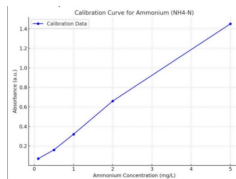


EXECUTIVE SUMMARY:

Upcycling and Waste Management

The increasing global emphasis on sustainable and environmentally friendly alternatives to conventional chemical coagulants gave rise to our solution project “Upcycling and Waste Management”. Water pollution remains a pressing issue, particularly in developing regions where access to clean water is limited. Traditional chemical coagulants, while effective, often pose health risks and environmental concerns due to their synthetic nature. Alarmed with its rising threats, we aimed to explore the potential of natural coagulants, specifically Moringa Oleifera, sugarcane bagasse, aluminium sulphate and ammonium (NH₄), in water treatment processes. The increasing demand for sustainable and eco-friendly alternatives to chemical coagulants in water purification has prompted this research.



Sample	Coagulant concentration in ppm	Absorbance	Turbidity	Turbidity reduction %
Initial	0	0.00	950	0
1	5	0.07	70	93.3
2	10	0.16	50	95.7
3	15	0.20	40	95.3
4	20	0.32	30	96.0
5	25	0.66	20	98.7

Ammonium concentration (mg/L)	Absorbance
0.1	0.07
0.5	0.16
1.0	0.32
2.0	0.66
5.0	1.45

Research Methodology:

Eternal Research: We conducted an extensive review of existing studies on natural coagulants, focusing on their chemical properties and effectiveness in water treatment.

Selection of Coagulants: We decided to choose Moringa Oleifera, sugarcane bagasse, aluminium sulphate and ammonium based on their availability and previous research indicating their potential efficacy.

Experimental Design: We then developed a systematic approach to test the coagulants by preparing water samples with varying levels of turbidity, adding different concentrations of each coagulant to the samples and monitoring the coagulation process over a set period.

Data Collection: We measured the turbidity levels before and after treatment using a turbidity metre to assess the efficiency of each coagulant.

Results and Analysis:

Throughout the research, we also conducted several tests in different geographical regions around the globe, further consolidating our findings. Natural coagulants such as Moringa Oleifera which contain protein can help destabilise colloidal suspensions, making it easier for particles to clump together at relatively low concentrations, whereas sugarcane bagasse reduced turbidity by 65%. Coagulants such as Ammonium and Aluminum sulphate also showed significant reduction in water turbidity with its higher concentrations.

The findings of this study underscore the importance of incorporating natural coagulants into water treatment practices for several compelling reasons. Additionally, coagulants like Moringa Oleifera provide nutritional benefits alongside their water purification capabilities, contributing positively to public health.

Utilising natural coagulants reduces reliance on synthetic chemicals and promotes environmentally friendly practices in water treatment. Coagulants are also readily available and inexpensive, making them accessible for communities in need of water purification solutions. By implementing these coagulants can improve water quality in rural and underserved areas, and thus, enhancing public health and quality of life. In conclusion, this project underscores the potential of natural coagulants in water treatment, advocating for further research and implementation to harness their benefits for sustainable water management.