DAFTAR PUSTAKA

Ahmadan, F., Trisnaliani, L., Tahdid, T., Agustin, D., & Putri, A. D. (2019). Pembuatan Biopelet Dari Campuran Cangkang Dan Daging Biji Karet Menggunakan Screw Oilpress Machine. *Fluida*, *12*(1), 35–42. Https://Doi.Org/10.35313/Fluida.V12i1.1846

Al Qadry, M. G., Saputro, D. D., & Widodo, R. D. (2023). Karekteristik Dan Uji Pembakaran Biopelet Campuran Cangkang Kelapa Sawit Dan Serbuk Kayu Sebagai Bahan Bakar Alternatif Terbarukan. *Jurnal Inovasi Mesin*, *5*(1), 21–29. Https://Doi.Org/10.15294/Jim.V5i1.68759

Ali, A., & Restuhadi, F. (2010). Optimasi Pembuatan Biopellets Dari Bungkil Picung (Pangium Edule Reinw) Dengan Penambahan Solar Dan Perekat Tapioka. In *Sagu* (Vol. 9, Issue 1, Pp. 1–7).

Aryadi, M. I. (2021). *Perbandingan Kadar Kafein Dalam Kopi Arabika (Coffea Arabica), Robusta (Coffea Canephora) Dan Liberika (Coffea Liberica) Dengan Metode Spektrofotometri Uv-Vis Skripsi Diajukan Oleh*.

Baik, B. K., & Lee, M. R. (2003). Effects Of Starch Amylose Content Of Wheat On Textural Properties Of White Salted Noodles. *Cereal Chemistry*, *80*(3), 304–309. Https://Doi.Org/10.1094/Cchem.2003.80.3.304

Faijah, Fadilah, R., & Nurmila. (2020). No Title. *Jurnal Pendidikan Teknologi Pertanian*, *Volume 6,* 201–210. Https://Ojs.Unm.Ac.Id/Ptp/Article/View/10922/0

Gandhi. (2010). Pengaruh Variasi Jumlah Campuran Perekat Terhadap Karakteristik Arang Briket Batang Jagung. *Profesional: Jurnal Ilmiah Populer Dan Teknologi Terapan*, *8*(1), 1–12. Http://Lib.Unnes.Ac.Id/2256/

Grover, P. D., & Mishra, S. K. (1996). Biomass Briquetting : Technology And Pratices.Regional Wood Energy Development Program In Asia, Field Document No. 46. Bangkok, Thailand: Food And Agriculture Organization Of The United Nations; *Regional Wood Energy Development Programme In Asia*, *46*, 1–48.

Hendra, D. (2012). *Rekayasa Pembuatan Mesin Pelet Kayu Dan Pengujian Hasilnya (Design And Manufacture Of Wood Pellets Machine And Testing Of Its Product)*. *30*(2), 144–154.

Indrayant.L, Alpian, Wahyuspriyati, Renhart Jemi, Theresia Sirait, & Rosdiana. (2020). Kualitas Pelet Tiga Jenis Kayu Bangkirai (Shorea Laevis Rdl), Sungkai Dan Meranti Merah (Shorea Leprosula, Miq). *Agrienvi*, *14*(1), 13–23. Https://Doi.Org/10.36873/Aev.2020.14.1.13

Iriany, Hasibuan, R., Novita, D., & Ummah, N. M. (2023). Pengaruh Komposisi Bahan Baku Dan Ukuran Partikel Terhadap Kualitas Biobriket Dari Cangkang Buah Karet Dan Ranting Kayu. *Jurnal Teknik Kimia Usu*, *12*(1), 1–8. Https://Doi.Org/10.32734/Jtk.V12i1.9818

g, Z., Dewi, R., & Sawit, S. K. (2022). *Pemanfaatan Limbah Serabut* (Juni), 11–24.

?). *Skripsi: Analisis Kekerabatan Morfologi Dan Kedekatan Kelas Kopi Robusta (Coffea Canephora Pierre Ex Froehner)*. Politeknik g.

