

# Use of Moringa Oleifera Seeds as Natural Coagulant for Recycling of Domestic Waste Water in Ramanathapuram

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**Abstract:** The removal of turbidity from domestic water is essential before it can be disinfected for human consumption. In a water treatment works, this clarification stage is normally achieved by the application of chemical coagulants which change the water from a liquid to semi-solid state. This is usually followed by flocculation, the process of gentle and continuous stirring of coagulated water, which encourages the formation of 'Flocs' through the aggregation of the minute particles present in the water. Flocs can be easily removed by settling or filtration. For many communities in developing countries, however, the use of coagulation, flocculation and sedimentation is in appropriate because of the high and low availability of chemical coagulants, such as aluminium potassium sulphate. This technical brief gives an overview of an indigenous, naturally derived coagulant, namely seed material from the multi-purpose tree moringa oleifera which offers an alternative solution to the expensive chemical coagulants.

**Keywords:** Alkalinity, Coagulation, Turbidity, Water treatment.

## 1. Introduction

A coagulant is one of the key components for removing turbidity in a water treatment process. Coagulants are classified into inorganic, synthetic organic polymers and natural coagulants, two primary coagulants are iron and aluminium. However, recent studies have shown several drawbacks of using aluminium salts, such as Alzheimer's disease for residual aluminium in treated water and production of large sludge volumes. Recently researchers have shown tremendous interest in commonly used coagulants since long time in treating drinking water and it is also used as disinfect in drinking water treatment. Moringa oleifera (MO), is a tropical plant from the family of moringaceae, a single family of shrubs with 14 known species. MO is native from India but is now found in arid and semi-arid regions of India. They are non-toxic natural organic polymers, a medical plant. It is drought tolerant and has nutritional, medicinal, and water-cleaning attributes the mechanism of suspended solids removal by the coagulation active component has been described. They are finely powdered and used as coagulant in treatment. They produce less sludge compared to aluminium and iron and is good adsorbent for cadmium. It is inexpensive safe and active compounds. The coagulant activity of Moringa oleifera seeds is widely known

and applied in water treatment at household level in rural areas of developing countries.

## 2. Drinking water treatment and water quality

Water, where ever present in nature, is always contaminated with various types of pollutants. Some of them are harmless, and sometimes even desired in the water where as others need to be removed before the water can be used for drinking purposes. The following chapter describes the main aspects of drinking water treatment.

### A. Parameters for drinking water quality

When evaluating the quality of drinking water, numerous parameters must be taken in to account. The most important ones are presented and described below.

#### 1) Turbidity

The cloudiness of water is referred to as turbidity and has its origin from particles suspended in the water. These are natural contaminants and most often mineral particles such as clay and silt or organic Flocs. Turbidity is a major problem in drinking water treatment when the water source is surface water but can often be neglected in treatment of ground water. Turbidity is usually measured in nephelometric turbidity units (NTU), and is an optical measurement, where a light beam is transmitted through the water sample, and the amount of scattered and absorbed light is detected. The world health organization allows drinking water with turbidity level below.

#### 2) pH:

The pH of the water will have an impact on the water quality and are closely linked corrosion pH is defined as the negative 10-logarithm of the hydrogen ion activity in the water, and thus indicates the amount of hydrogen ions in the water. Alkalinity is the water's ability to neutralize added hydrogen ions, or buffering capacity.

The main buffering species include carbonates ( $CO_3^{2-}$ ), and hydrogen carbonates ( $HCO_3^-$ ) in the water. Since corrosion is caused by calcium carbonates, the corrosion process is dependent on the pH of the water.

#### 3) Electrical conductivity

Conductivity is a measurement of the water's ability to lead electricity and depends on the amount of ions in the water.



Table 3  
Moringa Oleifera as a coagulant

PARAMETER	RAW WATER	TESTE WATER						STANDARD LIMITS	
		ALUM ADDED(ML)							OPTIMUM DOSAGE
		2 ML	4 ML	6 ML	8 ML	10 ML	20 ML		
Turbidity (NTU)	36	5.2	3	3	2	2	1	2ML	5-10
PH	7.32	8.43	8.43	8.4	8.3	7.7	7.54		6.5-8.5
Electrical connectivity MS	3.2	1	0.9	0.9	0.9	0.9	0.7		5-5.5

Table 4  
Moringa Oleifera + Alum as Coagulant

PARAMETER	RAW WATER	TESTE WATER						STANDARD LIMITS	
		ALUM ADDED(ML)							OPTIMUM DOSAGE
		2 ML	4 ML	6 ML	8 ML	10 ML	20 ML		
Turbidity (NTU)	36	6.2	4.2	2	2	2	1	2ML	5-10
PH	7.32	8.16	8.28	8.3	8.08	8.12	8.00		6.5-8.5
Electrical connectivity MS	3.2	0.7	0.7	0.7	0.7	0.5	0.5		5-5.5

#### 4. Conclusion

Mo shows good coagulating properties, and has many advantages compared to aluminium potassium sulphate; it does not affect the pH, alkalinity or conductivity of the water and it can be produced at low cost Mo is a method that can be considered as a good, sustainable and cheap solution for smaller water works, if the supply of Mo seeds can be guaranteed Mo provides a good, cheap and sustainable alternative to aluminium potassium sulphate which should be considered as a coagulant in smaller water works.

#### References

- [1] K. A. Adeniran, T. D. Akpenpuun, B. A. Akinyemi & R. A. Wasiu (2017) Effectiveness of Moringa oleifera seed as a coagulant in domestic wastewater treatment, African Journal of Science, Technology, Innovation and Development, 9:3, 323-328.