

农村能源科学

玉米棒芯的连续微波裂解制取生物油

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摘要:

摘要: 生物质能的研究和利用当前备受关注, 目前推出的生物质能主要集中在淀粉类发酵制取生物燃料乙醇方面, 生物质热裂解的规模化利用大都还停留在试验探索阶段, 但其利用都因成本效益低等因素而具有一定的局限性。研究组在生物质批式微波裂解试验研究的基础上, 研制出了一套每小时处理50-70kg生物质原料的连续微波裂解设备。利用自行研制的设备, 以未处理和经稀硫酸预处理的玉米棒芯为原料进行微波裂解制取生物油的试验, 得到含不同组分的生物油产物。通过GC-MS分析, 发现用酸预处理过的原料所得的生物油成分较为简单。研究为利用农林废弃物等生物质原料制取生物油提供理论支持和设备参考。

关键词: 微波裂解 生物油 玉米棒芯 连续反应装置

Continuous Microwave Assisted Pyrolysis of Corn Cob for Producing Bio-Oil

Abstract:

Continuous Microwave Assisted Pyrolysis of Corn Cob for Producing Bio-Oil Wan Yiqin^{1,2}, Wang Yingkuan^{2,3}, Liu Yuhuan^{1,2}, Lin Xiangyang^{2,4}, Paul Chen², Roger Ruan^{1,2} (1. State Key Laboratory of Food Science and Technology, Engineering Research Center for Biomass Conversion, Ministry of Education, Nanchang University, Nanchang 330047, China; 2. Center for Biorefining and Department of Bioproducts and Biosystems Engineering, University of Minnesota, St. Paul, MN 55108, USA; 3. Chinese Academy of Agricultural Engineering, Beijing 100125, China; 4. College of Biological Science and Technology, Fuzhou University, Fuzhou 350108, China) Abstract: Research and application of biomass energy are receiving global attention. The existing biomass technologies mainly focused on producing bio-fuel ethanol by fermenting starch-based biomass, and the large-scale exploration of biomass pyrolysis is still at an experimental stage. However, their applications are limited to low cost-efficiency. The authors' research group developed a complete set of continuous microwave assisted pyrolysis(MAP) test equipment with a biomass-pyrolyzing capacity of 50-70 kg/h, based on the previous experimental studies on batch MAP of biomass. The self-developed continuous MAP equipment was used to produce bio-oil from untreated corn cob and corn cob pretreated with dilute sulphuric acid. The bio-oil products with different components were obtained. The analysis shows that the compositions of the bio-oil produced from corn cob pretreated with dilute sulphuric acid were relatively simpler and less using Gas Chromatography-Mass Spectrometry (GC-MS). The research results provide theoretical basis and test rig reference for producing bio-oil from agricultural and forestry wastes.

Keywords: microwave assisted pyrolysis bio-oil corn cob continuous pyrolysis equipment

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