#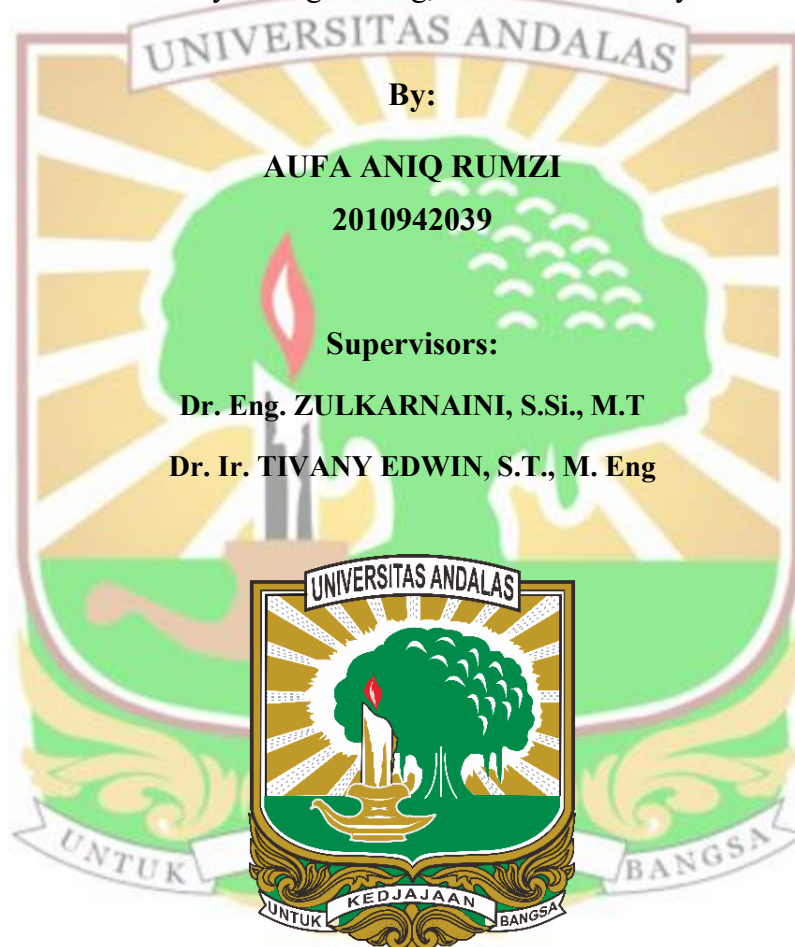 EFFECTS OF PH VARIATION TOWARDS AMMONIUM AND PHOSPHATE RECOVERY USING STRUVITE PRECIPITATION WITH SEAWATER AS MAGNESIUM SOURCE

## UNDERGRADUATE THESIS

As one of the requirements to complete the
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# ABSTRACT

*Tofu is widely produced and consumed in Indonesia. This generates a large volume of wastewater that contains high concentrations of ammonium ($NH_4^+$) and phosphate ($PO_4^{3-}$), leading to eutrophication in water bodies. A multistage anaerobic digester treatment system conducted by BRIN still produced an effluent with ammonium and phosphate levels that exceeded regulatory limits. This study investigates the recovery of ammonium and phosphate through struvite ($MgNH_4PO_4 \cdot 6H_2O$) precipitation. Seawater as the magnesium source and focuses on understanding the influence of pH variation on nutrient recovery efficiency from tofu wastewater. Batch experiments were performed on two solutions, with and without seawater addition, at pH levels 7.0 – 10.0 with 0.5 intervals. The solutions were precipitated for 60 minutes at 200 RPM. Phosphate recovery at pH 9.5 reached 75% for the wastewater solution and 99% for the wastewater + seawater solution. The lowest ammonium concentrations for each solution were 29.93 mg/L and 34.95 mg/L, which occurred at pH 10. The maximum crystal yield of 16.4 mg and 22.54 mg was obtained at pH 9 and pH 9.5, respectively. Seawater addition increases the concentration of $Mg^{2+}$ in the solution, and when supersaturation occurs, resulted in a higher turbidity value and struvite crystal production. Overall, optimal nutrient recovery was achieved at pH 8 – 9.5, while efficiency declined at pH 10. These results indicated that pH control is important for struvite precipitation and that seawater can be used as an effective magnesium source for nutrient recovery from tofu wastewater.*

***Keywords****: Ammonium, phosphate, seawater, struvite precipitation, tofu wastewater*