

影响牛粪高浓度水解酸化过程中乙酸含量的因素研究

Factors affecting acetic acid content in the process of high-concentration hydrolysis and acidogenesis of cow manure

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中文摘要:

在室温为20℃的实验室条件下,对牛粪进行了批量式高浓度厌氧发酵,采用二次正交旋转组合设计试验方法,探讨牛粪水解酸化过程中,温度、料液浓度和停留时间对乙酸含量的影响规律。温度、料液浓度和停留时间的取值范围分别为25~35℃、6%~10%和2~12 d,利用单因素分析法确定各因素在二次非线性模型中的主次顺序。利用频数分析找出各因素的最佳试验范围。结果表明,停留时间对乙酸含量的影响最大,温度次之,料液浓度的影响最小。通过频数分析,得出了在温度为26~30℃、料液浓度为7%~9%、停留时间为2~5 d时挥发酸中的乙酸含量均高于66%。当温度为26~30℃、料液浓度为10%、停留时间为10~12 d时挥发酸中的乙酸含量均低于60%。

英文摘要:

High-concentration anaerobic fermentation of cow manure was investigated using an anaerobic batch reactors under laboratory conditions at 20℃. In this present study, acetic acid content was used as response function, and three factors, namely, temperature, liquor concentration and retention time, were selected as input variables in the process of hydrolysis and acidogenesis of cow manure using a central composite rotatable orthogonal experimental design. The ranges of temperature, liquor concentration and retention time were 25~35℃, 6%~10% and 2~12 days, respectively. In the quadratic nonlinear model, the principal and secondary order of every parameter was analyzed with single-parameter method. The optimal experimental extent of every parameter was found by frequency analysis. Experimental results show that acetic acid content is greatly influenced by retention time, temperature was second on it, and liquor concentration was the least. Acetic acid content was more than 66% under the condition of 26~30℃, concentration 7%~9% and retention time 2~5 days. And acetic acid content was less than 60% under the condition of 26~30℃, concentration 10% and retention time 10~12 days.

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