

## LAMPIRAN B PERHITUNGAN

### A. Perhitungan Densitas Asap Cair Limbah Tulang Ikan Tenggiri

- Berat piknometer kosong (A) = 59,9904 gr
- Berat piknometer + Aquadest (B) = 160,1442 gr
- Berat aquadest (C) = (B) - (A)  
= (160,1442 - 59,9904) gr  
= 100,1538 gr
- Volume aquadest = volume piknometer =  $\frac{C}{0,9998 \text{ gr/mL}}$   
=  $\frac{100,1538 \text{ gr}}{0,9998 \text{ gr/mL}}$   
= 100,1738 mL

#### Sampel 1, T = 120°C

- Berat piknometer + Asap Cair = 161,3266 gr
- Berat Asap Cair = 101,3362 gr
- $\rho = \frac{101,3362 \text{ gr}}{100,1738 \text{ mL}}$
- $\rho = 1,0116 \text{ gr/mL}$

#### Sampel 2, T = 140°C

- Berat piknometer + Asap Cair = 162,3714 gr
- Berat Asap Cair = 102,3810 gr
- $\rho = \frac{102,3810 \text{ gr}}{100,1738 \text{ mL}}$
- $\rho = 1,0220 \text{ gr/mL}$

#### Sampel 3, T = 160°C

- Berat piknometer + Asap Cair = 162,5283 gr
- Berat Asap Cair = 102,5379 gr
- $\rho = \frac{102,5379 \text{ gr}}{100,1738 \text{ mL}}$
- $\rho = 1,0236 \text{ gr/mL}$

Sampel 4, T = 180°C

- Berat piknometer + Asap Cair = 162,6740 gr
  - Berat Asap Cair = 102,6836 gr
- $$\rho = \frac{102,6836 \text{ gr}}{100,1738 \text{ mL}}$$
- $$\rho = 1,0250 \text{ gr/mL}$$

Sampel 5, T = 200°C

- Berat piknometer + Asap Cair = 164,1611 gr
  - Berat Asap Cair = 104,1707 gr
- $$\rho = \frac{104,1707 \text{ gr}}{100,1738 \text{ mL}}$$
- $$\rho = 1,0398 \text{ gr/mL}$$

B. Perhitungan % Kadar Air Asap Cair Limbah Tulang Ikan Tenggiri

Sampel 1, T = 120°C

- Berat Sampel Awal ( $W_1$ ) = 5,0176 gr
- Berat Cawan + Sampel ( $W_2$ ) = 54,5982 gr
- Berat Cawan + Sampel setelah dioven ( $W_3$ ) = 51,4657 gr

$$\begin{aligned} \% \text{ Kadar Air} &= \frac{(W_2 - W_3)}{W_1} \\ &= \frac{(54,5982 - 51,4657) \text{ gr}}{5,0176 \text{ gr}} \\ &= 62,43\% \end{aligned}$$

Sampel 2, T = 140°C

- Berat Sampel Awal ( $W_1$ ) = 5,0025 gr
- Berat Cawan + Sampel ( $W_2$ ) = 58,2633 gr
- Berat Cawan + Sampel setelah dioven ( $W_3$ ) = 55,4882 gr

$$\begin{aligned} \% \text{ Kadar Air} &= \frac{(W_2 - W_3)}{W_1} \\ &= \frac{(58,2633 - 55,4882) \text{ gr}}{5,0025 \text{ gr}} \\ &= 55,47\% \end{aligned}$$

Sampel 3, T = 160°C

- Berat Sampel Awal ( $W_1$ ) = 5,0186 gr
- Berat Cawan + Sampel ( $W_2$ ) = 53,3386 gr
- Berat Cawan + Sampel setelah dioven ( $W_3$ ) = 50,6195 gr

$$\begin{aligned} \% \text{ Kadar Air} &= \frac{(W_2 - W_3)}{W_1} \\ &= \frac{(53,3386 - 50,6195) \text{ gr}}{5,0186 \text{ gr}} \\ &= 54,19\% \end{aligned}$$

Sampel 4, T = 180°C

- Berat Sampel Awal ( $W_1$ ) = 5,0132 gr
- Berat Cawan + Sampel ( $W_2$ ) = 57,1264 gr
- Berat Cawan + Sampel setelah dioven ( $W_3$ ) = 54,6065 gr

$$\begin{aligned} \% \text{ Kadar Air} &= \frac{(W_2 - W_3)}{W_1} \\ &= \frac{(57,1264 - 54,6065) \text{ gr}}{5,0132 \text{ gr}} \\ &= 50,26\% \end{aligned}$$

Sampel 5, T = 200°C

- Berat Sampel Awal ( $W_1$ ) = 5,0030 gr
- Berat Cawan + Sampel ( $W_2$ ) = 57,6982 gr
- Berat Cawan + Sampel setelah dioven ( $W_3$ ) = 55,1867 gr

$$\begin{aligned} \% \text{ Kadar Air} &= \frac{(W_2 - W_3)}{W_1} \\ &= \frac{(57,6982 - 55,1867) \text{ gr}}{5,0030 \text{ gr}} \\ &= 50,19\% \end{aligned}$$

C. Perhitungan Total Asam Asap Cair Limbah Tulang Ikan Tenggiri

Asam total asap cair yang dihasilkan adalah sebagai berikut:

$$\% \text{ total asam} = \frac{V_{titran} \times N \text{ NaOH} \times BM \text{ Asam Asetat} \times FP}{gr \text{ sampel} \times 1000} \times 100\%$$

$$N \text{ NaOH} = 0,1 \text{ N}$$

$$\text{BM Asam asetat} = 60 \text{ gr/mol}$$

$$\text{FP (Faktor pengenceran)} = 100/5$$

Sampel 1, T = 120°C

$$\begin{aligned} \% \text{ total asam} &= \frac{0,6 \text{ mL} \times 0,1 \frac{\text{gr}}{\text{ek}} \times 60 \frac{\text{gr}}{\text{mol}} \times 100/5}{5,058 \text{ gr} \times 1000} \\ &= 1,42\% \end{aligned}$$