, E., Hakim, L., Dewi, R., & Muhammad, M. (2023). Pembuatan

Briket Cangkang Kelapa Sawit Menggunakan Variasi Jenis Dan Persentase Perekat Tepung Tapioka Dan Tepung Beras. *Chemical Engineering Journal Storage (Cejs)*, *3*(4), 505. Https://Doi.Org/10.29103/Cejs.V3i4.9913

Mustamu, S., & Pattiruhu, G. (2018). Pembuatan Biopelet Dari Kayu Putih Dengan Penambahan Gondorukem Sebagai Bahan Bakar Alternatif. *Jurnal Hutan Pulau-Pulau Kecil*, *2*(1), 91–100. Https://Doi.Org/10.30598/Jhppk.2018.2.1.91

Permatasari, R., Muthia Atikayanti, & Elisanti Sugitha Ginting. (2022). Characteristic Tests Of Bio-Pellets Made Of Calliandra Wood As A Renewable Alternative Fuel. *International Journal Of Electrical, Energy And Power System Engineering*, *5*(2), 45–49. Https://Doi.Org/10.31258/Ijeepse.5.2.45-49

Rahman. (2011). *Uji Keragaan Biopelet Dari Biomassa Limbah Sekam Padi (Oryza Sativa Sp.) Sebagai Bahan Bakar Alternatif Terbarukan*. 1–67.

Randriani, E., & Dani. (2017). Pengenalan Varietas Unggul Kopi. In *Universitas Nusantara Pgri Kediri* (Vol. 01).

Saberian, M., Li, J., Donnoli, A., Bonderenko, E., Oliva, P., Gill, B., Lockrey, S., & Siddique, R. (2021). Recycling Of Spent Coffee Grounds In Construction Materials: A Review. *Journal Of Cleaner Production*, *289*, 125837. Https://Doi.Org/10.1016/J.Jclepro.2021.125837

Salma Kune, Jumiati Ilham, E. H. H. (2022). Sebagai Sumber Energi Alternatif Studi Nilai Kalor Briket Bioarang Dari Limbah Rumah Tangga Sebagai Sumber Energi Alternatif Salma. *Jurnal Ilmiah Teknik Elektro Universitas Negri Gorontalo*, *1*(2), 23–28.

Surya, V. A., & Wijanarko, D. V. (2024). Pengaruh Perekat Tapioka Terhadap Kualitas Biopelet Dari Campuran Tongkol Jagung, Ampas Tebu, Dan Ampas Kopi. *Jtm*, *12*(02), 39–44.

Utomo, T. A. (2019). Karakteristik Briket Arang Serbuk Gerjaji Dengan Perekat Berbahan Tapioka, Tepung Sagu, Dan Molases. In *Universitas Jember*.

Wahyu Prasojo, S., Iskandar, N., & Muchammad. (2022). Analisis Komposisi Material Berbahan Eceng Gondok Terhadap Karakteristik Biopelet. *Jurnal Teknik Mesin S-1*, *10*(4), 559–566.

Widya, R., & Jaswella, A. (2022). *Briket, Ukuran Partikel, Kualitas Briket*. 7–19.

Wijayani, A., Virgawati, S., & Probosari, N. (2021). Produksi Kopi Arabika Dan Robusta Di Lingkungan Tumbuh Berbeda Di Lereng Gunung Arjuna Malang. *Jurnal Agrivet*, *27*(1), 52–57.

Yemita, S., Helwani, Z., & Fatra, W. (2016). Karbonisasi Pelepah Sawit. *Jom Fteknik*, *3*(1), 1–6.

Yuli Lestari, R., Gede Putra Prabawa, I. D., & Tri Cahyana, B. (2019). Pengaruh Kadar Air Terhadap Kualitas Pelet Kayu Dari Serbuk Gergajian Kayu Jabon Dan [illegible] *Jurnal Penelitian Hasil Hutan*, *37*(1), 1–12. 10.20886/Jphh.2019.37.1.1-12

LAMPIRAN

Lampiran 1 Perhitungan Analisis Data

A. Kadar Air

$$X = \frac{W_1}{W_2} \times 100\%$$

Dimana,

X = Kadar air (%)

W_1 = Kehilangan bobot contoh (gram)

W_2 = Bobot contoh (gram)

