

Phosphorous removal by oyster shell and regeneration

Annaliza Cainglet and Woohang Kim

Department of Environmental Engineering and Biotechnology, Mokpo National Maritime University Chonnam 58628, Korea

패각에 의한 인의 제거 및 재생

Annaliza Cainglet · 김우항

목포해양대학교 환경생명공학과

핵심용어 : 인, 패각, 전처리, 재생

Key Words : phosphorous, oyster shell, pre-treatment, regeneration

I. Introduction

Chemical precipitation of hydroxyapatite (HAP) in the form ($\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$) was assessed in two methods; batch testing and continuous test. This study aimed to show the phosphate removal efficiency of the pre-treated waste oyster shells with regards to pH change as well as the efficiency of hydrogen chloride (HCl) to regenerate the previously used powders in different treatments across differing concentrations (g/mL).

II. Materials and Methods

A clear column was prepared with a diameter of 3.55 cm was used in this experiment. 100g of HOSP was loaded to the column with a rubber stopper on both ends. The flow rate of the 10 ppm-P solution was kept at 34 mL/min for 5 hours of the total reaction time, sampling analysis was done every 30 minutes-1 hour interval. The regeneration experiment for the used HOSP in this continuous test was done using 1.2N HCl solution which was allowed to pass through the column for 30 minutes of the reaction time. The remaining HOSP was then reused for its phosphate removal efficiency.

III. Results and Discussion

Lastly, the graph below shows the regeneration of HOSP when added with 1.2N HCl in the continuous flow.

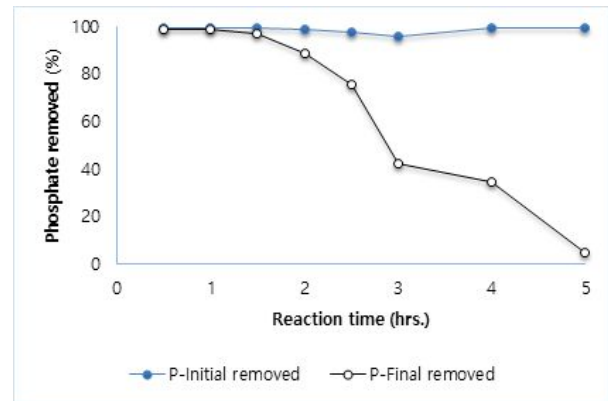


Fig. 1. Phosphate removal efficiency of HOSP across varying time in a continuous mode before and after regeneration.

IV. Conclusion

The regeneration capacity reached up to 100%, however, mass loss of the HOSP powder was observed. Continuous testing was also performed, it was shown that through time, the efficiency of the HOSP powder lowers which signifies that free Ca^{2+} ions may have been used up to form HAP and therefore, reapplication of HCl solution in the column should be done every after 1-2 hours of the test. Concentration of waste OSP showed a slight difference in the removal of phosphate, favoring the removal at higher concentration.