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EXPLORING CALCITE AS A SUSTAINABLE ALTERNATIVE FOR PHOSPHORUS RECOVERY FROM SWINE MANURE SOLUTIONS WITH LITTLE IMPACT ON THE PH OF SYSTEM

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Abstract

To explore the ability of low-impact and environmentally friendly technology to recover phosphorus (P) from swine manure, this study investigated the feasibility and parameters of using calcite to recover P. Filter methods, the solid-to-liquid ratio and the adsorption time were examined, as they could be used to determine operation parameters. We also tested the efficiency of reusing calcite for P recovery. The results revealed that both filtering materials, the filter paper and the membrane, were able to separate the liquid from the original swine manure, with no significant difference ($p < 0.05$). Calcite was found to react with P in diluted solutions rather than in concentrated swine manure solutions. A solid-to-liquid ratio higher than 1/1500 g/mL was optimal, with a P recovery efficiency of 75%. The addition of calcite to the solution resulted in only minor alterations in the pH and electrical conductivity (EC), suggesting that calcite may serve as a mild reagent within the system. However, the efficacy of calcite in phosphorus (P) recovery decreased with repeated use, achieving only a 10% recovery rate by the fourth cycle. Therefore, our study indicates that the use of calcite, a widely available mineral, could be an effective option for extracting phosphorus from manure without disrupting the existing waste treatment process.

Key words: biowaste management, calcite, phosphorus, recovery method, swine manure

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