UNIVERSITAS
GADJAH MADA
OPTIMIZATION OF STRUVITE PRECIPITATION IN POULTRY SLAUGHTERHOUSE EFFLUENT
SIENG, SREYVICH, Chandra Wahyu Purnomo, S.T., M.E., M.Eng., D.Eng.; Himawan Tri Bayu Murti Petrus, S.T., M.
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

ABSTRACT

Due to population rapid growth, fertilizer industries have to increase the production to ensure food security causing faster non-renewable resource depletion. Poultry slaughterhouse wastewater (PSW) commonly contains high amount in NH_4^+ and PO_4^{3-} is still underutilized and causing eutrophication and unpleasant odor problem. Struvite precipitation, a common technique using for nitrogen and phosphorus recovery from wastewater, is proposed to recover the organic and renewable nutrients sources. The precipitation process is formed based on the equimolecular concentration of Mg^{2+}, NH_4^+ and PO_4^{3-} at a slightly alkaline condition.

Three parameters in struvite precipitation will be observed in this study which are pH, temperature, and PO_4^{3-}/Mg^{2+} molar ratio to determine the optimum conditions of struvite precipitates from PSW. Struvite precipitation process for nutrients recovery from waste sources is beneficial not only providing slow-releasing and high-quality fertilizer but also reducing soil and water pollution from rich-nutrients wastewater.

The highest nutrient removal efficiency set up can be obtained by PO_4^{3-}/Mg^{2+} ratio of 1:3, pH at 9; and temperature at 30℃. However, the result of kinetics study is quite different due to the different conditions. As obtained by the simulation, the reaction rates for pH at 7.5 is 0.0408 $L^2/mol^2.s$, the 1:3 of PO_4^{3-}/Mg^{2+} molar ratio provided the reaction rate 0.2961 $L^2/mol^2.s$ and at the temperature of 40℃ provided 0.0541 $L^2/mol^2.s$.

The obtained powder of struvite has been successfully confirmed by X-Ray diffraction (XRD) with expected impurity of $MgCl_2$ due to the excess usage during

UNIVERSITAS
GADJAH MADA
OPTIMIZATION OF STRUVITE PRECIPITATION IN POULTRY SLAUGHTERHOUSE EFFLUENT
SIENG, SREYVICH, Chandra Wahyu Purnomo, S.T., M.E., M.Eng., D.Eng.; Himawan Tri Bayu Murti Petrus, S.T., M.
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

struvite precipitation. In conclusion, the parameters such as pH, temperature and PO_4^{3-}/Mg^{2+} molar ratio are affecting the removal efficiency of nutrients in wastewater and also the kinetic of struvite formation.

Keywords: Struvite precipitation, removal efficiency, nutrients, kinetic study, and reaction rate constant.