1. Perhitungan Kadar Air menggunakan ayakan 30 mesh

   a) 5% Bahan Perekat + 95% Ampas Kopi

   Sampel awal = 1,0490 gram

   Sampel akhir = 0,0358 gram

   $$X = \frac{W_1}{W_2} \times 100\%$$

   $$X = \frac{0{,}0358}{1{,}0490} \times 100\% \qquad X = 3{,}51\%$$

   b) 10% Bahan Perekat + 90% Ampas Kopi

   Sampel awal = 1,0043 gram

   Sampel akhir = 0,0464 gram

   $$X = \frac{W_1}{W_2} \times 100\%$$

   $$X = \frac{0{,}0464}{1{,}0043} \times 100\% \qquad X = 4{,}64\%$$

   c) 15% Bahan Perekat + 85% Ampas Kopi

   Sampel awal = 1,0342 gram

   Sampel akhir = 0,0601 gram

   $$X = \frac{W_1}{W_2} \times 100\%$$

   $$X = \frac{0{,}0601}{1{,}0342} \times 100\% \qquad X = 5{,}81\%$$

   d) 20% Bahan Perekat + 80% Ampas Kopi

   Sampel awal = 1,0180 gram

   Sampel akhir = 0,0666 gram

   $W_$: 100%

   $\frac{6}{0} \times 100\%$ $X = 6{,}54\%$

   Kadar Air menggunakan ayakan 50 mesh

   an Perekat + 95% Ampas Kopi

   awal = 1,0060 gram

Sampel akhir = 0,0440 gram

$X = \frac{W_1}{W_2} \times 100\%$

$X = \frac{0,0440}{1,0060} \times 100\%$ $X = 4,37\%$

b) 10% Bahan Perekat + 90% Ampas Kopi

Sampel awal = 1,0110 gram

Sampel akhir = 0,0511 gram

$X = \frac{W_1}{W_2} \times 100\%$

$X = \frac{0,0511}{1,0110} \times 100\%$ $X = 5,05\%$

c) 15% Bahan Perekat + 85% Ampas Kopi

Sampel awal = 1,0311 gram

Sampel akhir = 0,0719 gram

$X = \frac{W_1}{W_2} \times 100\%$

$X = \frac{0,0719}{1,0311} \times 100\%$ $X = 6,97\%$

d) 20% Bahan Perekat + 80% Ampas Kopi

Sampel awal = 1,0376 gram

Sampel akhir = 0,0794 gram

$X = \frac{W_1}{W_2} \times 100\%$

$X = \frac{0,0794}{1,0376} \times 100\%$ $X = 7,65\%$

B. Kadar Abu

$Kadar\ Abu = \frac{W_1 - W_2}{w} \times 100\%$

Dimana,

w = Bobot contoh sebelum diabukan (gram)

W_1 = Bobot contoh + cawan sesudah diabukan (gram)

W_2 = Bobot cawan kosong (gram)

