



LAMPIRAN A

DATA-DATA

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Hasil Analisis Karbon Aktif (SNI) 06-3730-1995

Tabel A.1 Analisis Karbon Aktif

No.	Uraian	Satuan	SNI 06-3730-1995	Analisis
1	Kadar Zat Terbang	%	Maks 25	0,1
2	Kadar Air	%	Maks 15	0,25
3	Kadar Abu	%	Maks 10	0,86

Hasil Analisis Unsur Kayu Akasia (*Acacia Mangium Willd.*)

Tabel A.2 Unsur Serbuk Kayu Akasia Menurut Hasil Analisis EDS

No.	Unsur	Persen Berat (%)
1.	C	78,03
2.	O	21,43
3.	Ca	0,32
4.	K	0,15
5.	Mg	0,03
6.	Na	0,02
7.	Fe	0,02

Hasil Analisis Kandungan Natrium dalam Karbon Aktif

Tabel A.3 Analisis Kandungan Natrium dalam Karbon Aktif

Waktu Impregnasi (Jam)	Konsentrasi NaOH (Normalitas)	Logam Natrium yang Terserap(%)
18	1	27,4804
	2	58,7044
	3	67,0464
	4	73,9
	5	76,3943
21	1	21,9464
	2	56,9768
	3	69,4804
	4	78,2688
	5	80,92
24	1	35,9446
	2	60,1188
	3	70,0928
	4	76,8344
	5	80,1154

Hasil Analisis Biodiesel

Tabel A.4 Analisis Biodiesel

Parameter	Satuan	SNI-04-7182-2006	Analisis
Angka Asam	mg-KOH/g	Maksimal 0,8	1,4
Viskositas Kinematik pada 40°C	mm ² /s (Cst)	2,3-6,0	3,6
Massa Jenis pada 40°C	kg/m ³	850-890	901
Kadar Air	%	≤0,05	0,6
Titik Nyala	°C	Minimal 100	139



LAMPIRAN B PERHITUNGAN

LAMPIRAN B

PERHITUNGAN

1. Persiapan Sebelum Impregnasi

1.1. Pembuatan Larutan NaOH

$$N = \frac{\text{gram zat terlarut}}{BE} \times \frac{1000}{\text{ml larutan}}$$

$$\text{gram zat terlarut} = \frac{N \times BE \times \text{ml larutan}}{1000}$$

$$BE = \frac{Mr}{\text{Banyaknya atom H yang dilepas atau diterima}}$$

- a. Larutan NaOH pada Konsentrasi 1 N

$$\begin{aligned} \text{gram zat terlarut} &= \frac{N \times BE \times \text{ml larutan}}{1000} \\ &= \frac{1 \text{ N} \times \frac{40 \text{ gr/ml}}{1} \times 750 \text{ ml}}{1000 \text{ ml}} \\ &= 30 \text{ gram} \end{aligned}$$

- b. Larutan NaOH pada Konsentrasi 2 N

$$\begin{aligned} \text{gram zat terlarut} &= \frac{N \times BE \times \text{ml larutan}}{1000} \\ &= \frac{2 \text{ N} \times \frac{40 \text{ gr/ml}}{1} \times 750 \text{ ml}}{1000 \text{ ml}} \\ &= 60 \text{ gram} \end{aligned}$$

- c. Larutan NaOH pada Konsentrasi 3 N

$$\begin{aligned} \text{gram zat terlarut} &= \frac{N \times BE \times \text{ml larutan}}{1000} \\ &= \frac{3 \text{ N} \times \frac{40 \text{ gr/ml}}{1} \times 750 \text{ ml}}{1000 \text{ ml}} \\ &= 90 \text{ gram} \end{aligned}$$

