

LAMPIRAN

Lampiran 1.1 Perhitungan Pengujian Rendemen Arang

$$\text{Rendemen (\%)} = \frac{M1}{M2} \times 100 \%$$

Keterangan :

M1 : Berat arang setelah pengarangan (gram)

M2 : Berat bahan sebelum pengarangan (gram)

1. Arang Tongkol Jagung

$$M1 = 92 \text{ gram}$$

$$M2 = 300 \text{ gram}$$

$$\text{Rendemen (\%)} = \frac{92}{300} \times 100 \% = 30,7\%$$

2. Arang Serasah Getah Pinus

$$M1 = 220 \text{ gram}$$

$$M2 = 500 \text{ gram}$$

$$\text{Rendemen (\%)} = \frac{220}{500} \times 100 \% = 44\%$$

Lampiran 1.2 Perhitungan Pengujian Kadar Air

$$\text{Kadar Air (\%)} = \frac{W_1}{W_2} \times 100\%$$

Keterangan :

W1 : Bobot contoh akhir (gram)

W2 : Bobot contoh awal (gram)

1. Tongkol Jagung (bahan mentah)

$$W_1 = 0,14 \text{ gram}$$

$$W_2 = 1 \text{ gram}$$

$$\text{Kadar Air (\%)} = \frac{0,14}{1} \times 100\% = 14\%$$

2. Serasah Pinus (bahan mentah)

$$W_1 = 0,17 \text{ gram}$$

$$W_2 = 1 \text{ gram}$$

$$\text{Kadar Air (\%)} = \frac{0,17}{1} \times 100\% = 17\%$$

3. Tepung Tapioka (perekat)

$$W_1 = 0,13 \text{ gram}$$

$$W_2 = 1 \text{ gram}$$

$$\text{Kadar Air (\%)} = \frac{0,13}{1} \times 100\% = 13\%$$

4. Sampel A1

Arang Tongkol Jagung : Arang Serasah
100% : 0%

$$W_1 = 0,02 \text{ gram}$$

$$W_2 = 1 \text{ gram}$$

$$\text{Kadar Air (\%)} = \frac{0,02}{1} \times 100\% = 2\%$$

5. Sampel A2

Arang Tongkol Jagung : Arang Serasah
75% : 25%

$$W_1 = 0,03 \text{ gram}$$

$$W_2 = 1 \text{ gram}$$

$$\text{Kadar Air (\%)} = \frac{0,03}{1} \times 100\% = 3\%$$

6. Sampel A3

Arang Tongkol Jagung : Arang Serasah
50% 50%

$$W1 = 0,03 \text{ gram}$$

$$W2 = 1 \text{ gram}$$

$$\text{Kadar Air (\%)} = \frac{0,03}{1} \times 100\% = 3\%$$

7. Sampel A4

Arang Tongkol Jagung : Arang Serasah
25% 75%

$$W1 = 0,04 \text{ gram}$$

$$W2 = 1 \text{ gram}$$

$$\text{Kadar Air (\%)} = \frac{0,04}{1} \times 100\% = 4\%$$

8. Sampel A5

Arang Tongkol Jagung : Arang Serasah
0 100%

$$W1 = 0,04 \text{ gram}$$

$$W2 = 1 \text{ gram}$$

$$\text{Kadar Air (\%)} = \frac{0,04}{1} \times 100\% = 4\%$$

9. Sampel B1

Arang Tongkol Jagung : Arang Serasah
50% 50%

$$W1 = 0,03 \text{ gram}$$

$$W2 = 1 \text{ gram}$$

$$\text{Kadar Air (\%)} = \frac{0,03}{1} \times 100\% = 3\%$$

10. Sampel B2

Arang Tongkol Jagung : Arang Serasah
50% 50%

$$W1 = 0,02 \text{ gram}$$

$$W2 = 1 \text{ gram}$$

$$\text{Kadar Air (\%)} = \frac{0,02}{1} \times 100\% = 2\%$$

11. Sampel B3

Arang Tongkol Jagung : Arang Serasah
50% 50%

$$W1 = 0,04 \text{ gram}$$

$$W2 = 1 \text{ gram}$$

$$\text{Kadar Air (\%)} = \frac{0,04}{1} \times 100\% = 4\%$$

Lampiran 1.3 Perhitungan Pengujian Kadar Abu

$$\text{Kadar Abu (\%)} = \frac{W1}{W2} \times 100\%$$

Keterangan :

W1 : Berat abu (gram)

W2 : Bobot sampel (gram)