1. Perhitungan Kadar Abu menggunakan ayakan 30 mesh

a) 5% Bahan Perekat + 95% Ampas Kopi

ımpel + cawan sesudah diabukan = 25,1838 gram

ɜwan = 24,1564 gram

ımpel = 2,5165 gram

$bu = \frac{W_1 - W_2}{w} \times 100\%$

$bu = \frac{26,6729 - 25,1838}{26,6729} \times 100\%$

$$Kadar\ Abu = \ 5{,}58\%$$

b) 10% Bahan Perekat + 90% Ampas Kopi

Berat Sampel + cawan sesudah diabukan = 28,3142 gram

Berat Cawan = 28,2493 gram

Berat Sampel = 2,5077 gram

$$Kadar\ Abu = \frac{W_1 - W_2}{w} \times 100\%$$

$$Kadar\ Abu = \frac{30{,}7570 - 28{,}3142}{30{,}7570} \times 100\%$$

$$Kadar\ Abu = \ 7{,}94\%$$

c) 15% Bahan Perekat + 85% Ampas Kopi

Berat Sampel + cawan sesudah diabukan = 25,0709 gram

Berat Cawan = 25,0191 gram

Berat Sampel = 2,5104 gram

$$Kadar\ Abu = \frac{W_1 - W_2}{w} \times 100\%$$

$$Kadar\ Abu = \frac{27{,}5235 - 25{,}0709}{27{,}5235} \times 100\%$$

$$Kadar\ Abu = \ 8{,}93\%$$

d) 20% Bahan Perekat + 80% Ampas Kopi

Berat Sampel + cawan sesudah diabukan = 24,5039 gram

Berat Cawan = 25,3643 gram

Berat Sampel = 2,5273 gram

$$Kadar\ Abu = \frac{W_1 - W_2}{w} \times 100\%$$

$$Kadar\ Abu = \frac{27{,}8916 - 24{,}5039}{27{,}8916} \times 100\%$$

$$Kadar\ Abu = \ 12\%$$

2. Perhitungan Kadar Abu menggunakan ayakan 50 mesh

a) 5% Bahan Perekat + 95% Ampas Kopi

Berat Sampel + cawan sesudah diabukan = 25,4238 gram

Berat Cawan = 24,4587 gram

Berat Sampel = 2,5141 gram

$$bu = \frac{W_1 - W_2}{w} \times 100\%$$

$$bu = \frac{26{,}9728 - 25{,}4238}{26{,}9728} \times 100\%$$

$$bu = \ 5{,}74\%$$

nan Perekat + 90% Ampas Kopi

mpel + cawan sesudah diabukan = 25,5453 gram

Berat Cawan = 25,3616 gram

Berat Sampel = 2,5083 gram

$$Kadar\ Abu = \frac{W_1 - W_2}{w} \times 100\%$$

$$Kadar\ Abu = \frac{27{,}8699 - 25{,}5453}{27{,}8699} \times 100\%$$

$$Kadar\ Abu = \ 8{,}34\%$$

c) 15% Bahan Perekat + 85% Ampas Kopi

Berat Sampel + cawan sesudah diabukan = 24,9615 gram

Berat Cawan = 24,9088 gram

Berat Sampel = 2,5070 gram

$$Kadar\ Abu = \frac{W_1 - W_2}{w} \times 100\%$$

$$Kadar\ Abu = \frac{27{,}4158 - 24{,}9615}{27{,}4158} \times 100\%$$

$$Kadar\ Abu = \ 8{,}95\%$$

d) 20% Bahan Perekat + 80% Ampas Kopi

Berat Sampel + cawan sesudah diabukan = 24,2300 gram

Berat Cawan = 25,1313 gram

Berat Sampel = 2,5365 gram

$$Kadar\ Abu = \frac{W_1 - W_2}{w} \times 100\%$$

$$Kadar\ Abu = \frac{27{,}6678 - 24{,}2300}{27{,}6678} \times 100\%$$

$$Kadar\ Abu = \ 12{,}43\%$$

C. Kadar Volatil

$$Zat\ yang\ mudah\ menguap\ = \frac{W_1 - W_2}{W_1} \times 100\%$$

Dimana:

W_1 = Bobot sampel awal (gram)

W_2 = Bobot sampel setelah pemanasan (gram)

1. Perhitungan Kadar zat mudah menguap menggunakan ayakan 30 mesh

a) 5% Bahan Perekat + 95% Ampas Kopi

Berat sampel awal = 1.5089 gram

Sampel akhir = 1,1705 gram

$$ıng\ mudah\ menguap\ = \frac{W_1 - W_2}{W_1} \times 100\%$$

$$ıng\ mudah\ menguap\ = \frac{1{,}5089 - 1{,}1705}{1{,}5089} \times 100\%$$

$$ıng\ mudah\ menguap\ = 22{,}43\%$$

b) 10% Bahan Perekat + 90% Ampas Kopi

Berat sampel awal = 1,5040 gram

Berat Sampel akhir = 1,1397 gram

$$Zat\ yang\ mudah\ menguap = \frac{W_1 - W_2}{W_1} \times 100\%$$

$$Zat\ yang\ mudah\ menguap = \frac{1{,}5040 - 1{,}1397}{1{,}5040} \times 100\%$$

$$Zat\ yang\ mudah\ menguap = 24{,}22\%$$

c) 15% Bahan Perekat + 85% Ampas Kopi

Berat sampel awal = 1,5029 gram

Berat Sampel akhir = 1,1397 gram

$$Zat\ yang\ mudah\ menguap = \frac{W_1 - W_2}{W_1} \times 100\%$$

$$Zat\ yang\ mudah\ menguap = \frac{1{,}5029 - 1{,}1397}{1{,}5029} \times 100\%$$

$$Zat\ yang\ mudah\ menguap = 30{,}25\%$$

d) 20% Bahan Perekat + 80% Ampas Kopi

Berat sampel awal = 1,5069 gram

Berat Sampel akhir = 1,0444 gram

$$Zat\ yang\ mudah\ menguap = \frac{W_1 - W_2}{W_1} \times 100\%$$

$$Zat\ yang\ mudah\ menguap = \frac{1{,}5069 - 1{,}0444}{1{,}5069} \times 100\%$$