Sampel 2, T = 140°C

$$\begin{aligned} \% \text{ total asam} &= \frac{1,7 \text{ mL} \times 0,1 \frac{\text{gr}}{\text{ek}} \times 60 \frac{\text{gr}}{\text{mol}} \times 100/5}{5,11 \text{ gr} \times 1000} \\ &= 3,99\% \end{aligned}$$

Sampel 3, T = 160°C

$$\begin{aligned} \% \text{ total asam} &= \frac{2,0 \text{ mL} \times 0,1 \frac{\text{gr}}{\text{ek}} \times 60 \frac{\text{gr}}{\text{mol}} \times 100/5}{5,118 \text{ gr} \times 1000} \\ &= 4,68\% \end{aligned}$$

Sampel 4, T = 180°C

$$\begin{aligned} \% \text{ total asam} &= \frac{2,5 \text{ mL} \times 0,1 \frac{\text{gr}}{\text{ek}} \times 60 \frac{\text{gr}}{\text{mol}} \times 100/5}{5,125 \text{ gr} \times 1000} \\ &= 5,85\% \end{aligned}$$

Sampel 5, T = 200°C

$$\begin{aligned} \% \text{ total asam} &= \frac{2,8 \text{ mL} \times 0,1 \frac{\text{gr}}{\text{ek}} \times 60 \frac{\text{gr}}{\text{mol}} \times 100/5}{5,199 \text{ gr} \times 1000} \\ &= 6,46\% \end{aligned}$$

D. Perhitungan Kadar Fenol Asap Cair Limbah Tulang Ikan Tenggiri

Dari kurva kalibrasi standar didapatkan persamaan:

$$y = 0,0035x + 0,4444$$

Dimana: y = Absorbansi

x = Konsentrasi fenol

Sampel 1

- T = 120°C, Absorbansi = 0,445

$$y = 0,0035x + 0,4444$$

$$0,445 = 0,0035x + 0,4444$$

$$0,445 - 0,4444 = 0,0035x$$

$$x = 0,171 \text{ mg/L}$$

$$\begin{aligned} \% \text{ Fenol} &= \frac{\text{Konsentrasi Fenol}}{\text{Densitas Asap Cair}} \\ &= \frac{0,171 \text{ mg/L}}{1,0116 \text{ gr/mL}} \times \frac{1 \text{ gr}}{1000 \text{ mg}} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times 100\% \\ &= 1,69 \times 10^{-5} \% \end{aligned}$$

### Sampel 2

- T = 140°C, Absorbansi = 0,536

$$y = 0,0035x + 0,4444$$

$$0,536 = 0,0035x + 0,4444$$

$$0,536 - 0,4444 = 0,0035x$$

$$x = 26,171 \text{ mg/L}$$

$$\begin{aligned} \% \text{ Fenol} &= \frac{\text{Konsentrasi Fenol}}{\text{Densitas Asap Cair}} \\ &= \frac{26,171 \text{ mg/L}}{1,0220 \text{ gr/mL}} \times \frac{1 \text{ gr}}{1000 \text{ mg}} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times 100\% \\ &= 2,56 \times 10^{-3} \% \end{aligned}$$

### Sampel 3

- T = 160°C, Absorbansi = 0,607

$$y = 0,0035x + 0,4444$$

$$0,607 = 0,0035x + 0,4444$$

$$0,607 - 0,4444 = 0,0035x$$

$$x = 46,457 \text{ mg/L}$$

$$\begin{aligned} \% \text{ Fenol} &= \frac{\text{Konsentrasi Fenol}}{\text{Densitas Asap Cair}} \\ &= \frac{46,457 \text{ mg/L}}{1,0236 \text{ gr/mL}} \times \frac{1 \text{ gr}}{1000 \text{ mg}} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times 100\% \\ &= 4,53 \times 10^{-3} \% \end{aligned}$$

## Sampel 4

- T = 180°C, Absorbansi = 0,712

$$y = 0,0035x + 0,4444$$

$$0,712 = 0,0035x + 0,4444$$

$$0,712 - 0,4444 = 0,0035x$$

$$x = 76,457 \text{ mg/L}$$

$$\begin{aligned} \% \text{ Fenol} &= \frac{\text{Konsentrasi Fenol}}{\text{Densitas Asap Cair}} \\ &= \frac{76,457 \text{ mg/L}}{1,0250 \text{ gr/mL}} \times \frac{1 \text{ gr}}{1000 \text{ mg}} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times 100\% \\ &= 7,45 \times 10^{-3} \% \end{aligned}$$

## Sampel 5

- T = 200°C, Absorbansi = 0,785

$$y = 0,0035x + 0,4444$$

$$0,785 = 0,0035x + 0,4444$$

$$0,785 - 0,4444 = 0,0035x$$

$$x = 97,314 \text{ mg/L}$$

$$\begin{aligned} \% \text{ Fenol} &= \frac{\text{Konsentrasi Fenol}}{\text{Densitas Asap Cair}} \\ &= \frac{97,314 \text{ mg/L}}{1,0398 \text{ gr/mL}} \times \frac{1 \text{ gr}}{1000 \text{ mg}} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times 100\% \\ &= 9,35 \times 10^{-3} \% \end{aligned}$$