Name(s)	Project Number
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Project Title

Effectiveness of Different Plants as Coagulants to Purify Contaminated Drinking Water

Abstract

Objectives

According to the World Health Organization, globally 1.8 billion people are drinking contaminated water. Distributed water, surface water, and ground water are contaminated due to chemical runoffs and wastewater leaking into water bodies, making it unsafe to drink. These contaminants cause cloudiness of water, called turbidity, which can be reduced using chemical and natural plant coagulants. A coagulant is a natural or chemical substance that, when added to turbid water, aids in the process of coagulation. Chemical coagulants like Aluminum Sulfate (Alum) are expensive and have adverse health and environmental effects. Therefore, plant coagulants can be used as point-of-use technology in underdeveloped communities to purify contaminated drinking water since they are readily available, cost-effective, and biodegradable resources. The purpose of this experiment is to assess the effectiveness of plants such as Moringa, Okra, Nirmali, and Aloe Vera as coagulants, compared to Alum, to purify contaminated drinking water. The effectiveness of each coagulant was measured based on turbidity, pH, and Total Dissolved Solids (TDS). Moringa seeds have protein polymers with higher molecular mass and surface area compared to other coagulants. Thus, it was hypothesized that Moringa would be the most effective and Okra the least.

Methods

The synthetic turbid water was prepared by mixing Kaolin clay and tap water. Each coagulant was added to the synthetic turbid water samples and was allowed to settle for 3 hours. Coagulants remove impurities through adsorption, charge neutralization, interparticle bridging, and enmeshment processes. This results in increased water purification and decrease in turbidity. Readings were recorded for turbidity using a turbidity tube, the pH using a pH meter, and TDS using TDS meter for treated and untreated water.

Results

The results for Alum showed that TDS was not the right indicator for turbidity. Moringa decreased turbidity from 229 to 14 NTU, TDS from 383 to 313 ppm, and pH from 9.2 to 7.7. Moringa was the most effective, followed by Nirmali, then Aloe Vera, and Okra.

Conclusions

The experiment showed that the tested seed powders have varying levels of coagulating properties and are excellent biodegradable and ecofriendly alternatives to chemical coagulants to purify contaminated drinking water. Moringa was proven to be comparably the most effective plant coagulant.

Summary Statement

By testing the effectiveness of different plant coagulants, I concluded that Moringa is the most effective plant alternative to chemical coagulants like alum to purify contaminated drinking water.

Help Received

My science teacher explained the metrics to measure the quality of water. My parents helped by answering questions relating to creating Pivot data tables and charts in Excel.