$$Zat\ yang\ mudah\ menguap = 30{,}69\%$$

2. Perhitungan Kadar zat mudah menguap menggunakan ayakan 50 mesh

a) 5% Bahan Perekat + 95% Ampas Kopi

Berat sampel awal = 1.5041 gram

Berat Sampel akhir = 1,1101 gram

$$Zat\ yang\ mudah\ menguap = \frac{W_1 - W_2}{W_1} \times 100\%$$

$$Zat\ yang\ mudah\ menguap = \frac{1{,}5041 - 1{,}1101}{1{,}5041} \times 100\%$$

$$Zat\ yang\ mudah\ menguap = 26{,}20\%$$

[illegible] Bahan Perekat + 90% Ampas Kopi

[illegible]t sampel awal = 1,5082 gram

[illegible]t Sampel akhir = 1,0450 gram

$$[illegible]\ yang\ mudah\ menguap = \frac{W_1 - W_2}{W_1} \times 100\%$$

$$Zat\ yang\ mudah\ menguap\ = \frac{1{,}5082-1{,}0450}{1{,}5082} \times 100\%$$

$$Zat\ yang\ mudah\ menguap\ = 30{,}71\%$$

c) 15% Bahan Perekat + 85% Ampas Kopi

Berat sampel awal = 1,5055 gram

Berat Sampel akhir = 0,9596 gram

$$Zat\ yang\ mudah\ menguap\ = \frac{W_1-W_2}{W_1} \times 100\%$$

$$Zat\ yang\ mudah\ menguap\ = \frac{1{,}5055-0.596}{1{,}5055} \times 100\%$$

$$Zat\ yang\ mudah\ menguap\ = 32{,}67\%$$

d) 20% Bahan Perekat + 80% Ampas Kopi

Berat sampel awal = 1,5062 gram

Berat Sampel akhir = 0,9010 gram

$$Zat\ yang\ mudah\ menguap\ = \frac{W_1-W_2}{W_1} \times 100\%$$

$$Zat\ yang\ mudah\ menguap\ = \frac{1{,}5062-0{,}9010}{1{,}5062} \times 100\%$$

$$Zat\ yang\ mudah\ menguap\ = 40{,}18\%$$

D. Nilai Kalor

1. Perhitungan Nilai Kalor menggunakan ayakan 30 mesh

a) 5% Bahan perekat + 95% Ampas Kopi

T_1 = 28,6℃

T_2 = 93,7℃

ΔT = 65,1℃

M = 100 ml

Massa Biopelet = 60 gram

$$Q = m \times c \times \Delta T$$

$$Q = 100\ ml \times\ 1\ kal/gr \times\ 65{,}1℃$$

$$Q =\ 66510 \text{ kal}$$

$$k = \frac{Q}{m\ bahan\ bakar}$$

$$k = \frac{6510\ kal}{60\ gram}$$

08,50 kal/gr

ersi kal/gr ke MJ/kg

3,50 × 4 joule/kalori

3,964 J/gram

$= \frac{453{,}964}{1.000.000} / \frac{1}{1.000}$

= 0,452 MJ/kg

b) 10% Bahan Perekat + 90% Ampas Kopi

T_1 = 29,7℃

T_2 = 86,9℃

ΔT = 57.2℃

M = 100 ml

Massa Biopelet = 60 gram

$Q = m \times c \times \Delta T$

$Q = 100\, ml \times\ 1\ kal/gr \times\ 57{,}2℃$

$Q =\ 5720$ kal

$k = \frac{Q}{m\ bahan\ bakar}$

$k = \frac{5720\ kal}{60\ gram}$

$k =$ 95,33 kal/gr

Konversi kal/gr ke MJ/kg

= 95,33 × 4 joule/kalori

= 398,87 J/gram

$= \frac{398{,}87}{1.000.000} / \frac{1}{1.000}$

