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沼气厌氧发酵生物催化剂研究进展与展望*

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摘要: 综述了国内外厌氧发酵用多功能催化剂(如微生物、酶、营养物质、吸附剂、消泡剂、螯合剂及染料等)的研究进展, 强调了催化剂在厌氧发酵中的作用, 讨论了沼气发酵菌群、工艺控制和系统处理废弃物等方面的关键问题, 突出了使用催化剂的技术优势, 并对催化剂在厌氧发酵中应用的未来发展趋势进行了展望。沼气的生产不仅使生物质资源得到深度开发和循环利用, 而且实现了废弃物无害化处理及多层次的资源化利用, 变废为宝、化害为利, 对解决人类社会所面临的能源危机和环境污染具有重大的意义。

关键词: 厌氧发酵 生物催化剂 产气量 微生物 微量元素

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Recent Progress and Outlook of Biocatalysts for Anaerobic Fermentation in Biogas Production Process

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Abstract: The recent progress of multifunctional catalysts, such as microbes, bacterium, enzymes, microelements, adsorbents, foaming agents, chelating agents, dyes, inhibitors and so on, used in the anaerobic fermentation was reviewed. This paper also emphasized the roles of the biocatalysts in the process of anaerobic fermentation, discussed the several critical issues in the fermenting methane bacterium, process control, waste disposal using a systematic processing and highlighted the advantages of the use of catalysts for fermenting methane. Also, the perspective of the biocatalysts in anaerobic fermentation was given. The biogas production can not only make biomass resources deeply developed and recycled, but also cause the waste harmlessly treated and effectively utilized, transforming the trash into treasure and making the harm to benefit, which are of great practical significance to solve the present energy crisis and environmental pollution problems.

Key words: Anaerobic fermentation Biocatalysts Biogas production Microbes Microelements

引言

我国畜禽粪便年产量约为 17.3 亿 t, 是工业废弃物的 2.7 倍。因管理不善, 每年 25% ~ 30% 的畜禽粪便随污水流失到水体中^[1], 相当于 8.7 t COD

或 6.2 t BOD 工业污染物的排放量^[2]。随着我国新农村建设的推进和养殖业规模的不断扩大, 这一数字还将进一步提高。科学合理处理这些畜禽粪便和污水成为加快城乡一体化和生态文明建设的重要内容。

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