

4.6 BIOSCRUBBERS

- A bio scrubber couples traditional air pollution control and wastewater treatment technologies and consists of two units:
 - The soluble waste gases and oxygen are continuously absorbed into water in the scrubber.
 - Biological oxidation occurs in the basin unit, which often is the activated sludge basin of a wastewater treatment plant.
- Bio scrubbers are used where the biological degradation products (such as the acids produced during H₂S and NH₃ removal) would harm a biofilter bed.
- In addition to hydrocarbons, bio scrubbers are being used to remove chlorinated organics. Bio scrubbers come in two forms:

1. Activated-sludge scrubber:

- Gaseous pollutants are absorbed by a solvent in a countercurrent packed column tower.
- The absorption solution generally is a water and sludge mixture (1-10 g sludge per liter of water). After absorption in the column, the solution proceeds to a sedimentation tank where biodegradation takes place.
- Clean solution from the sedimentation tank recycles back to the packed column.

2. Trickling-filter scrubbers:

- As with the activated-sludge scrubber, gaseous contaminants are transferred into the liquid phase with a countercurrent scrubber.
- Instead of being fed into an activated sludge pond, however, the pollutant-laden scrubber wastewater is spread over a trickling filter.
- The technology offers greater control than does the activated sludge scrubber.

Applications Biofilters and Bioscrubbers:

- Biofilters and bioscrubbers have different applications, such as VOC treatment, inorganic compounds treatment or odor reduction.

- Biofiltration is a biological process used for the treatment of volatile organic and inorganic compounds.
- Biofiltration application uses microorganisms that subject contaminants contained in air to biological degradation.
- During an air treatment process by biofiltration, polluted air passes through the macro pores of the filter material.
- At this time the contaminants degrade in order to be subsequently transferred to a liquid medium where they are used as carbon and energy sources (organic compounds) or as a source of energy (inorganic compounds).
- Use of biofiltration implies the production of biomass and the partial or total oxidation of the contaminant.
- Biomass, under certain conditions, undergoes oxidation by endogenous respiration.
- Thus, biofiltration processes result in a complete decomposition of the contaminants, creating non-hazardous products.

Advantages of bioscrubbers compared to biofilters:

- Smaller volume of the equipment
- Better pH control
- No clogging problems of packing materials
- Lower occurrence of toxic concentrations in the water phase.

Disadvantages:

- Only cost-effective for pollutants with a dimensionless Henry's law's coefficient below 0.01
- More difficult to attain elimination efficiencies higher than 98%
- More complicated start-up procedure
- Higher operational costs.