= 0,398 MJ/kg

c) 15% Bahan Perekat + 85% Ampas Kopi

T_1 = 29,1℃

T_2 = 85,1℃

ΔT = 56,05℃

M = 100 ml

Massa Biopelet = 60 gram

$Q = m \times c \times \Delta T$

$Q = 100\, ml \times\ 1\ kal/gr \times\ 56℃$

$Q =\ 5600$ kal

$\frac{Q}{\text{ı bahan bakar}}$

$\frac{600\ kal}{0\ gram}$

3.33 kal/gr

ersi kal/gr ke MJ/kg

= 93,33 × 4 joule/kalori

= 390,51 J/gram

$= \frac{390,51}{1.000.000} / \frac{1}{1.000}$

= 0,39 MJ/kg

d) 20% Bahan Perekat + 80% Ampas Kopi

T_1 = 29,2℃

T_2 = 78,9℃

ΔT = 49,7℃

M = 100 ml

Massa Biopelet = 60 gram

$Q = m \times c \times \Delta T$

$Q = 100\ ml \times\ 1\ kal/gr \times\ 49,7℃$

$Q =\ 4970$ kal

$k = \frac{Q}{m\ bahan\ bakar}$

$k = \frac{4970\ kal}{60\ gram}$

$k =$ 82,83 kal/gr

Konversi kal/gr ke MJ/kg

= 82,83 × 4 joule/kalori

= 346,57 J/gra=m

$= \frac{346,57}{1.000.000} / \frac{1}{1.000}$

= 0,35 MJ/kg

2. Perhitungan Nilai Kalor menggunakan ayakan 30 mesh

a) 5% Bahan perekat + 95% Ampas Kopi

T_1 = 29,9℃

T_2 = 90,5℃

ΔT = 60,64℃

M = 100 ml

Massa Biopelet = 60 gram

$n \times c \times \Delta T$

$100\ ml \times\ 1\ kal/gr \times\ 60,6℃$

6060 kal

$\frac{Q}{n\ bahan\ bakar}$

$k = \frac{6060\ kal}{60\ gram}$

k = 101,00 kal/gr

Konversi kal/gr ke MJ/kg

= 101,00 × 4 joule/kalori

= 422,58 J/gram

= $\frac{422,58}{1.000.000} / \frac{1}{1.000}$

= 0,42 MJ/kg

b) 10% Bahan Perekat + 90% Ampas Kopi

T_1 = 28,3℃

T_2 = 81,9℃

ΔT = 53,6℃

M = 100 ml

Massa Biopelet = 60 gram

$Q = m \times c \times \Delta T$

$Q = 100\ ml \times\ 1\ kal/gr \times\ 53,6℃$

$Q =\ 5360$ kal

$k = \frac{Q}{m\ bahan\ bakar}$

$k = \frac{5360\ kal}{60\ gram}$

k = 89,33 kal/gr

Konversi kal/gr ke MJ/kg

= 89,33 × 4 joule/kalori

= 373,77 J/gram

= $\frac{390,86}{1.000.000} / \frac{1}{1.000}$

= 0,37 MJ/kg

c) 15% Bahan Perekat + 85% Ampas Kopi

T_1 = 28,8℃

T_2 = 79,8℃

ΔT = 51℃

= 100 ml

a Biopelet = 60 gram

$n \times c \times \Delta T$

$00\ ml \times\ 1\ kal/gr \times\ 51℃$

5100 kal

$$k = \frac{Q}{m\ bahan\ bakar}$$

$$k = \frac{5100\ kal}{60\ gram}$$

k = 85,00 kal/gr

Konversi kal/gr ke MJ/kg

= 85,00 × 4 joule/kalori

= 355,64 J/gram

$$= \frac{355{,}64}{1.000.000} / \frac{1}{1.000}$$

= 0,35 MJ/kg

d) 20% Bahan Perekat + 80% Ampas Kopi

T_1 = 29,4℃

T_2 = 76,2℃

