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汽爆预处理青玉米秸秆厌氧发酵特性

Anaerobic fermentation characteristic of green corn straw pretreated by steam explosion

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英文关键词: [biomass](#) [biogas](#) [fermentation](#) [green straw](#) [steam explosion](#)

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中文摘要:

为了研究青玉米秸秆未汽爆和汽爆预处理后厌氧发酵产沼气特性, 该文采用汽爆压力为2.5 MPa, 保压时间为90 s, 加入质量分数为30%的沼液, 未汽爆青玉米秸秆的TS(总固体物)质量分数为6%, 汽爆预处理青玉米秸秆厌氧发酵的TS质量分数分别为1%、2%、3%、4%、6%、8%、10%和15%, 考察了厌氧发酵过程中pH值和产气量随时间和TS质量分数的变化。结果表明: 未汽爆秸秆在TS质量分数为6%时能够顺利厌氧发酵, 但汽爆秸秆厌氧发酵液极易酸化, 且无法调节, 适宜的TS质量分数最大为4%; 未汽爆秸秆挥发性固体产气率为214.6 mL/g, 汽爆秸秆在TS质量分数为3%时产气率最大, 为334.8 mL/g, 比未处理秸秆提高了56%; 未汽爆秸秆的产气速率为 3.3 mL/(g·d), 汽爆秸秆产气速率随TS质量分数增大而减小, 在TS质量分数为1%时最大, 为14.8 mL/(g·d)。青玉米秸秆经汽爆预处理后其厌氧发酵产沼气的产气率和产气速率大大提高, 可以节约发酵时间, 缩短发酵周期, 有利于秸秆能源化利用的工业化生产。

英文摘要:

The anaerobic fermentation characteristic of green corn straw pretreated by steam explosion method was studied. The steam explosion pressure and during time were 2.5 MPa and 90 s. The fermentation experiments were carried out with 30% (mass percentage) of the biogas slurry. The TS (total solid mass) mass percentages of the steam-exploded straw were 1%, 2%, 3%, 4%, 6%, 8%, 10% respectively, and 15% and that of the green straw without pretreatment was 6%. The pH value, CH₄ volume percentage and biogas yield were measured each day. The results showed that, when the TS mass percent was high, the anaerobic fermentation liquid of steam-exploded straw was easily acidified and the appropriate TS mass percentage was not more than 4%, while fermentation of the unexploded straw could be carried out well under TS mass percentage of 6%. The biogas yield of volatile solid of unexploded straw was 214.6 mL/g, while that of the exploded straw had the maximum value of 334.8 mL/g under the TS mass percentage of 3%. The biogas production rate of volatile solid of unexploded straw was 3.3 mL/g each day, while that of the exploded straw decreased with the increasing of the TS mass percentage and had the maximum value of 14.8 mL/g each day under the TS mass percentage of 1%. The biogas yield and production rate of the exploded straw were improved obviously and the fermentation period was shortened greatly. The research can provide a reference for the straw energy utilization in industrial production.

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