WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Optimization of Physio-Chemical Parameters for Biosorption of Heavy Metals Using Allium Sativum and Zingiber Offiscinale

Sharanabasava R S, Suresh M, Tanush B, Sripanth H S., Prof. Spoorthy S S(Asst prof)

Department of Civil Engineering, Dayananda Sagar College of Engineering, Bengaluru (560078), Karnataka, India.

ABSTRACT

In recent years, growing industries and their waste management has been the main concern for many environmental scientists. That too treating a waste water has become a tough solvable problem in this era, failing to do so has parented many problems including diseases and causing disabilities for the upcoming generation. This has led many researchers on the path to solve the problems with low cast and high efficiency to fulfill the requirements of portable water. Presence of heavy metals in water is one of those problems and concern of the society. Our project helps to take out such metal ions from the waste water with cost, using abundant available resources and with maximum efficiency. We focus on removing two of such metal ions from the waste water and the method and coagulants can be extended in removing such heavy metal ions. This paper reviews such current researches and development related to removing of heavy metals from waste water.

Keywords: Waste water, heavy metal ions, absorption, biosorption, absorbent.

Introduction

The term Heavy Metals refer to any metallic chemical element that has relatively high density and is toxic at even low concentrations. E.g. Mercury (Hg), Cadmium(Cd), Arsenic(As), Chromium(Cr), Lead(Pb) etc. These heavy metals at higher concentration in drinking water may lead to food poisoning, bioaccumulation in food chain etc. These metal ions in human or living organism's body will lead to many diseases and harmful to lives. Removal of some of these heavy metals like Cadmium (Cd) and Lead (Pb) using Officinale (Ginger) and Zingiber Allium sativum (Garlic) will help to tame these spreading diseases. This method proves to be low costly and highly efficient in removing of heavy metal ions. The methodology of the project when applied to large scale like, waste water outflown from the industries and treating them will be useful for the society and environment health.

.

1.1Title of paper: Removal of heavy metals from contaminated water by biopolymer crab shell chitosan.

- The study focuses on potential of using crab shell chitosan as a low cost biosorbent, for heavy metals removal from aqueous solutions in an adsorption filtration system. Chitosan was synthesized from chitin by treatment of strong alkali solution under reflux condition. Spectrometric (AA and UV) was employed to detect heavy metals.
- The research revealed that prepared chitosan showed better removal performance for Mn, Cd, Zn whereas the removal efficiency was satisfactory for Co, Ni, Fe but it exhibited relatively least performance for Pb and Cr.

1.2Title of paper: heavy metal pollution removal from water using cost effective biosorbent.

- One of the worldwide issues is that water bodies are polluted with toxic heavy metals, copper is considered one of the most common method of heavy metal pollution of water bodies from industries. It has potential on ecosystem and environment.
- The biosorbent is prepared by washing the Westland Irish peat moss with acidic bath for half an hour with the continuous shaken process.
- The maxi$_a$mum copper removal of 94.6percent was obtained$_c$at a pH of 6, optimum adsorption time of 80 minutes, peat moss dosage of 7.5gper liter.

1.3 Title of paper: Study of physio chemical parameters of waste water generated from Aurangabad city of Maharashtra Author: Dr Mb mule.

- Khan river is a seasonal river, which is passing through same part of Aurangabad city, the sewage generated is disposed everywhere

without any treatment.

- Present study is the effort to study change in water quality of Kham River due to disposal of waste water and sewage the water samples are collected from the river at two different locations.
- The water quality is studied in terms of its physio chemical properties like temperature, Ph., dissolved oxygen, biochemical oxygen demand, chemical oxygen demand, total hardness electrical conductivity etc.
- The produced results are compared with the standard parameters for identification of its suitability for specific water use such as domestic water uses and to decide range of its pollution load.
- It was observed that water quality is changed significantly due to contamination of sewage waste water it it and not suitable for direct domestic$_a$c use without treatment.

1.4 Biosorption of Heavy metals from industrial waste water by "GeobacillusThermodenitrificans".

- The Thermophilic bacteria geobacillusThermodenitrificans isolated from Damodar river.
- India was assessed using synthetic metal solutions and Industrial waste water.
- Metals are removed in fe+3(90%), cr+3(80%), cu+2(57.14%), zn+2(55.14%), cd+2(49.02%), in optimum ph. within 720min.
- Sample collection site Damodar river.
- Water samplee collection Kalajharia industrial outfall, sample were taken a depth of 15cm below the surface triplicate and mixed to get a composite sample.

1.5 Removal of heavy metals from tannery waste water by using natural absorbents.

- Tannery waste water is highly complex and are characterized by high contents of organic, inorganic and nitrogenous compounds, chromium, sulfides, suspended solids and dissolved solids
- In this journal paper removal of heavy metals from tannery industry waste water by charcoal discharging of tannery waste water into a any water body effect the aquatic animals, life &human health
- The tannery industry is releases harmful heavy metals 20to40 then the standard values
- Heavy metal is one of the major cyclic pollutants which effects human health &soil fertility
- Formation of sludge is more effective to cause land &river pollution
- Recycling of tannery waste water with bark canker, chlorophyll dead and neem leaf's as a mixing absorbent
- Bark canker, coffee husk, dried water melon peel, charcoal as a filtration bed along with slow sand filter
- Heavy metal like, chromium, cadmium, lead and nickel metals are up to 90%.

1.6 Removal of heavy metal lead (Pb) from electrochemical industry waste water.

- Result indicates that the maximum removal efficiency for lead is about 94%. by using 0.25gm/l amount of activated coconut shell carbon powder, charcoal powder.