ΔT = 46,8℃

M = 100 ml

Massa Biopelet = 60 gram

$Q = m \times c \times \Delta T$

$Q = 100\ ml \times\ 1\ kal/gr \times\ 46{,}8℃$

$Q =\ 4680$ kal

$$k = \frac{Q}{m\ bahan\ bakar}$$

$$k = \frac{4680\ kal}{60\ gram}$$

k = 78 kal/gr

Konversi kal/gr ke MJ/kg

= 78 × 4 joule/kalori

= 326,35 J/gram

$$= \frac{346{,}57}{1.000.000} / \frac{1}{1.000}$$

= 0,33 MJ/kg

E. Konversi Kalor ke Listrik

1. Perhitungan konversi nilai kalor ke listrik menggunakan ayakan 30 mesh

erekat + 95% limbah ampas kopi

$$\frac{Nilai\ kalor}{8859}$$

$$\frac{108500}{8859}$$

6 kWh/kg

berekat + 90% limbah ampas kopi

$$kWh/kg = \frac{Nilai\ kalor}{8859}$$

$$kWh/kg = \frac{95333}{8859}$$

kWh/kg = 111 kWh/kg

c) 15% bahan perekat + 85% limbah ampas kopi

$$kWh/kg = \frac{Nilai\ kalor}{8859}$$

$$kWh/kg = \frac{9333}{8859}$$

kWh/kg = 109 kWh/kg

d) 20% bahan perekat + 80% limbah ampas kopi

$$kWh/kg = \frac{Nilai\ kalor}{8859}$$

$$kWh/kg = \frac{82833}{8859}$$

kWh/kg = 96 kWh/kg

2. Perhitungan konversi nilai kalor ke listrik menggunakan ayakan 50 mesh

a) 5% bahan perekat + 95% limbah ampas kopi

$$kWh/kg = \frac{Nilai\ kalor}{8859}$$

$$kWh/kg = \frac{101000}{8859}$$

kWh/kg = 117 kWh/kg

b) 10% bahan perekat + 90% limbah ampas kopi

$$kWh/kg = \frac{Nilai\ kalor}{8859}$$

$$kWh/kg = \frac{89333}{8859}$$

kWh/kg = 104 kWh/kg

c) 15% bahan perekat + 85% limbah ampas kopi

$$kWh/kg = \frac{Nilai\ kalor}{8859}$$

$$kWh/kg = \frac{85000}{8859}$$

kWh/kg = 99 kWh/kg

d) 20% bahan perekat + 80% limbah ampas kopi

$$\frac{Nilai\ kalor}{8859}$$

$$\frac{78000}{8859}$$

kWh/kg

Lampiran 2 Dokumentasi Penelitian

1. Proses pengeringan limbah ampas kopi

2. Proses karbonisasi

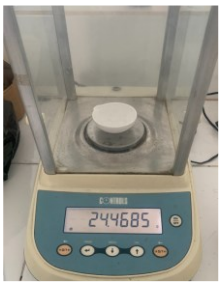
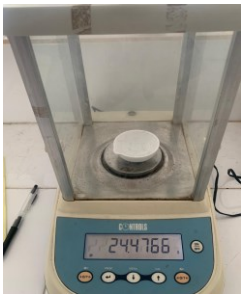
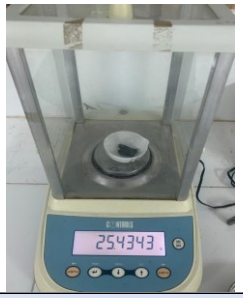
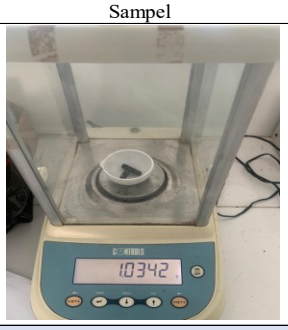
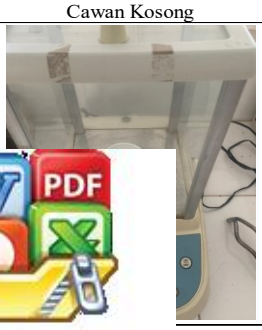
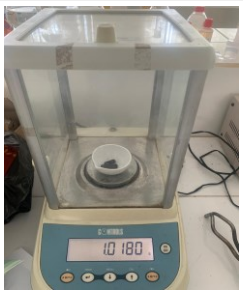
3. Proses pengayakan

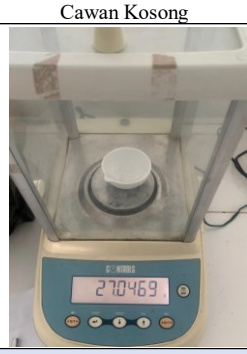
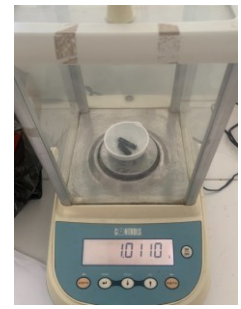
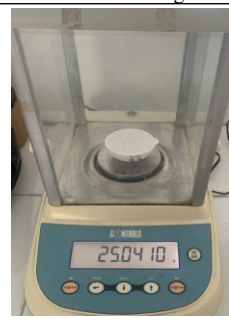
4. Proses Pencampuran Ampas kopi dan bahan perekat

5. Proses Pencetakan

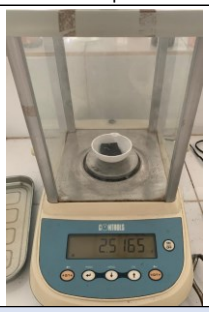
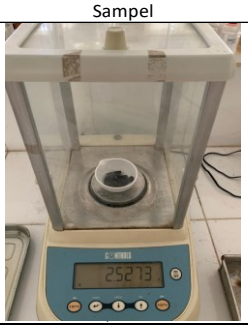
6. Proses Pengeringan

