

Biological Hydrogen Gas Production by Anaerobic Fermentation of Food Waste

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Abstract

Hydrogen gas is considered as a promising alternative energy source because it produces only harmless water when it burns, has a higher energy content (122 kJ/g) than methane and can be used as a raw material itself.¹⁾ Among the biological hydrogen production processes, dark fermentation is thought to be a feasible process for the sustainable hydrogen production. It can produce hydrogen continuously without sunlight and establish high hydrogen production rate due to high cell growth rate.²⁾ In the mean time, food waste has been a great concern in Korea since its landfill has been inhibited. Since food waste has a high organic content, dark fermentation can be a promising process to treat food waste. In this study, we aim to maximize hydrogen production from food waste by optimizing operating parameters such as hydraulic retention time (HRT), pH, temperature and agitation speed. When HRT, pH, temperature and agitation speed were maintained at 16 d, 5.2-5.5, 35 °C and 150 rpm, respectively, hydrogen gas production reached 2006 mL/d and its content was 38% at the most. Most volatile fatty acids (VFAs) were analyzed as acetate and caproate. Further optimization could be achieved by using response surface methodology (RSM).

References

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