1.7 A Review on Removal of Heavy Metal Ions from Waste Water using Natural/ Modified Bentonite.

The increasing been surging importance in the production of a variety of economical adsorbents for water treatment. Outcome from the latest advances in using bentonites and modified bentonite shows the adaptable nature of the clay and its environment friendly nature. main purpose of this review is to describe the flexible way of natural bentonite and modified bentonite and its ability to absorb array of inorganic pollutants, which are present in the waste water. Number of research publications on adsorption of heavy metals using modified bentonite leads to the fact that there has**.**

1.8 Removal of Heavy Metals from Water and Waste Water by Electrocoagulation Process.

- Among the various heavy metal's arsenic, lead, zinc and chromium are considered to be more toxic due to their more harmfuleffects in living beings.
- Various techniques for heavy metal removal from water/ wastewater are being employed such as ion- exchange, adsorption, Membrane filtration a coagulation/flocculation.
- All these techniques are not cost effective, and also produces secondary sludge, which creates environmental hazard.
- Electrocoagulation has gaining attentions a potential electrochemical technique for treating water/ wastewater que to its versatility and environmental compatibility.
- It is evident from the literature survey articles that electrocoagulation is the most frequently used and proficient for the treatment of heavy metal containing water/ wastewater.

3.METHODOLOGY

1. Preparation of the Biosorbent.
2. Preparation of Cadmium and Lead stock solution.
3. Passing lead and cadmium solution through fixed bed.
4. Analyzation using AAS.
5. Conclusion of optimized water characteristics.

Preparation of the Biosorbent:

- The biosorbents used for the biosorption of cadmium and lead are Allium Sativum (Garlic) and Zingiber Offiscinale(Ginger).
- About 150 to 200grams of Allium Sativum and Zingingiber Offiscinale should be taken and washed several times with deionized water remove impurities and salts.
- The washed biosorbent is taken and should be sundried for 20 days,
- The sundried biosorbents should be taken and grinded individually to obtain amorphous powder which should be stored in two different air tight container.

Preparation of Cadmium and Lead stock solution:

- A weighed quantity of cadmium sulphate hydrate(3CdSO4.8H2O) and lead acetate hydrate in deionized water respectively.
- Weight of the quantity to be taken is 2.2 gm and 1.83gm for the cadmium and lead solution respectively.
- These quantities are then dissolved in compound of one litre of double distilled water.
- subsequently carrying out the process of serial dilution three times, in order to obtain a concentration of 1mg/l of cadmium and lead stock solution respectively.

Passing the solution through fixed-bed column:

- Then the prepared solution is passed through fixed bed adsorption column.
- Fixed-bed adsorption removes the dissolved heavy metal ions from water sample

Analyzing by AAS:

- Atomic absorption spectroscopy (AAS) is a spectroanlytical procedure for the quantitative determination of chemical elements using the absorption of optical radiation(light) by free atoms in gaseous state.
- AAS can be used determine 70 different elements in solution or solid samples.
- AAS makes use of absorption spectrometry to access the concentration of an analyte in a sample. It requires standards with known analyte to establish relation with analyte concentration and relies on a Beer-Lambert law.

Conclusion of optimized water characteristics:

- The batch experiment will be carried out for pH ranging from 2 to 7 to note down the results for varying pH. Then final pH value is observed.
- The contact time with the biosorbent is noted in this step, and the optimum time for the maximum biosorption is found out.
- The optimum temperature for maximum biosorption is found out and variation of biosorption is duly noted.
- Then by measuring them and heavy metals removed the water sample's quality is found out and based on that its purpose.

Conclusion

- The batch experiment will be carried out for pH ranging from 2 to 7 to note down the results for varying pH. Then final pH value is observed.
- The contact time with the biosorption batch experiment will be carried out for pH ranging from 2 to 7 to note down the results for varying pH. Then final pH value is observed.
- The contact time with the biosorbent is noted in this step, and the optimum time for the maximum biosorption is found out.
- The optimum temperature for maximum biosorption is found out and variation of biosorption is duly noted. Then by measuring them and heavy metals removed the water sample's quality is found out and based on that its purpose.rbent is noted in this step, and the optimum time for the maximum biosorption is found out. The optimum temperature for maximum biosorption is found out and variation of biosorption is duly noted. Then by measuring them and heavy metals removed the water sample's quality is found out and based on that its purpose.

REFERENCES

Environmental Protection Agency (US EPA), 2004.Guidelines for Water Reuse, Office of Wastewater Management Office of Water, Washington DC, 2004, EPA/R04/108.Veli, S., Alyuz, B., 2007. Adsorption of copper and zinc from aqueous solutions by using natural clay. Journal of Hazardous Materials 149, 226

–

233.Verma, S.K., Khandegar, V.Anil K Saroha, A.K., 2013.Removal of chromium from electroplating industry effluent using electrocoagulation. Journal of Hazardous, Toxic, and Radioactive Waste 17, 2. DOI:10.1061/(ASCE)HZ.2153-5515. 0000170.Wahyuni, E.T., Aprilita, N.H., Hatimah, H., Wulandari, A.M.,Mudasir, M., 2015. Removal of toxic metal ions in water by photocatalytic method, American Chemical ScienceJournal 5, 194-201.World Health Organization (WHO), 2008. Guidelines for Drinking-Water Quality, Incorporating 1st and 2ndAddenda, 3rd Edition, Vol. 1, Recommendations, Geneva.

Yavuz, O., Altunkaynak, Y., Guzel, F., 2003. Removal of copper, nickel, cobalt and manganese from aqueous solution by kaolinite. Water Research 37, 948-952.Zafar, M.N., Dar, Q., Nawaz, F., Zafar, M.N., Iqbal, M., Nazar,M.F., 2018. Effective adsorptive removal of azo dyes over spherical ZnO nanoparticles. Journal of Materials Research and Technology.