HEATING VALUE EVALUATION OF PALM OIL WASTE

ERIS ELIANDDY BIN SUPENI

MASTER OF SCIENCE
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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirements for the degree of Master of Science

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By

ERIS ELIANDDY SUPENI

May 2004

Chairman : Associate Professor Megat Mohd. Hamdan Megat Ahmad, Ph.D.

Faculty : Engineering

The aim of this project is to evaluate the heating value of palm oil waste (POW). It is also concerned with the theory and method for determining heating value. The POW have high moisture contents (MC) which may affect the heating value. Therefore, this study also investigates the relationship between higher heating value (HHV) and MC.

Calorimetry is the science of measuring heat based on the change in temperature that occurs during energy exchange between a reaction system and its environment. This exchange in energy can be measured using a thermally insulated container known as a bomb calorimeter.

The experimentation part of this project mainly comprises on the calibration of the experimental set-up and arrangement and secondly the determination of POW'S HHV at full dry condition, as well as for different MC. Before conducting the tests on POW samples, the calibration test must be carried out firstly to identify whether the equivalent

value of energy obtained is recommended by the manufacturer. Then, the remaining experiments will be proceeded further to satisfy the scope of the study.

The POW which was fresh fibre and shell samples were collected from the Sri Ulu Langat, Dengkil, Selangor. The statistical analysis of t-test was applied to see whether all heating values of POW show significantly different between one to each other at fully dry. To verify all data sampling for POW at different MC, the Anova one-way test was used to see whether the heating values varied with the moisture contents.

It is clearly being observed that higher heating value (HHV) is a function of moisture contents (MC). As conclusion, the aim of the study to evaluate the heating values of POW has been achieved.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi sebahagian keperluan untuk ijazah Master Sains

PENILAIAN NILAI HABA BAGI BAHAN BUANGAN SISA SAWIT

Oleh

ERIS ELIANDDY SUPENI

Mei 2004

Pengerusi : Profesor Madya Megat Mohd. Hamdan Megat Ahmad, Ph.D.

Fakulti : Kejuruteraan

Matlamat utama projek ini adalah untuk menilai haba bahan buangan sisa sawit. Projek ini merangkumi teori dan kaedah bagi mengukur nilai haba. Sisa buangan sawit (POW) disifatkan mempunyai kandungan kelembapan (MC) yang sangat tinggi yang mana boleh mempengaruhi nilai haba tersebut. Oleh yang demikian, kajian ini juga menyiasat hubungkait di antara nilai haba tinggi (HHV) dengan kandungan kelembapan (MC).

Kalorimetri adalah merupakan sains pengukuran haba berdasarkan perubahan suhu yang berlaku ketika perubahan tenaga di antara sistem bertindakbalas dengan persekitaran. Perubahan tenaga ini boleh diukur dengan sebuah bekas berpenebat yang dikenali sebagai bom kalorimeter.

Bahagian ujikaji bagi projek ini secara keseluruhannya merangkumi tentukur pemasangan peralatan dan pengendalian alat. Keduanya, mengukur nilai haba tinggi sisa buangan sawit pada keadaan sepenuh kering dan juga pada kandungan kelembapan yang

berlainan. Sebelum memulakan ujikaji, ujian tentukur mesti dijalankan bagi mendapatkan tenaga kesamaan sama seperti yang dikehendaki oleh pembuat bom kalorimeter. Oleh yang demikian, ujikaji seterusnya dapat dijalankan bagi memenuhi keperluan skop ujikaji ini.

Sampel gentian dan tempurung yang segar diambil dari sebuah kilang di Sri Ulu Langat, Dengkil, Selangor. Analisis statistik iaitu ujian- t telah digunakan bagi melihat sama ada kesemua nilai haba menunjukkan perbezaan yang ketara di antara satu sama lain pada sepenuh kering. Untuk mengesahkan kesemua nilai sampel data pada kandungan kelembapan yang berbeza, analisis variasi (Anova) satu arah telah dibuat.

Jelas kelihatan, nilai haba tinggi (HHV) adalah suatu fungsi kepada kandungan kelembapan (MC). Sebagai kesimpulan, matlamat untuk menilai nilai haba bagi bahan buangan sisa sawit telah tercapai.

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I certify that an Examination Committee met on 17th May 2004 to conduct the final examination of Eris Elianddy bin Supeni on his Master of Science thesis entitled " Heating Value Evaluation of Palm Oil Waste" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

Thamir Sabir Younis, PhD.
Faculty of Engineering
Universiti Putra Malaysia
(Chairman)

Megat Mohamad Hamdan Megat Ahmad, Ph.D.
Associate Professor
Faculty of Engineering
Universiti Putra Malaysia
(Member)

Ir. Mohd. Sapuan Salit, Ph.D.
Associate Professor
Faculty of Engineering
Universiti Putra Malaysia
(Member)

Ir. Md. Yusof Ismail, Ph.D.
Associate Professor
Faculty of Engineering
Universiti Putra Malaysia
(Member)

Ir. Nor Mariah Adam, Ph.D.
Associate Professor
Faculty of Engineering
Universiti Putra Malaysia
(Member)

_____

GULAM RUSUL RAHMAT ALI, Ph.D.
Professor/Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

This thesis submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. Members of the Supervisory Committee are as follows:

Megat Mohamad Hamdan Megat Ahmad, Ph.D.
Associate Professor
Faculty of Engineering
Universiti Putra Malaysia
(Chairman)

Ir. Mohd. Sapuan Salit, Ph.D.
Associate Professor
Faculty of Engineering
Universiti Putra Malaysia
(Member)

Ir. Md. Yusof Ismail, Ph.D.
Associate Professor
Faculty of Engineering
Universiti Putra Malaysia
(Member)

Ir. Nor Mariah Adam, Ph.D.
Associate Professor
Faculty of Engineering
Universiti Putra Malaysia
(Member)

AINI IDERIS, Ph.D.
Professor/ Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

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Eris Elianddy Supeni

Date:

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