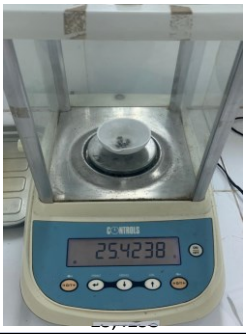
7. Pengujian Kadar Air

30 MESH		
5%		
Cawan Kosong	Sampel	Berat Akhir
		
10%		
Cawan Kosong	Sampel	Berat Akhir
		
15%		
Cawan Kosong	Sampel	Berat Akhir
		
20%		
Cawan Kosong	Sampel	Berat Akhir
		

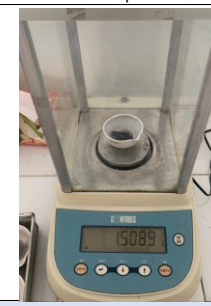
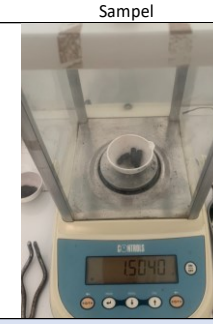
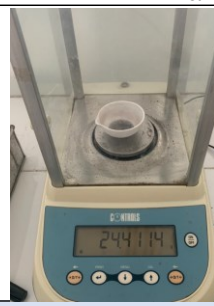
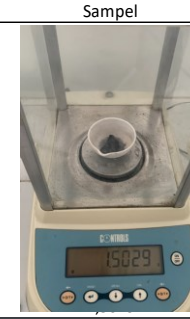
50 MESH		
5%		
Cawan Kosong	Sampel	Berat Akhir
		
10%		
Cawan Kosong	Sampel	Berat Akhir
		
15%		
Cawan Kosong	Sampel	Berat Akhir
		
20%		
Cawan Kosong	Sampel	Berat Akhir
		

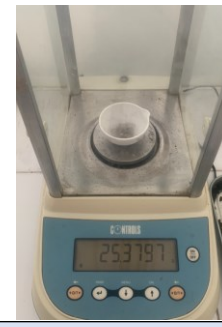
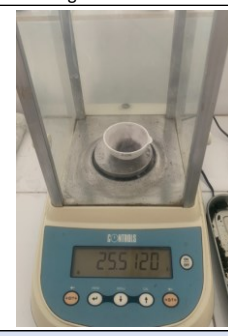
8. Pengujian Kadar abu

30 MESH		
5%		
Cawan Kosong	Sampel	Berat Akhir
		
10%		
Cawan Kosong	Sampel	Berat Akhir
		
15%		
Cawan Kosong	Sampel	Berat Akhir
		
20%		
Cawan Kosong	Sampel	Berat Akhir
		

50 MESH		
5%		
Cawan Kosong	Sampel	Berat Akhir
		
10%		
Cawan Kosong	Sampel	Berat Akhir
		
15%		
Cawan Kosong	Sampel	Berat Akhir
		
20%		
Cawan Kosong	Sampel	Berat Akhir
		

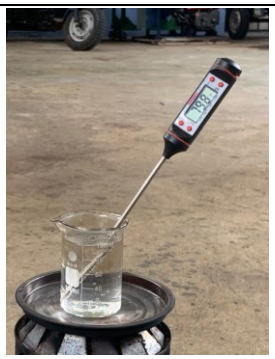
9. Pengujian Kadar Volatil

30 MESH		
5%		
Cawan Kosong	Sampel	Berat Akhir
		
10%		
Cawan Kosong	Sampel	Berat Akhir
		
15%		
Cawan Kosong	Sampel	Berat Akhir
		
20%		
Cawan Kosong	Sampel	Berat Akhir
		

50 MESH		
5%		
Cawan Kosong	Sampel	Berat Akhir
 		
10%		
Cawan Kosong	Sampel	Berat Akhir
 		
15%		
Cawan Kosong	Sampel	Berat Akhir
 		
20%		
Cawan Kosong	Sampel	Berat Akhir
 		

10. Pengujian Nilai Kalor

30 MESH	
5%	
T1	T2
	
10%	
T1	T2
	
15%	
T1	T2
	
20%	
T1	T2
	

50 MESH	
5%	
T1	T2
	
10%	
T1	T2
	
15%	
T1	T2
	
20%	
T1	T2