

LAMPIRAN B PERHITUNGAN

1. Menghitung % Kadar Air Asap Cair

a. Sampel 1

$$\text{Berat sampel (A}_0\text{)} = 5,0260 \text{ gr}$$

$$\text{Berat cawan + sampel sebelum di oven (A)} = 59,6441 \text{ gr}$$

$$\text{Berat cawan + sampel setelah di oven (B)} = 56,1914 \text{ gr}$$

$$\begin{aligned} \% \text{ Kadar Air} &= \frac{A - B}{A_0} \times 100 \% \\ &= \frac{(59,6441 - 56,1914)\text{gr}}{5,0260 \text{ gr}} \times 100 \% \\ &= 68,6967 \% \end{aligned}$$

b. Sampel 2

$$\text{Berat sampel (A}_0\text{)} = 5,0639 \text{ gr}$$

$$\text{Berat cawan + sampel sebelum di oven (A)} = 60,5621 \text{ gr}$$

$$\text{Berat cawan + sampel setelah di oven (B)} = 57,2011 \text{ gr}$$

$$\begin{aligned} \% \text{ Kadar Air} &= \frac{A - B}{A_0} \times 100 \% \\ &= \frac{(60,5621 - 57,2011)\text{gr}}{5,0639 \text{ gr}} \times 100 \% \\ &= 66,3717 \% \end{aligned}$$

Perhitungan pada sampel berikutnya menggunakan metode yang sama dan hasilnya dapat dilihat pada Tabel 14:

Tabel 14. Data Penentuan % Kadar Air Sampel Asap Cair

Sampel ke-	Berat Sampel (gr)	Berat Cawan kosong (gr)	Berat Cawan + Sampel (gr)		Kadar Air (%)
			Sebelum di Oven	Setelah di Oven	
1	5,0260	54,6181	59,6441	56,1914	68,6967
2	5,0639	55,4982	60,5621	57,2011	66,3717
3	5,0410	55,1881	60,2291	57,0364	63,3346
4	5,0191	50,6168	55,6359	52,5736	61,0129
5	5,0131	51,5011	55,5142	52,7185	55,7678

2. Menghitung Densitas Asap Cair

$$\begin{aligned} \text{Massa Piknometer kosong} &= 60,0748 \text{ gr (a)} \\ \text{Massa Piknometer + Aquadest} &= 160,2928 \text{ gr (b)} \\ \text{Massa Aquadest} &= b - a = (160,2928 - 60,0748) \text{ gr} \\ &= 100,218 \text{ gr} \end{aligned}$$

$$\rho \text{ Air pada } 20^\circ\text{C} = 0,998 \text{ gr/mL}$$

$$\begin{aligned} \text{Volume Aquadest} &= \frac{\text{massa aquadest}}{\rho \text{ air pada } 20^\circ\text{C}} \\ &= \frac{100,218 \text{ gr}}{0,998 \frac{\text{gr}}{\text{mL}}} \\ &= 100,4188 \text{ mL} \end{aligned}$$

$$\text{Volume Aquadest} = \text{Volume Piknometer} = 100,4188 \text{ mL}$$

a. Sampel 1

$$\begin{aligned} \text{Massa piknometer + Asap Cair} &= 160,3006 \text{ gr (c)} \\ \text{Massa Asap Cair} &= c - a = (160,3006 - 60,0748) \text{ gr} \\ &= 100,2258 \text{ gr} \end{aligned}$$

$$\begin{aligned} \text{Densitas Asap Cair} &= \frac{\text{Massa Asap Cair}}{\text{Volume Piknometer}} \\ &= \frac{100,2258 \text{ gr}}{100,4188 \text{ ml}} \\ &= 0,9980 \text{ gr/mL} \end{aligned}$$

b. Sampel 2

$$\begin{aligned} \text{Massa piknometer + Asap Cair} &= 161,9252 \text{ gr (c)} \\ \text{Massa Asap Cair} &= c - a = (161,9252 - 60,0748) \text{ gr} \\ &= 101,8504 \text{ gr} \end{aligned}$$

$$\begin{aligned} \text{Densitas Asap Cair} &= \frac{\text{Massa Asap Cair}}{\text{Volume Piknometer}} \\ &= \frac{101,8504 \text{ gr}}{100,4188 \text{ ml}} \\ &= 1,0142 \text{ gr/mL} \end{aligned}$$

