both partners benefit is called mutualism.

86. Why DDT Is Banned?

DDT causes weakening of egg shells of birds, which led to dramatic decreases in the populations of many species.

87. What Is Xenobiotic and Co-Metabolism?

Xenobiotics

Xenobiotics are the foreign chemical substances found within an organism, which are not normally naturally produced by an organism or expected to be present within that organism.



Co-metabolism

Co metabolism A reaction in which microbes transform a contaminant even though the contaminant cannot serve as an energy source for the organisms. To degrade the contaminant, the microbes require the presence of other compounds (primary substrates) that can support their growth."

88. 80. Write Two Main Chemicals Characteristics of Chlorinated Pesticides That Lead to Problems?

Noted the growing incidences of problems to wildlife from pesticides. Concerns rose about chlorinated pesticides. One of the major forces that led to the environmental movement. Other problematic organic chemicals are

- ❖ Polychlorinated Biphenyls (PCBs),
- ❖ Halogenated Solvents,
- ❖ Chlorofluorocarbons (CFCs)

89. 81. Minimum Substrate Concentration - I

Biodegradation of synthetic organic compounds is strongly affected by **Smin**, The lower threshold concentration below which reaction speed is insufficient to supply the organism with sufficient energy for net growth. Many hazardous organic compounds have drinking-water standards that are very low.

Such concentrations are frequently less than **Smin** While a given compound may be easily biodegradable at higher concentrations.

90. Write the Features of Phenol That Makes It Pollutant.

Phenol is a weak acid ($pK_a = 9.82$) and thus not ionized at pH 7. Being ionizable, the phenols are quite soluble in water and are commonly found as groundwater contaminants.

91. Two Source of Dioxin

- ❖ Dioxins released as by-products in a number of chemical processes. Production of some pesticides, the manufacture of PVC plastics, the chlorine bleaching of pulp and paper, and waste incineration.
- ❖ Carcinogenic

92. Five Impacts of Chlorobenzene and Dioxin on Human Health.

Human responses include chloracne, weight loss, insomnia, liver dysfunction, spontaneous abortion, and possibly cancer.



93. What Are PCBs? Which Biosensors Detect Them?

Polychlorinated biphenyls (PCBs) are xenobiotics having high level of halogenation. PCBs are substrates for very few pathways normally occurring in nature.

DNA biosensor with chronopotentiometric detection, and various immunosensors with fluorescence, SPR, and electrochemical detection principles.

94. Write 3 Oxidation Product Of TNT

- ❖ 4-amino-2, 6-dinitrotoluene (4ADNT)m
- ❖ 2-amino-4,6-dinitrotoluene (2ADNT)
- ❖ 2,4-diamino-6-nitrotoluene (2,4DANT),

95. With The Help Of Named Example Discuss How Whole Organism Can Be Used To Measure Potential Biological Toxicity Of Water And Soil.

Whole organisms to measure the potential biological toxicity of a water or soil sample. Toxicity assays Microtox® (Azure, Bucks, UK), or ToxAlert® (Merck, Darmstadt, Germany). Based on the use of luminescent bacteria, *Vibrio fischeri*, to measure toxicity from samples. Cellsense®, an amperometric sensor that incorporates *Escherichia coli* cells, for rapid ecotoxicity analysis.

96. Environmental Concern to The Release of The Hormone into Environment.

Endogenous hormones, of human or animal origin, have been reaching the environment for thousands of years... Exogenous steroids, used as growth promoters in several countries, have also become a matter of concern. Endocrine-disrupting activity in aquatic fauna or even terrestrial. Their widespread use and their capability to induce responses in fish at concentrations as low as ng/l or even pg/l level, have alerted scientists to the potentially dangerous consequences. An optical immunosensor to determine estrone, along with other organic pollutants (atrazine and isoproturon). New biosensing strategies for the control of hormone residues in an effort to improve food quality controls and to protect public health.

97. Ex Situ Technique

The main characteristic of ex situ methods is that the soil is removed from where it originally lay, for treatment.

These techniques are best suited to instances of relatively localized pollution within a site, typically in 'hot-spots' of medium to relatively high concentration which are fairly near to the surface.

Benefits:

- ❖ Conditions are more readily optimized,
- ❖ Process control is easier, monitoring is more accurate,



- ❖ Simpler to achieve,
- ❖ Introduction of specialist organisms is safer,
- ❖ Faster than corresponding *in situ* techniques

Disadvantages:

- ❖ Additional transport costs,
- ❖ increased likelihood of spillage

98. In Situ Technique?

The major benefit is the low site disturbance, which enables existing buildings and features to remain undisturbed. These methods are suited to instances where the contamination is widespread throughout, and often at some depth within, a site, and of low to medium concentration. Relatively slow to act, they are of most use when the available time for treatment is not restricted.

Disadvantages

Stringent requirement for thorough site investigation and survey. Since reaction conditions are not readily controlled, the supposed process ‘optimisation’ may, in practice, be less than optimum.

99. Co-Metabolism:

The contaminant is not used as food by the microbe, being metabolized fortuitously alongside the organism’s food into a less hazardous chemical. Typically, there is no apparent benefit to the microorganisms involved.

100. What Is Biosensor?

A biosensor is an analytical device, used for the detection of a chemical substance, that combines a biological component with a physicochemical detector

101. Classes of Biosensor and Advantage & Disadvantages of Immunosensor

According to the biorecognition principle, biosensors classified into

- ❖ Immunochemical,
- ❖ Enzymatic,
- ❖ Nonenzymatic Receptor,
- ❖ Whole-cell, and DNA biosensor

Immunosensors present the advantages of sensitivity and selectivity. Limitations are the regeneration of the immunosurface, and cross-reactivity.

102. What Is the Role of Hormones in Body and Young Children?



Hormones are the body's little messengers, which get produced in one part of the body, such as the thyroid, adrenal or pituitary gland, pass into the bloodstream or other body fluid and go to distant organs and tissues where they act to modify structures and functions.

103. What Is Biocide?

A biocide is defined as a chemical substance or microorganism intended to destroy, deter, render harmless or exert a controlling effect on any harmful organism by chemical or biological means.

104. Applications of Biosensor for The Detection of Biocide?

Enzymatic sensors, based on the inhibition of a selected enzyme, are the most extended biosensors used for the determination of these compounds. Various biosensors, based on the inhibition of acetyl cholinesterase (AChE) and colin oxidase, for the detection of organo phosphorous and carbamate pesticides. Although sensitive, biosensors based on AchE inhibition are not selective. One approach to solve the lack of specificity of AchE involves the genetic engineering of cholinesterase enzyme.

105. Describe Biosensor Single Transduction & Bio Recognition Principle.

Classified according to the signal transduction and the biorecognition principles. On the basis of the transducing element, categorized as electrochemical, optical, piezoelectric, and thermal sensors.

Electrochemical biosensors, and among them the amperometric and the potentiometric ones, are the best described in the literature. Those based on optical principles are the next most commonly used transducers.



**"Curiosity Keeps
Leading me down
new Paths"**

~Marie Curie