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นายยศदनัย อนันตะทัต

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สาขาวิชาวิศวกรรมเคมี ภาควิชาวิศวกรรมเคมี
คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

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ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย



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**BREWER'S YEAST AUTOLYSATE UTILIZATION FOR LACTIC ACID
PRODUCTION IN BATCH FERMENTOR**

Mr. Yoddanai Anatkatat

**A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Engineering Program in Chemical Engineering**

Department of Chemical Engineering

Faculty of Engineering

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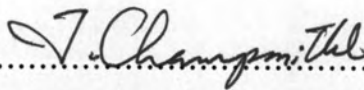
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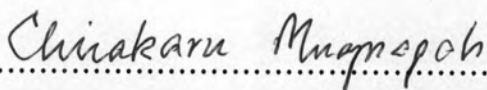
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By Yoddanai Anatkatat
Department Chemical Engineering
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
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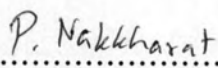
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ยศदनัย อนันตะทัต : การใช้บริวเวอรียีสต์ ออโตไลเซทเพื่อผลิตกรดแลคติก ในถังหมักแบบไม่
 ต่อเนื่อง (BREWER'S YEAST AUTOLYSATE UTILIZATION FOR LACTIC
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งานวิจัยนี้ได้ทำการทดลองผลิตกรดแลคติกในถังหมักแบบไม่ต่อเนื่องโดยใช้แบคทีเรีย
L.salivarius subsp. salivarius ATCC 11741 และมี น้ำตาลกลูโคสจาก cassava starch
 hydrolysate (CSH) กับ บริวเวอรียีสต์ออโตไลเซทเป็นแหล่งคาร์บอนและไนโตรเจน ตามลำดับ โดย
 งานวิจัยนี้ได้ทำการศึกษาลักษณะของพีเอช, ความเข้มข้นของน้ำตาลกลูโคส (commercial grade, CG),
 ความเข้มข้นของน้ำตาลกลูโคสจาก CSH, ความเข้มข้นของยีสต์สกัด (yeast extract, YE) และความ
 เข้มข้นของบริวเวอรียีสต์ออโตไลเซทที่ใช้ในกระบวนการหมักต่อการเจริญเติบโตของแบคทีเรียและการ
 ผลิตกรดแลคติก นอกจากนี้ยังเปรียบเทียบผลของการใช้น้ำตาลกลูโคส (CG) กับ น้ำตาลกลูโคสจาก
 CSH และ ยีสต์สกัด กับ บริวเวอรียีสต์ออโตไลเซท ต่อการผลิตกรดแลคติก และศึกษาลักษณะของความขม
 ที่มีอยู่ในบริวเวอรียีสต์ออโตไลเซทต่อการผลิตกรดแลคติก จากการศึกษาพบว่าการใช้น้ำตาลกลูโคส
 (CG) และ YE จะให้ผลที่ดีต่อการผลิตกรดแลคติกมากกว่าน้ำตาลกลูโคสจาก CSH และ บริวเวอรียีสต์
 ออโตไลเซท แต่เราพบว่าเปอร์เซ็นต์ผลได้ของการผลิตกรดแลคติกโดยการใช้น้ำตาลกลูโคสจาก CSH
 และ บริวเวอรียีสต์ออโตไลเซท มีค่าที่เหมาะสม (0.72-0.91) ดังนั้นการนำน้ำตาลกลูโคสจาก CSH
 และ บริวเวอรียีสต์ออโตไลเซท มาผสมใช้กับน้ำตาลกลูโคส (CG) และ YE เพื่อลดต้นทุนการผลิตจึง
 เป็นอีกทางเลือกที่น่าสนใจ จากงานวิจัยสรุปได้ว่าค่าพีเอช, ความเข้มข้นของน้ำตาลกลูโคส (CG),
 ความเข้มข้นของน้ำตาลกลูโคสจาก CSH, และความเข้มข้นของบริวเวอรียีสต์ออโตไลเซทที่เหมาะสม
 ต่อการผลิตกรดแลคติก คือ 5.5, 70 กรัม/ลิตร, 70 กรัม/ลิตร, และ 48 มล./ลิตร, ตามลำดับ นอกจากนี้
 ยังพบว่า การกำจัดความขมที่มีอยู่ใน BYA ออกจะช่วยให้การเจริญเติบโตจุลินทรีย์ดีขึ้น แต่ไม่มีผลต่อ
 การผลิตกรดแลคติก

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SALIVARIUS

YODDANAI ANATKATAT: BREWER'S YEAST AUTOLYSATE
UTILIZATION FOR LACTIC ACID PRODUCTION IN BATCH
FERMENTOR. THESIS ADVISOR : ASSOC.PROF.CHIRAKARN
MUANGNAPOH, Dr.Ing., 78 pp.

Lactic acid production in this study was carried out in a batch fermentor using lactic acid bacteria *Lactobacillus salivarius subsp. salivarius* ATCC 11741. Glucose from cassava starch hydrolysate (CSH) and brewer's yeast autolysate (BYA) were used as carbon and nitrogen source for the producing lactic acid. The effect of pH, commercial grade glucose (CG) concentration, glucose from cassava starch hydrolysate (CSH) concentration, yeast extract concentration (YE) and brewer's yeast autolysate (BYA) concentration on cell growth and lactic acid production were investigated. In addition, the comparison between CG and CSH, YE and BYA were studied. Moreover, we studied the effect of the bitterness of BYA on lactic acid production. We found that the CG and YE had more good effect for lactic acid production than CSH and BYA. Whereas, a higher lactic acid yields were investigated from using CSH and BYA as a carbon and nitrogen source, so it recommends that the blending of CG with CSH and YE with BYA for lactic acid production is the one choice for reduce the cost of carbon and nitrogen source. The optimum pH, commercial grade glucose (CG) concentration, cassava starch hydrolysate (CSH) concentration and brewer's yeast autolysate (BYA) concentration for lactic acid production were found to be 5.5, 70 g/l, 70 g/l and 48 ml/l, respectively. Moreover, the result shows that the bitterness of BYA didn't effect the lactic acid production but the debittering of the bitterness was good for cell growth.

Department.....Chemical Engineering

Student's signature.....Y. Anattkatat.....

Field of study.....Chemical Engineering

Advisor's signature.....C. Muangnapoh.....

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NOMENCLATURE

| | | |
|------------------|---|--|
| BYA | = | brewer's yeast autolysate |
| cont. | = | continuous culture |
| CSH | = | cassava starch hydrolysate |
| CSL | = | corn steep liquor |
| F | = | Volumetric flow rate (l/h) |
| Hydr. | = | hydrolysate |
| K | = | Product destruction rate (h^{-1}) |
| LA | = | lactic acid |
| M | = | Maintenance |
| m | = | Maintenance factor (h^{-1}) |
| P | = | Product formation |
| perm. | = | permeate |
| recirc. | = | recirculation of cells |
| S | = | Substrate concentration (g-substrate/l) |
| V | = | Working volume (l) |
| X | = | Cell concentration (g-cell/l) |
| YE | = | yeast extract |
| Y _{p/s} | = | Product yield (g-product/g-substrate) |
| Y _{x/s} | = | cell yield (g-cell/g-substrate) |
| μ | = | Specific growth rate (h^{-1}) |
| γ | = | Specific death rate (h^{-1}) |
| q _p | = | Specific production rate (g-product/g-cell h) |
| q _s | = | Specific consumption rate (g-substrate/g-cell h) |
| r _s | = | Substrate consumption rate (g/l h) |

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