

1994 Fiscal Year Final Research Report Summary

Study on Rapid Degradation and Utilization of Plant and Animal Wastes for Environment Preservation

Research Project

Project/Area Number

05680484

Research Category

Grant-in-Aid for General Scientific Research (C)

Allocation Type

Single-year Grants

Research Field

環境保全

Research Institution

Kanazawa University

Principal Investigator

SAWADA Tatsuro Kanazawa University, Faculty of Engineering, Professor, 工学部, 教授 (80019728)

Co-Investigator(Kenkyū-buntansha)

ISHIKAWA Hidenori Kanazawa University, Faculty of Engineering, Assistant, 工学部, 助手 (70232262)

NAKAMURA Yoshitoshi Kanazawa University, Faculty of Engineering, Associate Professor, 工学部, 助教授 (20172455)

Project Period (FY)

1993 – 1994

Keywords

Environment Preservation / Waste / Alcohol Fermentation / New Material

Research Abstract

Steam explosion is one of the effective pretreatment methods for the utilization of plant and animal wastes. Effects of steam explosion on the modification of plant and animal wastes were studied experimentally. Wastes were treated with high-pressure steam (2.55,3.04,3.53 and 4.51 MPa)

for 0.5-20 min. The exploded product was separated into water-soluble hemicellulose, holocellulose, methanol-soluble lignin and Klason lignin. The effects of steam explosion on the characteristics of the exploded product were studied from experimental data on pH, amounts of extractive components and enzymatic saccharification. The enzymatic saccharification increased with increasing amounts of methanol-soluble lignin, and was affected by the pore size distribution. New pores for enzymatic saccharification were formed with a variety of diameters in the exploded product by the steam explosion. The enzymatic hydrolysis and ethanol productivity were compared in two cultures : a liquid culture of enzymatic saccharification and fermentation in two steps, and a simultaneous culture of saccharification and fermentation. From the results of these cultures, it was confirmed that the simultaneous culture of saccharification and fermentation was the most effective for producing alcohol from the exploded product. The lignin epoxy resin was synthesized from methanol-soluble lignin of exploded product. It was found that the lignin epoxy resin was more easily heat hardened and heat stable than the epoxy resin of bisphenol A.

Research Products (12 results)

All Other

All Publications (12 results)

- [Publications] 中村嘉利、沢田達郎、壺田 勉、中西英二、鈴木基之: "連続培養におけるシュウ酸、酢酸をともに含むモデル廃水の微生物分解" 環境科学会誌. 6. 131-141 (1993) ▼
- [Publications] Sawada, T., Y. Nakamura and T. Katada: "Study on Formation Mechanisms of Sugars from Lignocellulose by Model Compound" 7th International Symposium on Wood and Pulping Chemistry. 1. 357-362 (1993) ▼
- [Publications] 中村嘉利、沢田達郎、壺田 勉: "リグニンモデル化合物のベラトロールとグアイアコールのオゾン分解の速度表示" 水環境学会誌. 17. 40-49 (1994) ▼
- [Publications] Nakamura, Y., T. Sawada and M. Kuwahara: "Microbial Degradation of Organic Acids Formed from Lignin by Ozonolysis" 3rd Asia-Pacific Biochemical Engineering Conference. 1. 486-488 (1994) ▼
- [Publications] Nakamura, Y., T. Sawada and M. Kuwahara: "Alcohol Production from Enzymatic Hydrolyzate of Exploded Biomass" 3rd Asia-Pacific Biochemical Engineering Conference. 1. 387-389 (1994) ▼
- [Publications] Nakamura, Y., H. Origasa and T. Sawada: "Mathematical Modeling for Diauxic Growth in Immobilized Cell Culture" Journal of Fermentation and Bioengineering. 78. 361-367 (1994) ▼
- [Publications] Nakamura, Y., T. Sawada, T. Katada, .Nakanishi and M. Suzuki: "Microbial Degradation of Model Wastewater Containing Acetic Acid and Oxalic Acid in a Continuous Culture" Kankyo Kagaku Kaishi and T. Katada. 6. 131-141 (1993) ▼
- [Publications] Sawada, T., Y. Nakamura and T. Katada: "Study on Formation Mechanisms of Sugars from Lignocellulose by Model Compound" 7th International Symposium on Wood and Pulping Chemistry. 1. 357-362 (1993) ▼
- [Publications] Nakamura, Y., T. Sawada and T. Katada: "Expression of Degradation Rate in Veratrole and Guaiacol of Lignin Model Compounds by Ozonolysis" Mizukankyo Gakkaishi. 17. 40-49 (1994) ▼
- [Publications] Nakamura, Y., T. Sawada and M. Kuwahara: "Microbial Degradation of Organic Acids Formed from Lignin by Ozonolysis" 3rd Asia-Pacific Biochemical Engineering Conference. 1. 486-488 (1994) ▼
- [Publications] Nakamura, Y., T. Sawada and M. Kuwahara: "Alcohol Production from Enzymatic Hydrolyzate of Exploded Biomass" 3rd Asia-Pacific Biochemical Engineering Conference. 1. 387-389 (1994) ▼
- [Publications] Nakamura, Y., H. Origasa and T. Sawada: "Mathematical Modeling for Diauxic Growth in Immobilized Cell Culture" Journal of Fermentation and Bioengineering. 78. 361-367 (1994) ▼

URL: https://kaken.nii.ac.jp/report/KAKENHI-PROJECT-05680484/056804841994kenkyu_seika_hokoku_

Published: 1996-04-14