1. Tongkol Jagung (bahan mentah)

$$W1 = 0,03 \text{ gram}$$

$$W2 = 2 \text{ gram}$$

$$\text{Kadar Abu (\%)} = \frac{0,03}{2} \times 100\% = 1,5\%$$

2. Serasah Pinus (bahan mentah)

$$W1 = 0,09 \text{ gram}$$

$$W2 = 2 \text{ gram}$$

$$\text{Kadar Abu (\%)} = \frac{0,09}{2} \times 100\% = 4,5\%$$

3. Tepung Tapioka (perekat)

$$W1 = 0,02 \text{ gram}$$

$$W2 = 2 \text{ gram}$$

$$\text{Kadar Abu (\%)} = \frac{0,02}{2} \times 100\% = 0,5\%$$

4. Sampel A1

Arang Tongkol Jagung : Arang Serasah
100% : 0

$$W1 = 0,08 \text{ gram}$$

$$W2 = 2 \text{ gram}$$

$$\text{Kadar Abu (\%)} = \frac{0,08}{2} \times 100\% = 4\%$$

5. Sampel A2

Arang Tongkol Jagung : Arang Serasah
75% : 25%

$$W1 = 0,12 \text{ gram}$$

$$W2 = 2 \text{ gram}$$

$$\text{Kadar Abu (\%)} = \frac{0,12}{2} \times 100\% = 6\%$$

6. Sampel A3

Arang Tongkol Jagung : Arang Serasah
50% 50%

$$W1 = 0,14 \text{ gram}$$

$$W2 = 2 \text{ gram}$$

$$\text{Kadar Abu (\%)} = \frac{0,14}{2} \times 100\% = 7\%$$

7. Sampel A4

Arang Tongkol Jagung : Arang Serasah
25% 75%

$$W1 = 0,14 \text{ gram}$$

$$W2 = 2 \text{ gram}$$

$$\text{Kadar Abu (\%)} = \frac{0,14}{2} \times 100\% = 7\%$$

8. Sampel A5

Arang Tongkol Jagung : Arang Serasah
0 100%

$$W1 = 0,23 \text{ gram}$$

$$W2 = 2 \text{ gram}$$

$$\text{Kadar Abu (\%)} = \frac{0,23}{2} \times 100\% = 11,5\%$$

9. Sampel B1

Arang Tongkol Jagung : Arang Serasah
50% 50%

$$W1 = 0,14 \text{ gram}$$

$$W2 = 2 \text{ gram}$$

$$\text{Kadar Abu (\%)} = \frac{0,14}{2} \times 100\% = 7\%$$

10. Sampel B2

Arang Tongkol Jagung : Arang Serasah
50% 50%

$$W1 = 0,15 \text{ gram}$$

$$W2 = 2 \text{ gram}$$

$$\text{Kadar Abu (\%)} = \frac{0,15}{2} \times 100\% = 7,5\%$$

11. Sampel B3

Arang Tongkol Jagung : Arang Serasah
 50% 50%

$$W1 = 0,16 \text{ gram}$$

$$W2 = 2 \text{ gram}$$

$$\text{Kadar Abu (\%)} = \frac{0,16}{2} \times 100\% = 8\%$$

Lampiran 1.4 Perhitungan Pengujian Bagian Yang Hilang

$$\text{Bagian yang hilang (\%)} = \frac{W_1 - W_2}{W_1} \times 100\%$$

Keterangan :

W1 : Bobot contoh awal (gram)

W2 : Bobot contoh setelah pemanasan (gram)

1. Sampel A1

Arang Tongkol Jagung : Arang Serasah
75% 25%

$$W_1 = 48,10 \text{ gram}$$

$$W_2 = 47,34 \text{ gram}$$

$$\text{Bagian yang hilang (\%)} = \frac{48,10 - 47,34}{48,10} \times 100\% = 1,58\%$$

2. Sampel A2

Arang Tongkol Jagung : Arang Serasah
50% 50%

$$W_1 = 46,79 \text{ gram}$$

$$W_2 = 45,89 \text{ gram}$$

$$\text{Bagian yang hilang (\%)} = \frac{46,79 - 45,89}{46,79} \times 100\% = 1,92\%$$

3. Sampel A3

Arang Tongkol Jagung : Arang Serasah
100% 0

$$W_1 = 43,52 \text{ gram}$$

$$W_2 = 42,65 \text{ gram}$$

$$\text{Bagian yang hilang (\%)} = \frac{43,52 - 42,65}{43,52} \times 100\% = 1,99\%$$

4. Sampel A4

Arang Tongkol Jagung : Arang Serasah
25% 75%

$$W_1 = 47,29 \text{ gram}$$

$$W_2 = 46,35 \text{ gram}$$

$$\text{Bagian yang hilang (\%)} = \frac{47,29 - 46,35}{47,29} \times 100\% = 1,98\%$$

5. Sampel B1

Arang Tongkol Jagung : Arang Serasah
100% 0

$$W1 = 43,52 \text{ gram}$$

$$W2 = 42,65 \text{ gram}$$

$$\text{Bagian yang hilang (\%)} = \frac{43,52-42,65}{43,52} \times 100\% = 1,99\%$$

