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Physico-Chemical Analysis of *Moringa oleifera* Seeds: Harnessing its Industrial Application Potentials

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ABSTRACT

Moringa oleifera is an aesthetical tree that grows very fast. Previous literature has reported the use of the grounded dry seeds for seasoning sauces as well as the dry root powder from the young plant as a hot seasoning base with a flavor similar to that of horseradish. This is why the Moringa tree has been given the name "Horseradish tree. This study presents the Physico-chemical analysis of the seed powder of *Moringa oleifera.* The results of the analysis of the seed powder were done according to standard methods and the reports revealed that the dry seed powder has a pH of 5.66, and good electrical conductivity of 1170.00µs/cm which makes it a good coagulant for industrial wastewater treatment applications. The results also revealed high levels of cationic activity within the range of 5.30 to 18.70mg/kg of some metals such as sodium, magnesium, aluminum, zinc, and calcium. The high cationic property of *Moringa oleifera* seed power supports the use effective use of *Moringa oliefera* seed powders as food supplements and additives in the food industry as well as the pharmaceutical industries for the green synthesis of its metal/metal oxide nanomaterial for biomedical applications and lots more.

Keywords: *Moringa oleifera*; Physico-chemical analysis; wastewater; nanomaterial; biomedical

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INTRODUCTION

- Plant-based materials contain essential nutrients and other constituents that are beneficial to mankind serving various applications domestically and industrially resulting in their high economic value.
- Plants such as *Moringa Oleifera*, an aesthetical tree that grows widely have been used domestically for several purposes, especially as local herbs for medicinal purposes.
- However, scientific curiosity has prompted further research on the benefits viz a viz its application in this modern day.
- Recent research and literature have shown the sporadic use of different parts of *Moringa oliefera* in the fields of Pharmaceuticals, biomaterials utilization, nano-medicine, water treatment and lots more.
- This present study however presents the chemical analysis of *Moringa oliefera* seed powder (MOSP) and further looks into its potential industrial application in the near future.

MATERIALS AND METHODS

1. *Moringa oliefera* seed were cultivated and harvested in Benin City, Nigeria.
2. All chemicals used for Physico-Chemical Analysis were of analytical grade.

Processing of *Moringa oliefera* seed powder.

The matured pods of *Moringa oliefera* plant were harvested. The seeds were removed from the pods and husks were removed. The de-husked seeds were ground with an electric blender into a very fine powder, weighed and sealed in a container.

Analysis

The physicochemical parameters of the effluent samples before and after treatment were analyzed according to standard methods (APHA, 2005). Where analysis was not immediately possible, the samples were preserved also according to standard methods.

RESULTS AND DISCUSSION

- The physicochemical characterization of MOSP particles demonstrated clearly that MOSP showed high electrical conductivity and stable pH at triplicate determinations. This shows it could possibly be responsible for the efficient use as a coagulant for effective water clarification.
- This also reveals possible use for the industrial applications for nano-packing materials in water treatment facilities in addition to the high levels of the divalent and trivalent metal ions which in solution carry an overall positive charge as seen in Table 1.

TABLE 1: Physico-chemical analysis of the seed powder of *Moringa oleifera.*

Parameters	*Moringa oliefera* Seed powder
pH	
E.C µs/cm	1170.00 ± 0.00
Iron (mg/kg)	5.30 ± 0.03
Aluminium (mg/kg)	1.20 ± 0.01
Manganese (mg/kg)	15.70 ± 1.56
Zinc (mg/kg)	9.70 ± 0.28
Calcium (mg/kg)	9.10 ± 0.19
Magnesium (mg/kg)	18.70 ± 1.24
Sodium(mg/kg)	8.60 ± 0.06
Potassium(mg/kg)	Potassium(mg/kg)

- However, clean drinking water in economically deprived settings can be achieved using MOSP as previously reported in some literature.
- In this study, we present MOSP also as a food additive in Pharmaceuticals and medicine thus supporting the need for the physicochemical characterization of MOSP. The abundance of high levels of Calcium, Iron, Magnesium, and Potassium can be recommended as a natural supplement to boost immunity.
- The recommended daily dose of the aforementioned metals which serves as minerals in food supplements is essential to human health.
- The findings from this study suggest that MOSP possesses far more interesting constituents suitable and necessary for optimal product development and efficient manufacturing and this lends support to the potential efficiency and effectiveness in the application of the powder at the interphase of food, medicine and environmental application.

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