

Recovering resources from wastewater screenings through Anaerobic Digestion and Phosphorus Precipitation

Abstract

Background: The potential of a material that has received little attention, namely wastewater screenings produced during wastewater treatment, was examined for recovering valuable products, in the form of methane and phosphorus, in order to turn this waste into useful resources. Anaerobic digestion was performed to recover biogas that has sustainable energy in the form of methane as its main component. The nutrient released in the residual digested liquor can then be precipitated as struvite, which allows its recovery as phosphorus, which is reported is depleting.

Objectives: This study aims to examine the potential of wastewater screenings for biogas and phosphorus recovery through anaerobic digestion and phosphorus precipitation.

Methods: Wastewater screenings were subject to anaerobic batch digestion at a range of dry solid concentrations to determine the biochemical methane potential. The anaerobic digestion was performed at mesophilic condition of 37°C for 30 days at maintained pH 6.8-7.2. The digestate was then analysed for its struvite potential, which permitted the theoretical amount of struvite precipitation to be determined by molar balance calculation.

Results: The optimum dry solids concentration for methane was of 6% when methane yield of 0.355 m³CH₄/kg VS was achieved. By contrast a lower dry solids concentration of 3% was optimal for phosphorus recovery when 0.27g struvite/g dry solids was achieved.

Conclusion: Wastewater screenings can provide a valuable source of methane and phosphorus, which are not exploited by current landfill disposal practice. By performing anaerobic digestion on screenings, it's not only to alleviate environmental problems but also to recover depleted resources.