6. Sampel B2

Arang Tongkol Jagung : Arang Serasah
50% 50%

$$W1 = 48,46 \text{ gram}$$

$$W2 = 47,72 \text{ gram}$$

$$\text{Bagian yang hilang (\%)} = \frac{48,46-47,72}{48,46} \times 100\% = 1,52\%$$

7. Sampel B3

Arang Tongkol Jagung : Arang Serasah
50% 50%

$$W1 = 19,50 \text{ gram}$$

$$W2 = 18,83 \text{ gram}$$

$$\text{Bagian yang hilang (\%)} = \frac{19,50-18,83}{19,50} \times 100\% = 3,43\%$$

Lampiran 1.5 Perhitungan Pengujian Nilai Kerapatan

$$\rho = \frac{M}{V} = \frac{M}{p.l.t}$$

Keterangan:

ρ = Kerapatan (gr/cm^3)

M = Massa briket (gr)

V = Volume briket (cm^3)

p = Panjang briket (cm)

l = Lebar briket (cm)

t = Tinggi briket (cm)

1. Sampel A1

Arang Tongkol Jagung : Arang Serasah
100% : 0

$$\begin{aligned}\rho &= \frac{M}{V} = \frac{M}{p.l.t} = \frac{11,61}{2,84 \times 2,73 \times 3,35} \\ &= \frac{11,61 \text{ gram}}{25,97 \text{ cm}^3} = 0,44 \text{ gr}/\text{cm}^3\end{aligned}$$

2. Sampel A2

Arang Tongkol Jagung : Arang Serasah
75% : 25%

$$\begin{aligned}\rho &= \frac{M}{V} = \frac{M}{p.l.t} = \frac{12,61}{2,84 \times 2,74 \times 3,48} \\ &= \frac{12,61 \text{ gram}}{27,07 \text{ cm}^3} = 0,46 \text{ gr}/\text{cm}^3\end{aligned}$$

3. Sampel A3

Arang Tongkol Jagung : Arang Serasah
50% : 50%

$$\begin{aligned}\rho &= \frac{M}{V} = \frac{M}{p.l.t} = \frac{13,44}{2,87 \times 2,77 \times 3,33} \\ &= \frac{13,44 \text{ gram}}{26,47 \text{ cm}^3} = 0,50 \text{ gr}/\text{cm}^3\end{aligned}$$

4. Sampel A4

Arang Tongkol Jagung : Arang Serasah
25% 75%

$$\rho = \frac{M}{V} = \frac{M}{p.l.t} = \frac{15,51}{2,86 \times 2,75 \times 3,44}$$
$$= \frac{15,51 \text{ gram}}{27,05 \text{ cm}^3} = 0,57 \text{ gr/cm}^3$$

5. Sampel A5

Arang Tongkol Jagung : Arang Serasah
0 100%

$$\rho = \frac{M}{V} = \frac{M}{p.l.t} = \frac{17,16}{2,81 \times 2,75 \times 3,31}$$
$$= \frac{17,16 \text{ gram}}{25,57 \text{ cm}^3} = 0,67 \text{ gr/cm}^3$$

6. Sampel B1

Arang Tongkol Jagung : Arang Serasah
50% 50%

$$\rho = \frac{M}{V} = \frac{M}{p.l.t} = \frac{13,44}{2,87 \times 2,77 \times 3,33}$$
$$= \frac{13,44 \text{ gram}}{26,47 \text{ cm}^3} = 0,50 \text{ gr/cm}^3$$

7. Sampel B2

Arang Tongkol Jagung : Arang Serasah
50% 50%

$$\rho = \frac{M}{V} = \frac{M}{p.l.t} = \frac{14,60}{2,84 \times 2,76 \times 3,58}$$
$$= \frac{14,60 \text{ gram}}{28,06 \text{ cm}^3} = 0,52 \text{ gr/cm}^3$$

8. Sampel B3

Arang Tongkol Jagung : Arang Serasah
50% 50%

$$\rho = \frac{M}{V} = \frac{M}{p.l.t} = \frac{15,74}{2,89 \times 2,78 \times 3,79}$$
$$= \frac{15,74 \text{ gram}}{30,44 \text{ cm}^3} = 0,51 \text{ gr/cm}^3$$

Lampiran 1.6 Dokumentasi Penelitian



Proses Pencacahan Tongkol Jagung



Proses Penjemuran Tongkol Jagung



Proses Penjemuran Limbah Serasah
Pinus



Proses Karbonisasi



Arang Tongkol Jagung dan Serasah
Pinus



Proses Penghalusan Arang



Proses Pengayakan Arang



Penimbangan Arang



Tepung Tapioka



Pembuatan Perekat



Proses Pencetakan Briket



Briket Tongkol Jagung dan Serasah