- d. Larutan NaOH pada Konsentrasi 4 N

$$\begin{aligned} \text{gram zat terlarut} &= \frac{N \times BE \times \text{ml larutan}}{1000} \\ &= \frac{4 \text{ N} \times \frac{40 \text{ gr/ml}}{1} \times 750 \text{ ml}}{1000 \text{ ml}} \\ &= 120 \text{ gram} \end{aligned}$$

e. Larutan NaOH pada Konsentrasi 5 N

$$\begin{aligned}\text{gram zat terlarut} &= \frac{N \times BE \times \text{ml larutan}}{1000} \\ &= \frac{5 \text{ N} \times \frac{40 \text{ gr/ml}}{1} \times 750 \text{ ml}}{1000 \text{ ml}} \\ &= 150 \text{ gram}\end{aligned}$$

1.2. Pembuatan Larutan HCl 0,1 M 1000 ml

$$M = \frac{1000 \times \rho \times \%}{BM} = \frac{1000 \times 1,18 \times 37\%}{37,5} = 11,64 \text{ M} = 12 \text{ M}$$

Rumus pengenceran :

$$\begin{aligned}M_1 \times V_1 &= M_2 \times V_2 \\ 12 \text{ M} \times V_1 &= 0,1 \text{ M} \times 1000 \text{ ml} \\ V_1 &= 8,53 \text{ ml}\end{aligned}$$

2. Analisa Karbon Aktif

2.1. Uji Kadar Abu

$$\text{Kadar Abu} = \frac{m_3 - m_1}{m_2 - m_1} \times 100 \%$$

$$\text{Massa cawan (m}_1\text{)} = 43,5133 \text{ gram}$$

$$\text{Massa cawan + sampel awal (m}_2\text{)} = 44,5133 \text{ gram}$$

$$\text{Massa cawan + abu (m}_3\text{)} = 43,5219 \text{ gram}$$

$$\begin{aligned}\text{Kadar Abu} &= \frac{m_3 - m_1}{m_2 - m_1} \times 100 \% \\ &= \frac{43,5219 - 43,5133}{44,5133 - 43,5133} \times 100\% \\ &= 0,0086 \times 100\% \\ &= 0,86 \%\end{aligned}$$

2.2. Uji Kadar Air

$$\text{Kadar Air} = \frac{b - c}{b} \times 100\%$$

$$\text{Massa cawan + sampel sebelum di oven (b)} = 47,7631 \text{ gram}$$

$$\text{Massa cawan + sampel sesudah di oven (c)} = 47,640 \text{ gram}$$

$$\text{Kadar Air} = \frac{b - c}{c} \times 100 \%$$

$$= \frac{47,7631-47,640}{47,7631} \times 100\%$$

$$= 0,25 \%$$

2.3. Uji Kadar Zat Terbang

$$\text{Kadar Zat Terbang} = \frac{m_2-m_3}{m_2-m_1} \times 100\% - M_{ad}$$

Massa cawan (m_1) =

Massa cawan + sampel sebelum pemanasan (m_2) =

Massa cawan + sampel sesudah pemanasan (m_3) = 43,38 gram

Kadar air % (M_{ad}) = 0,25

$$\text{Kadar Zat Terbang} = \frac{m_2-m_3}{m_2-m_1} \times 100 \% - M_{ad}$$

$$= \frac{43,2273-43,2238}{43,2253-42,2253} \times 100\% - 0,25$$

$$= 0,35-0,25$$

$$= 0,1 \%$$

3. Konversi AAS

Keterangan	Konsentrasi ($\mu\text{g/ml}$)	Natrium yang Terserap (%)
1 N 18 Jam	9,6693	27,48
2 N 18 Jam	11,0121	58,70
3 N 18 Jam	13,1814	67,05
4 N 18 Jam	13,9200	73,90
5 N 18 Jam	15,7371	76,39
1 N 21 Jam	10,4071	21,95
2 N 21 Jam	11,4729	56,98
3 N 21 Jam	12,2079	69,48
4 N 21 Jam	11,5900	78,27
5 N 21 Jam	12,7200	80,92
1 N 24 Jam	8,5407	35,94
2 N 24 Jam	10,6350	60,12
3 N 24 Jam	11,9629	70,09
4 N 24 Jam	12,3550	76,83
5 N 24 Jam	13,2564	80,12

