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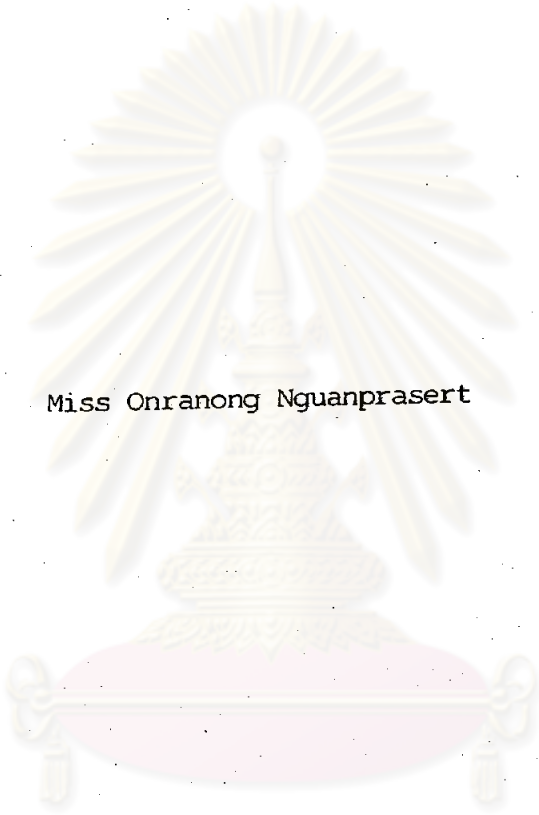
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GASIFICATION OF CROP RESIDUE SHREDS IN
A TUBULAR DOWNDRAFT GASIFIER



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บทคัดย่อ

วัสดุเหลือทางการเกษตรถูกนำมาผลิตเป็นก๊าซเชื้อเพลิงในเครื่องกำเนิดก๊าซแบบ
ฝาเปิดที่มีเส้นผ่าศูนย์กลาง 6 นิ้วแบบเป็นครั้งคราว (batch) วัสดุเหลือทางการเกษตรที่นำมา
ใช้ผลิตก๊าซเชื้อเพลิงได้ดีในการทดลองได้แก่ ชังข้าวโพค, ชังข้าวโพคหัก, แกลบข้าว, กาก-
อ้อย, ชักบไม้และก้านผักตบชวา ส่วนวัสดุเหลือทางการเกษตรที่มีลักษณะเป็นผงละเอียดไม่สา-
มารถใช้ได้ดี ได้แก่ แกลบข้าวบ่น, ชีเลี้ยง, ถ่านของแกลบที่ทำเป็นรูปทรงกลม และชังข้าวโพค
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จากการทดลองพบว่าอุณหภูมิภายในเครื่องกำเนิดก๊าซค่อนข้างต่ำเมื่อเทียบกับเครื่อง
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ABSTRACT

A set of biomass materials was gasified in a 6 in diameter 150 centimeter long open-top gasifier in a batch mode. Among the biomass materials tested successfully were corn cobs, hammermilled corn cobs, ordinary rice hulls, bagasse fibers, wood shavings, and cut water hyacinth stems. A number of other biomass materials were either unsuccessfully gasified or were gasified with difficulty mainly due to the presence of excessive biomass fines. Such as bagasse as received from sugar mills, shredded rice hull, sawdust, carbonized round rice hull pellets, and corn cob fines. With many such low bulk density biomass materials fuel cavitation in the batch gasifier was found to be a problem for several types of fuels. The open top gasifier operated at temperature levels which were generally low in the reaction zones and this was believed to cause gas calorific content somewhat lower than gas calorific contents expected from ordinary closed-top tuyered charcoal gasifiers. The range of calorific content obtained in these set of experiment ranges from 280.30 - 1363.19 kcal/scm.



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จุฬาลงกรณ์มหาวิทยาลัย



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NOMENCLATURE

| | |
|----------|---|
| A | Characteristic size ($v^{1/3}$, cm. |
| A_g | Cross sectional area of gasifier |
| F_d | Particle density, g/cu.cm. |
| F_m | Moisture fraction (dry basis) |
| F_o | Fraction of oxygen (for air it is 0.21) |
| F_s | Sphericity of particle (surface of equivalent sphere/surface of particle) |
| F_v | Void fraction |
| h_p | Heat of pyrolysis (2,081 J/g) |
| h_w | Heat to vaporize water at 600 C (3664 J/g) |
| m | Specific feed rate (mass/time-area) |
| q | Radiative heat transfer, W/cm (Reed used a figure of 2 W/cm in his communication) |
| t_{fp} | flaming pyrolysis time, minutes |
| T | Temperature of furnace around particle, |
| V | Particle volume, cm |
| V_f | Fuel velocity |