Perhitungan pada sampel berikutnya menggunakan metode yang sama dan hasilnya dapat dilihat pada Tabel 15:

Tabel 15. Data Penentuan Densitas Asap Cair

Sampel ke-	Berat Piknometer Kosong(gr)	Berat Piknometer + Aquadest (gr)	Berat Aquadest (gr)	Volume Aquadest (mL)	Berat Piknometer + Asap Cair (gr)	Berat Asap Cair (gr)	Densitas Asap Cair (gr/mL)
1	60,0748	160,2928	100,218	100,4188	160,3006	100,2258	0,9980
2	60,0748	160,2928	100,218	100,4188	161,9252	101,8504	1,0142
3	60,0748	160,2928	100,218	100,4188	160,3032	100,2284	0,9981
4	60,0748	160,2928	100,218	100,4188	160,3202	100,2454	0,9982
5	60,0748	160,2928	100,218	100,4188	160,3164	100,2416	0,9982

3. Menghitung % Asam Total Asap Cair

a. Sampel 1

$$\begin{aligned} \text{Volume titran NaOH} &= 0,6 \text{ mL} & \text{BE CH}_3\text{COOH} &= 60 \text{ mg/mek} \\ \text{N NaOH} &= 0,1 \text{ mek/mL} & \text{Volume Asap Cair} &= 5 \text{ mL} \\ \text{Massa Asap Cair} &= \rho \times V = 0,9980 \text{ gr/mL} \times 5 \text{ mL} \\ &= 4,99 \text{ gr} \end{aligned}$$

$$\% \text{ Asam Total} = \frac{V \times N \times BE}{\text{gr Asap Cair}} \times 100 \%$$

$$\begin{aligned} &= \frac{0,6 \text{ mL} \times 0,1 \frac{\text{mek}}{\text{mL}} \times 60 \text{ mg/mek}}{4,99 \text{ gr} \times \frac{1000 \text{ mg}}{1 \text{ gr}}} \times 100 \% \\ &= 0,072 \% \end{aligned}$$

b. Sampel 2

$$\begin{aligned} \text{Volume titran NaOH} &= 1 \text{ mL} & \text{BE CH}_3\text{COOH} &= 60 \text{ mg/mek} \\ \text{N NaOH} &= 0,1 \text{ mek/mL} & \text{Volume Asap Cair} &= 5 \text{ mL} \\ \text{Massa Asap Cair} &= \rho \times V = 1,0142 \text{ gr/mL} \times 5 \text{ mL} \\ &= 5,071 \text{ gr} \end{aligned}$$

$$\% \text{ Asam Total} = \frac{V \times N \times BE}{\text{gr Asap Cair}} \times 100 \%$$

$$\begin{aligned} &= \frac{1 \text{ mL} \times 0,1 \frac{\text{mek}}{\text{mL}} \times 60 \text{ mg/mek}}{5,071 \text{ gr} \times \frac{1000 \text{ mg}}{1 \text{ gr}}} \times 100 \% \\ &= 0,11 \% \end{aligned}$$

Perhitungan pada sampel berikutnya menggunakan metode yang sama dan hasilnya dapat dilihat pada Tabel 16:

Tabel 16. Data Penentuan % Asam Total Asap Cair

Sampel ke-	Temperatur Pirolisis (°C)	Konsentrasi NaOH (mek/mL)	BE CH ₃ COOH (mg/mek)	Volume Sampel (mL)	Volume Titran NaOH (mL)	Asam Total (%)
1	100	0,1	60	5	0,6	0,072
2	120	0,1	60	5	1	0,11
3	135	0,1	60	5	1,5	0,18
4	165	0,1	60	5	2,2	0,26
5	180	0,1	60	5	2,7	0,32

