

## Frequently Asked Questions on Phycoremediation

### ***What is Phycoremediation?***

Phycoremediation is the use of macro-algae or micro-algae for the removal or biotransformation of pollutants, including nutrients and xenobiotics from wastewater and CO<sub>2</sub> from waste air.

### ***What are algae?***

A group of aquatic, most primitive photosynthetic organisms ranging from unicellular to multicellular forms and generally possess chlorophyll but lack true roots, stems and leaves characteristic of terrestrial plants.

### ***What is special about micro-algae?***

The green-cell factories of microalgae tackle simultaneously more than one problem, a solution not capable by conventional chemical processes. That is, for example, problems such as pH correction, sludge removal, TDS reduction, BOD and COD removal, etc. can be handled simultaneously by micro-algal treatment (phycoremediation), whereas in conventional methods, separate methods or stages of treatments are used.

### ***Is phycoremediation environmentally safe? How so?***

Micro-algae are naturally occurring living organisms and therefore phycoremediation is a naturally occurring phenomenon. The micro-algae used in phycoremediation are already preset in nature and are at work consuming unwanted materials. We come into contact with them on a daily basis with no ill effects. After phycoremediation is completed, the environment is virtually restored to its pristine condition.

***Can phycoremediation help in selective treatments?***

The unique feature about phycoremediation is that while it can be used in the treatment of wide variety of effluents, it can also be highly specific, for example, in the treatment of heavy metal-bearing effluents or dyeing effluents or treatment of R/O rejects.

***Is there any specific method for running the Phycoremediation ETP?***

Phycoremediation is case specific as the process can be operated batch-wise, semi-continuous or in continuous manner.

***Are there any constraints in using phycoremediation with respect to the characteristic of the effluent?***

This technology is flexible to handle bulk fluctuations in quality and quantity of effluent feed. Moreover, it has been proved by us to be effective in treating array of effluents such as those of dye, food, chemical, pharmaceutical, dairy, oil drilling and pigment industries.

***Is it easy to separate algae from the effluent after treatment?***

There is no need to separate algae from the treated effluent as the process is an ecologically safe and natural process. Since micro algae are heavier than other microbes algal cells can be easily sedimented and harvested. In addition, micro-algae such as filamentous algae are available with high auto-flocculation capacity.

***How about using this technology along with other ETP methods?***

It is highly compatible with existing operations such as physical, chemical and other biological methods.

***Is there a need to employ specialists for operating the phycoremediation plant?***

Phycoremediation technology is robust as it minimizes automation, maintenance and the need for skilled operators.

***Will there be any sludge generation in the process?***

Phycoremediation assures nil sludge generation and as a result there is no disruption of surrounding, non-contaminated areas.

***Is there any need for additional nutrient addition?***

Nutrient addition for the growth enhancement of algae is required only to initiate the process. Once the culture is established there is no need to add these. Moreover, these chemicals are of negligible cost.

***Do we need to seed the phycoremediation plant with algal cultures in regular intervals?***

As micro-algae multiply fast, the cultures replenish themselves with fresh feed of effluents and hence there is only one time addition.

***Will there be any foul smell generated from the phycoremediation plant?***

In fact, micro-algae are adept in removing the obnoxious odours present in the effluent and convert them to rich algal smell. In addition, they make the coloured effluent into colourless.

***Why micro-algae? Why not other alternatives such as using bacteria and fungi?***

- ◆ Oxygenation of environment.
- ◆ CO<sub>2</sub> sequestration – a solution for the threat of global warming.
- ◆ Possible co-production of biofuels and biofertilizers.

- ◆ Sustainable and eco-friendly from an ecological perspective.
- ◆ Commercial benefits derived from the biomass and other extracted biochemicals.

All these are unique features of micro-algae.

***Is this technology cost effective?***

Yes it is, because it saves power and a lot of chemicals. The process generally is 70–90% less costly than other technologies as there is virtually little investment in “capital equipment”. Furthermore, the only energy requirement for the process is solar energy, which is abundantly available in our country.

***What is the social acceptability level of phycoremediation?***

The crucial factor for social acceptance, particularly by environmentalists, is the conclusive impact of micro-algae on the biodiversity and this factor is best accepted in phycoremediation when compared with other methods.