

Study of Natural Bio-Coagulants Moringa Oleifera and Cicer Arietinum for the Purification of Waste Water

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Abstract: Water is the most vital parameter among natural resources. Turbidity impart enormous problem in waste water treatment. In this present study, an attempt has made to evaluate the comparative effectiveness of chemical coagulant alum with natural coagulant such as Moringa Oleifera & Cicer Arietinum seed powder & oil extract. The pH, COD, BOD & turbidity was determined in treated sample of coagulant & maximum reduction efficiency was found in combined use of Moringa Oleifera & Cicer Arietinum seeds. As a result, it shows that the seed extracted powder of Moringa Oleifera and Cicer Arietinum removes the turbidity of water by nearly 96.5 to 98.3%. Moringa Oleifera and Cicer Arietinum seeds are very common & can easily available in nature and having low cost. Hence it was very cheap & every person can prepare it in their own at home in any village and can be used for the purification of water.

Keywords: Moringa Oleifera & Cicer Arietinum seeds, Waste water, Turbidity, Natural bio coagulants, etc.

I. INTRODUCTION

The use of Moringa Oleifera and Cicer Arietinum seeds for cleaner process in the water treatment has been proposed to treat raw water for the low income location for its abundant availability. Alum increases toxic metals and ions in treated water and can cause diseases like Alzheimer disease. Moringa Oleifera seed powder is non-toxic and biodegradable. Moringa Oleifera and Cicer Arietinum seeds can be used as an alternative to commercial coagulant Poly Ammonium Chloride (PAC) for water treatment in lake water & municipal water. Moringa Oleifera Seeds are more efficient than PAC in treating high turbid water. It is one of the most efficient main bio coagulant for water treatment including turbidity of surface water, alkali, organic contaminant in municipal water & industrial waste water including textile, coffee fermentation, pharmaceutical waste water, micro algae.

1.1 Objective of the Study

- To replace the use of alum to Moringa Oleifera or Cicer Arietinum seed extract as it increases toxic metals and ions in treated water & can cause Alzheimer's diseases.
- To reduce the cost for producing coagulants.
- To lower the turbidity of highly turbid water including municipal water and river water.

II. MATERIAL AND METHODS

Firstly measure the BOD, COD, pH & turbidity of six different water samples having different turbidity. Then we setup two different experiments, one using oil extract and second using powder form as combination of Moringa Oleifera and Cicer Arietinum seeds. In this experiment, natural coagulant Moringa Oleifera & Cicer Arietinum seeds were used to treat the samples & process parameters such as pH, turbidity, COD & BOD content were determined. This prepared coagulant includes 50:50 ratios of Moringa Oleifera & Cicer Arietinum seeds. Seed has a fairly soft kernel, so the oil can be extracted by hand using a screw press (also known as a 'spindle' or 'bridge' press). The seed is first crushed, 10% by volume of water is added, followed by gentle heating over a low fire for 10–15 minutes, taking care not to burn the seed (Meenakshi M. et al, 2015; Amaziah and Arthur Wokocha, 2016 and Suresnarayasamy, halimimohdsaud, 2014).



Cicer Arietinum Seeds & Powder

1. Moringa Oleifera



Fig.1 Moringa oleifera seed and powder

We take six different jar containing water samples. In first setup we use oil extract form of coagulant & stir under magnetic stirrer for 10-15 min. Then allowing them to settle for 3-4 hours. We will measure the change in pH, COD, BOD & turbidity. In second setup we use powder form as coagulant & repeat the same procedure then measure the pH, COD, BOD and turbidity of water sample (Mohammed Sulaiman,2017).

BOD is empirical test which measures oxygen required by microorganisms for the biochemical degradation of organic matter to carbon dioxide and water. COD can be measured by the method in which the organic matter present in sample gets completely oxidised by $K_2Cr_2O_7$ in presence of H_2SO_4 to form carbon dioxide and water. The excess of $K_2Cr_2O_7$ remaining after the reaction is titrated with Ferrous Ammonium Sulphate the $K_2Cr_2O_7$ used oxygen required for oxidation of organic matter. Which form is effective either oil extracts or powder form will be compared.

III. RESULT AND DISCUSSION

Moringa Oleifera and Cicer Arietinum Seed Powder: The seeds of Moringa Oleifera and Cicer Arietinum were collected from the various locations. The seeds were dried under sun for 4-5 days . Then the seeds were crushed and grounded in domestic mixer to lowest possible size.

Water Sample: The study is done by experimental method by taking water samples from different sources. The series of samples having different turbidity was prepared.



The prepared Moringa Oleifera and Cicer Arietinum seed powder was proved to be very good bio-coagulant compared to some traditional coagulant like alum since it remove nearly 97 to 98% turbidity of water.

As results shows that, the seed extracted powder of Moringa Oleifera and Cicer Arietinum removes the turbidity of water by nearly 96.5 to 98.3%. Moringa Oleifera and Cicer Arietinum seeds are very common & can easily available in nature so it was cost efficient. Hence it was very cheap & every person can prepare it in their own home in any village where there is no advance method for the purification of water.

As this research proves that Moringa Oleifera seed powder is a good bio-coagulant to remove turbidity of water, it will be better if we use activated charcoal in addition with powder.

V. CONCLUSION

Water is the most vital parameter among natural resources. Turbidity impart enormous problem in waste water treatment. In this present study, an attempt has made to evaluate the comparative effectiveness of chemical coagulant alum with natural coagulant such as Moringa Oleifera & Cicer Arietinum seed powder & oil extract. The pH, COD, BOD & turbidity was determined in treated sample of coagulant & maximum reduction efficiency was found in combined use of Moringa Oleifera & Cicer Arietinum seeds.

REFERENCES

- [1]. Ms. Vrushali V. Shimpi, Ms. Pooja R. Jondhale , Ms. Ritu B. Gangurde , Ms. Tejal D. Jadhav “Performance Assessment of Moringa Oleifera in clarification of surface water”, International Journal Of chem techResearch, Vol.2, 2015
- [2]. Dr.Amaziah Walter Otunyo and Arthur N. Wokocha, “Moringa Olrifera seed powder as a water coagulant for Purification of fresh, rain and borehole water”, International Research Journal of Engineering and Technology (IRJET), Volume-4, july-2016.
- [3]. Suresnarayasamy, halimimohdsaud, Water Sedimentation Using Moringa oleifera Seed Powder to Remove Water Turbidity in Malaysia, Journal of Agricultural Chemistry and Environment, Vol.3 2014.
- [4]. Mohammed Sulaiman, “Moringa oleifera seed as alternative Natural coagulant for Potential application in water treatment: A review”, Journal of Advanced Review on Scientific Research 30, Issue 1 (2017) 1-11