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BIOLOGICAL METHOD OF WASTEWATER TREATMENT USING "CHLORELLA VULGARIS"

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Abstract: Microalgae are microscopic aquatic organisms that transform light energy, water, and carbon dioxide into the biochemical energy necessary for their growth through photosynthesis and chemosynthesis [1]. Chlorella is a promising and environmentally friendly tool for treating industrial wastewater. Its ability to effectively remove a wide range of pollutants and produce valuable biomass makes it an attractive alternative or supplement to traditional treatment methods.

Keywords: Chlorella vulgaris, Chlorophyta, Eutrophication, Bioremediation.

Chlorella vulgaris microalgae is a microscopic, single-celled, photosynthetic microorganism. It is a genus of single-celled green microalgae that live in both fresh and salt water. They belong to the *Chlorophyta* division and are known for their high nutritional value. The Chlorella vulgaris cell is spherical in shape, about 2–10 micrometres in diameter. It is a single-celled green alga without flagella, eyespots or contractile vacuoles. It is round in shape and smaller than a chlamydomonas. The cells usually contain a cup-shaped chloroplast with or without a pyrenoid and one small nucleus. As in all higher plants, the plastids of Chlorella vulgaris contain chlorophylls of forms a and b, whose function is to accumulate energy from sunlight and use it to form organic substances. A single microscopic cell performs all vital functions. Chlorella vulgaris requires water, minerals, carbon dioxide and oxygen for growth and development. Chlorella has a high growth and reproduction rate under favourable conditions. The reproduction process of Chlorella vulgaris is very intense. Under optimal conditions, biomass growth can be 200 times greater than that of higher plants in a short period of time
[2]. Chlorella is rich in proteins (50-60% of dry weight), contains all essential amino acids, vitamins B, C, D, E, K, minerals (iron, magnesium, zinc), antioxidants (beta-carotene, lutein), omega-3 fatty acids and fibre.

Chlorella plays a significant role in the bioremediation of industrial wastewater due to its ability to absorb and accumulate various pollutants.

Chlorella actively absorbs nitrates, ammonium and phosphates from wastewater for its growth and metabolism. This helps prevent eutrophication of water bodies caused by an excess of these nutrients.

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1-picture. Chlorella vulgaris.

Removal efficiency can reach 78-99% for nitrogen and phosphorus, depending on the type of chlorella, the concentration of pollutants and the cultivation conditions.

Chlorella is capable of biodegrading certain organic substances, such as phenols, dyes, pesticides, and other industrial chemicals.

Chlorella has the ability to biosorb heavy metals, such as lead, cadmium, chromium, copper, and mercury from wastewater. The cell wall of chlorella contains functional groups that bind metal ions.

The efficiency of heavy metal removal can vary from 25% to 97% depending on the metal and conditions.

The most important cyanobacteria used in biotechnology are *Spirulina (Arhrospira) platensis, Nostoc commune, and Aphanizomenon flosaquae* [3].

Conclusion: The biological method of wastewater treatment using chlorella, which does not require the use of large amounts of chemical reagents, can reduce treatment costs compared to traditional physicochemical methods, especially when used on a large scale. Chlorella not only removes pollutants, but can also increase the level of dissolved oxygen in water through photosynthesis.

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