4. Menghitung % Fenol Total Asap Cair

a. Sampel 1

$$\text{Konsentrasi Fenol} = 2,743 \text{ ppm} = 2,743 \text{ mg/L}$$

$$\rho \text{ Asap Cair} = 0,9980 \text{ gr/mL}$$

$$\begin{aligned} \% \text{ Fenol Total} &= \frac{\text{Konsentrasi Fenol } \left(\frac{\text{mg}}{\text{L}}\right)}{\rho \text{ Asap Cair}} \times \frac{1 \text{ gr}}{1000 \text{ mg}} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times 100 \% \\ &= \frac{2,743 \left(\frac{\text{mg}}{\text{L}}\right)}{0,9980 \text{ gr/mL}} \times \frac{1 \text{ gr}}{1000 \text{ mg}} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times 100 \% \\ &= 0,000275 \% \end{aligned}$$

b. Sampel 2

$$\text{Konsentrasi Fenol} = 9,6 \text{ ppm} = 9,6 \text{ mg/L}$$

$$\rho \text{ Asap Cair} = 1,0142 \text{ gr/mL}$$

$$\begin{aligned} \% \text{ Fenol Total} &= \frac{\text{Konsentrasi Fenol } \left(\frac{\text{mg}}{\text{L}}\right)}{\rho \text{ Asap Cair}} \times \frac{1 \text{ gr}}{1000 \text{ mg}} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times 100 \% \\ &= \frac{9,6 \left(\frac{\text{mg}}{\text{L}}\right)}{1,0142 \text{ gr/mL}} \times \frac{1 \text{ gr}}{1000 \text{ mg}} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times 100 \% \\ &= 0,000946 \% \end{aligned}$$

Perhitungan pada sampel berikutnya menggunakan metode yang sama dan hasilnya dapat dilihat pada Tabel 17:

Tabel 17. Data Penentuan % Fenol Total Asap Cair

Sampel ke-	Temperatur Pirolisis (°C)	Fenol Total (% w/w)
1	100	0,000275

2	120	0,000946
3	135	0,001562
4	165	0,003137
5	180	0,004568

5. Menghitung % Randemen Asap Cair

a. Sampel 1

$$\begin{aligned} \text{Massa Asap Cair yang dihasilkan} &= V \times \rho \\ &= 110 \text{ mL} \times 0,998 \text{ gr/mL} \\ &= 109,78 \text{ gr} \end{aligned}$$

$$\begin{aligned} \% \text{ Randemen} &= \frac{\text{Massa Asap Cair yang dihasilkan}}{\text{Massa bahan baku awal}} \times 100 \% \\ &= \frac{109,78 \text{ gr}}{350 \text{ gr}} \times 100 \% \\ &= 31,3 \% \end{aligned}$$

b. Sampel 2

$$\begin{aligned} \text{Massa Asap Cair yang dihasilkan} &= V \times \rho \\ &= 125 \text{ mL} \times 1,0142 \text{ gr/mL} \\ &= 126,775 \text{ gr} \end{aligned}$$

$$\begin{aligned} \% \text{ Randemen} &= \frac{\text{Massa Asap Cair yang dihasilkan}}{\text{Massa bahan baku awal}} \times 100 \% \\ &= \frac{126,775 \text{ gr}}{350 \text{ gr}} \times 100 \% \\ &= 36,2 \% \end{aligned}$$

Perhitungan pada sampel berikutnya menggunakan metode yang sama dan hasilnya dapat dilihat pada Tabel 18:

Tabel 18. Data Penentuan % Randemen Asap Cair

Sampel ke-	Temperatur pirolisis (°C)	% Randemen
1	100	31,3
2	120	36,2
3	135	39,9
4	165	42,7
5	180	45,6