Title : Integrated Innovation of Saponin Extraction from Rain Tree Pods for Odor Control Products in Animal Facilities

Author(s) :
1. Boriwut jiramongkhonrat — **Student ID :** 650510062
2. — **Student ID :**
3. — **Student ID :**

Major : Chemistry

Advisor(s) :
1. Assistant Professor Dr. Win Wiriya
2. Dr. Rateeya SaiKaew
3.

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ABSTRACT

This study develops a method to extract saponins from rain tree pods (*Samanea saman*) for use as an active ingredient in odor and VOCs control products. The formulation is specifically designed for both livestock farms and household pet environments. The process utilizes Pulsed Electric Field (PEF) extraction and yeast fermentation to create a natural solvent-based extract. Analysis confirmed a total saponin content of 40,301.9 mg/L with 98.18% accuracy using the Vanillin-Sulfuric Acid Spectrophotometric Assay. Field testing using an FTIR gas analyzer showed significant air quality improvements. The spray application achieved a 100% reduction of Acrylonitrile (from 21.55 mg/m³), while removing 81.52% of ammonia and 80.03% of BTEX. When used with porous glass beads, ammonia and BTEX removal reached 100% and 95%, respectively. Consequently, the Hazard Index (HI) dropped from 36,387.83 to 1,812.92. This study demonstrates a sustainable approach to upcycling agricultural waste into high-efficiency air purification solutions, contributing to a circular economy through innovative waste management. The project aims to expand this technology into the livestock and pet care sectors, providing natural, high-performance filtration that enhances air quality while maintaining an eco-friendly product profile.

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