

ADOPTION OF BIOSORPTION TECHNIQUE TO REMOVE HEAVY METALS FROM INDUSTRIAL WASTE WATER BY USING CYANOBACTERIA

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ABSTRACT: Rapid industrialization has caused to the release of an alarming amount of toxic heavy metals into the environment endangering natural ecosystem and human health. Several processes such as ion exchange resins, electrochemical process, chemical precipitation and activated carbon have been widely used in the processes of wastewater purification. The dyeing industry sample was collected and the heavy metal pollutants were identified and the appropriate biomass is selected to be used as a biosorbent to remove the heavy metal trace. The biosorption technique has been presented as a promising alternative to solve the problem of contamination by heavy metals with low environmental and economic impact. The recommendations of this project would be of great help for the dyeing industries to follow the standards provided by Central Pollution Control Board of India (CPCB) with less expense and with high efficiency.

Keywords: Biosorption, AAS, ICP, Cyanobacteria

1. Introduction

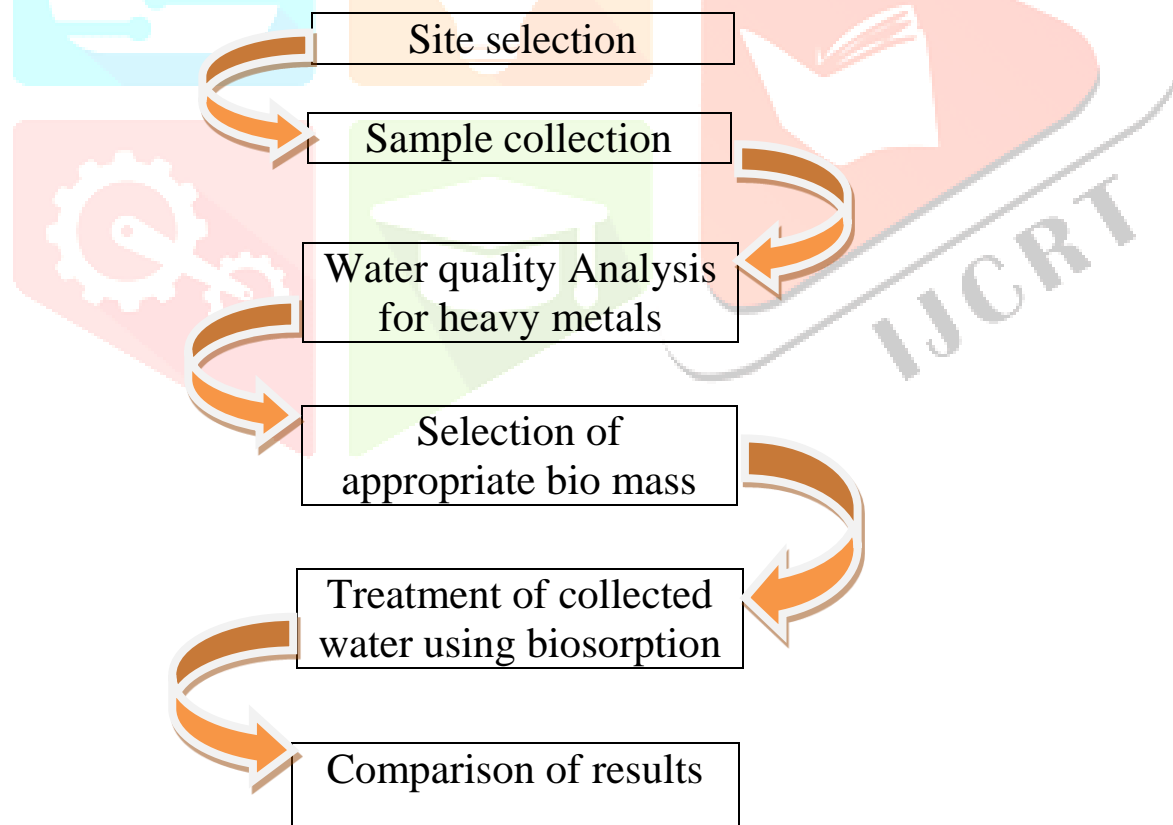
The health of the water you are taking is vital for our well-being. It is the same for the environment as a whole. Water is the bloodstream of the biosphere. Water is life and has many functions. In addition to serving as the basic requirements for humans and ecosystems, water also acts as a sink, solvent and transport vehicle for domestic, agricultural and industrial waste, causing pollution.. Cleaning technology has not kept

pace with the use of toxic chemicals in the many textile industries in and around the city. Over 700 bleaching and dyeing units, the two most water and chemical consuming industries in the textile production chain, let out virtually all effluents into the Noyyal river which flows through Tiruppur. There are several efficient and successful methods to remove the total solids, chlorides, etc., but the process of efficient heavy metals removal is in growing pace. Thus the biosorption technique proves to be economic and efficient solution.

2. Objective

- To analyse the heavy metal concentration of dyeing industry effluent.
- To adopt the biosorption technique to remove the heavy metals.
- To find the cost effective and efficient treatment for small scale industries.

3. Methodology



4. ICP Process

Inductively Coupled Plasma has been commercially available for over 40 years and is used to measure trace metals in a variety of solutions. Sample solutions are introduced

into the ICP as an aerosol that is carried into the centre of the plasma (superheated inert gas). The plasma dissolves the aerosol into a solid, vaporizes the solid into a gas, and then dissociates the individual molecules into atoms. This high temperature source (plasma) excites the atoms and ions to emit light at particular wavelengths, which correspond to different elements in the sample solution. The intensity of the emission corresponds to the concentration of the element detected. ICP spectroscopy offers a more sensitive, specific and reproducible way to determine heavy metal concentration in drug articles. It can be a useful tool in cleaning validations and extractable and leachable studies as well.

Table 3.4.2 Contamination of heavy metals in sample

HEAVY METAL	SAMPLE CONCENTRATION in mg/l	PERMISSIBLE LIMIT in mg/l
Iron	2.7	0.3
Zinc	1.6	3
Chromium	1.3	0.05
Lead	4.2	0.05

5. AAS Process

The biomass concentration of 5%, 10%, 15%, and 20% is allowed to be in contact with 1litre of effluent sample. The retention time for the tank is about 24 hours and the algae is allowed settle down. The treated effluent is obtained by filtering and it is then tested using AAS(atomic absorption spectroscopy).

Table No. 4.1 Results after AAS treatment.

PROPOR TION	CONCENTRATION mg/l		
	Fe	Cr	Pb
5%	0.12	0	0.023
10%	0.10	0	0.021

15%	0.09	0	0.020
20%	0.07	0	0.019

6. Conclusion

Adopting the biosorption technique is easy to adopt and remove the heavy metals. Based on the requirement the method of utilizing the algae has to be decided. Further this projects scopes for the effective usage of the algae containing heavy metals that has been retrieved. Its only used and adoptable for small scale industries. The storage tank is provided slightly higher than the treatment tank to have good flow of water to the treatment tank. In the storage tank, outlet valve is provided with screening. The screen removes the particles and impurities that are present the industrial effluent. The above process would aid in removing the heavy metals from the dyeing industry effluent.

7. References

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