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L.1: Bioremediation: is the biological treatment and removal of pollution from the environment.

The principal organisms in bioremediation are bacteria and fungi that have the ability to degrade hydrocarbons such as oil and coal tar, and xenobiotic such as pesticides. Although metals cannot be degrade they can be accumulated by micro- organisms and therefore removed from the environment.

As bioremediation uses mixed populations of microorganisms the dynamics of such population are complex. Bioremediation process depends greatly on the quantity of the pollution and is affected by other factors such as the presence of toxic agents, temperature, presence of nutrient, bioavailability of the compounds, and oxygen limitation.

Legislations now seeks to reduce the levels of Sulphur and nitrous oxide emissions from power stations. A Number of approaches have been made to reduce these:

- Burn less Fassil fuel, switch to gas or other energy sources.
- Use less Sulphur coal or reduce the Sulphur content by a biological process of desulphurization.
- Improve combustion.
- Flue gas desulphurization using an alkali such as limestone.

- The Co_2 is known as agree house gas as it traps heat radiated from the Earth, so that an increase in CO_2 will cause global warming.

The contamination of soil and water with organic and inorganic pollutants is of increasing concern and the subject of legislation. These pollutants include complex organic compounds, heavy metals, and natural products such as oils and are derived from industrial processing, deliberate release, and accidental release.

The classes of pollutant released into the environment are deals with the treatment of the biodegradable contaminants such as sewage, industrial waste, and agricultural waste. The contaminants can come from industrial effluents, deposition from flue and exhaust gases, old industrial sites and disused mines, run-off from waste tips and landfill, excess application of herbicides and pesticides, and accidental spills.

Deposition from the air may contaminate very wide areas but the concentration may be very low. Air deposition does however contribute high proportion of the heavy metals that are accumulated in soil. If volatile, the compound will evaporate, adding to air pollution, although if reactive it may react with the soil or soil microorganisms before it evaporates.

If the compound is water soluble it may dissolve in rivers, lakes or ground water. This will mean that it will be mobile in the soil and therefore may contaminate the water table.

The microbial population may also degrade the pollutant, as water soluble compounds are more accessible. If the compound is insoluble (hydrophobic) it will be more difficult to metabolize by micro- organ- isms but some compounds will dissolve in the organism and may become part of food chain. Metals are particular case as they cannot be biodegraded, but can be absorbed by microorganisms that should allow their concentration and disposal.

Many of the organic compounds, released into the environment are not normally found in the environment and are known as xenobiotic. This would apply to the insecticides DDT and the herbicide lindan but not to petrochemicals as these are the products of living material laid down millions of years ago.

Allow level of a compound in the environment may not appear at first to be a problem, but some organisms in the environment may concentrate. The compound to levels higher than those in the surrounding environment.

- Mineralization is complete degradation to CO_2, water and other inorganic compounds, and partial degradation refers to break down to an intermediate stage.

L.1: Persistent organic compounds undergo degraded under any condition.

- Recalcitrant compounds are not degraded under any conditions.

- Bioaccumulation is the increase in a compound in organism compared with the level found in the environment.
- Biomagnification is the increase in a pollutant in tissues of successive organisms of a food chain.
- Bioconcentration factor refers to the concentration of a pollutant from the environment, and the factor is the concentration in an organism compared with that in the environment.