Konversi ppm ($\mu\text{g/ml}$) ke persentase natrium yang terserap (%) :

Larutan 1 N 18 Jam :

- $$\text{ppm} = \frac{\text{gram zat terlarut} \times 1000 \text{ ml}}{0,75 \text{ L}}$$

$$= \frac{30 \text{ gram} \times 1000 \text{ ml}}{0,75 \text{ L}}$$

$$= 40.000 \text{ ppm}$$
- $$\begin{aligned} \text{Konsentrasi per 15 gram} &= \text{Konsentrasi larutan} \times 100 \text{ ml} \times 2 \times 15 \text{ gr} \\ &= 9,6693 \times 100 \text{ ml} \times 2 \times 15 \text{ gr} \\ &= 25622,14 \end{aligned}$$
- $$\begin{aligned} \text{Natrium yang Terserap (\%)} &= \frac{\text{ppm} - \text{konsentrasi per 15 gram}}{\text{ppm}} \times 100\% \\ &= \frac{40000 - 25622,14}{40000} \times 100\% \\ &= 27,48 \% \end{aligned}$$

4. Biodiesel

a. Perbandingan Rasio Molar

Diketahui :

- Bahan Baku Minyak Jelantah = 100 gram
- BM Minyak Jelantah (Trigliserida) = 851, 9923 gr/mol
- BM Asam Lemak = 271,3168 gr/mol
- BM Metanol = 32,04 gr/mol
- ρ Metanol = 0,792 gr/cm³

Rasio Molar Minyak : Metanol = 1 : 12

- Mol Minyak Jelantah 100 gram

$$n = \frac{\text{gr}}{\text{BM}} = \frac{100 \text{ gram}}{271,3168 \text{ gr/mol}} = 0,3685 \text{ mol}$$

- Mol Metanol

$$\begin{aligned} n &= \text{Mol} \times \text{Minyak Jelantah} \\ &= 12 \times 0,3685 \text{ mol} \\ &= 4,4229 \text{ mol} \end{aligned}$$

- Massa Metanol

$$\begin{aligned} m &= \text{mol metanol} \times \text{BM metanol} \\ &= 4,4229 \text{ mol} \times 32,04 \text{ gr/mol} \\ &= 141,709 \text{ gram} \end{aligned}$$

- Volume Metanol

$$v = \frac{m}{\rho \text{ metanol}} = \frac{141,709 \text{ gram}}{0,792 \text{ gr/cm}^3} = 178,9253 \text{ ml}$$

b. Analisis Biodiesel (Katalis 3 %, T = 60°C dan t = 120 menit)

a. Bilangan Asam

Diketahui :

- N KOH = 0,1 N
- BM KOH = 56,11 gr/mol
- Berat Sampel = 2 gram

$$\text{bilangan asam} = \frac{\text{ml titran KOH} \times \text{N KOH} \times \text{BM KOH}}{\text{gr sampel}}$$

$$\text{Bilangan asam} = \frac{0,3 \text{ ml} \times 0,1 \text{ KOH} \times 56,11 \text{ KOH}}{2 \text{ gram}} = 1,40275\%$$

b. Uji Kadar Air

$$\text{Kadar Air} = \frac{b - c}{b} \times 100\%$$

Massa cawan + sampel sebelum di oven (b) = 5 gram

Massa cawan + sampel sesudah di oven (c) = 4,97 gram

$$\begin{aligned} \text{Kadar Air} &= \frac{b - c}{c} \times 100 \% \\ &= \frac{5 - 4,97}{4,97} \times 100\% \\ &= 0,6 \% \end{aligned}$$

c. Massa Jenis

massa = (gr biodiesel + piknometer) – gr pikometer kosong

$$\text{massa} = 29,4388 \text{ gram} - 24,9323 \text{ gram} = 4,5065 \text{ gram}$$

$$\rho_{\text{biodiesel}} = \frac{m}{v} = \frac{4,5065 \text{ gram}}{5 \text{ ml}} = 0,9013 \text{ gr/ml}$$

d. Viskositas

Diketahui

- $t_{\text{bola jatuh}} = 15,33 \text{ s} = 0,2555 \text{ menit}$
- $\rho_2 (\rho_{\text{biodiesel}}) = 0,9013 \text{ gr/ml}$

$$\begin{aligned}\mu &= 0,3 \text{ mpa.menit.ml/gr.s} \times (8,02 \text{ gr/ml} - 0,9013 \text{ gr/ml}) \times 15,33 \text{ menit} \\ &= 32,7390 \text{ cP} \times 10^{-3} \\ &= 0,03274 \text{ pa.s} \times 897 \times 10^5 \\ &= 3,649 \text{ cSt}\end{aligned}$$

e. % Rendemen

Diketahui :

$$\text{Berat Produk} = 96,4391 \text{ gram}$$

$$\begin{aligned}\% \text{Rendemen} &= \frac{96,4391 \text{ gram}}{100 \text{ gram}} \times 100 \% \\ &= 96,4391 \%\end{aligned}$$



LAMPIRAN C DOKUMENTASI

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Hasil karbonisasi



Proses Screening



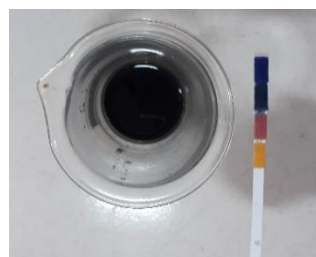
Hasil Screening



Aktivasi



Pencucian Dengan Aquades



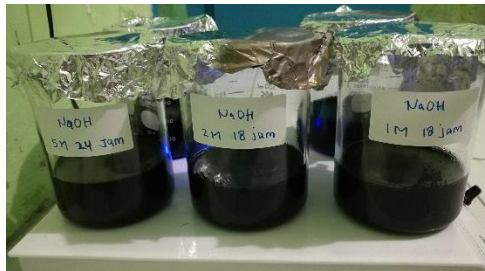
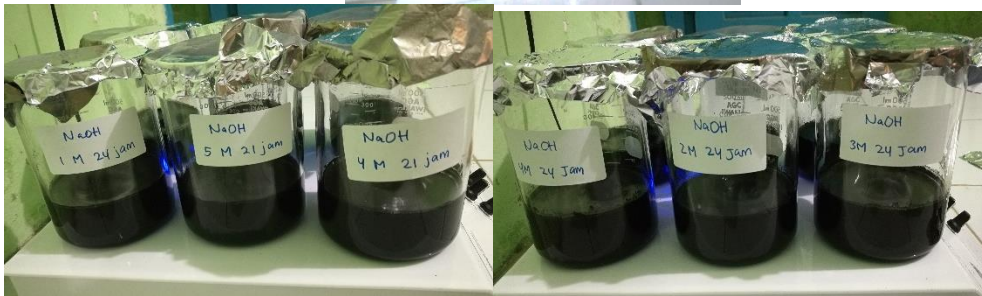
Tes pH



Hasil Oven



Proses Furnace



Proses Impregnasi





Hasil Furnace



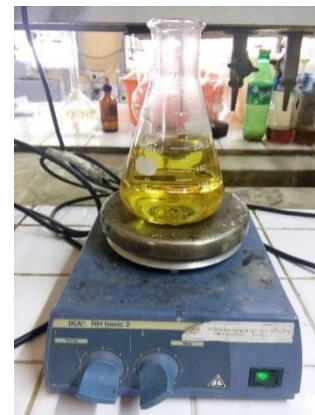
Proses Refluk

Proses Dekantasi

Penyaringan Katalis



Pencucian Biodiesel



Pemanasan Biodiesel



Biodiesel



Analisis Kadar Air



Analisis Viskositas



Analisis Titik Nyala



Analisis Densitas



Analisis Zat Terbang



Analisis Kadar Abu

