

### Lampiran 3. Perhitungan Kadar Protein

➤ **Pembuatan 100 mL**

**Indikator Metil Merah 0,2 %**

$$\% (b/v) = 0,2\%$$

$$V = 100 \text{ mL}$$

$$\% (b/v) = \frac{b}{v} \times 100 \%$$

$$b = \frac{\% (b/v) \times v}{100\%}$$

$$b = \frac{0,2\% \times 100 \text{ mL}}{100\%}$$

$$b = 0,2 \text{ gram}$$

➤ **Pembuatan 100 mL**

**Indikator Metil Biru 0,2 %**

Diketahui :

$$\% (b/v) = 0,2\%$$

$$V = 100 \text{ mL}$$

Perhitungan :

$$\% (b/v) = \frac{b}{v} \times 100 \%$$

$$b = \frac{\% (b/v) \times v}{100\%}$$

$$b = \frac{0,2\% \times 100 \text{ mL}}{100\%}$$

$$b = 0,2 \text{ gram}$$

➤ **Pembuatan 100 mL Larutan**

**NaOH 40%**

Diketahui :

$$\% (b/v) = 40\%$$

$$V = 100 \text{ mL}$$

Perhitungan :

$$\% (b/v) = \frac{b}{v} \times 100 \%$$

$$b = \frac{\% (b/v) \times v}{100\%}$$

$$b = \frac{40\% \times 100 \text{ mL}}{100\%}$$

$$b = 40 \text{ gram}$$

➤ **Pembuatan 100 mL Larutan**

**H<sub>3</sub>BO<sub>3</sub> 3%**

Diketahui :

$$\% (b/v) = 3 \%$$

$$V = 100 \text{ mL}$$

Perhitungan :

$$\% (b/v) = \frac{b}{v} \times 100 \%$$

$$b = \frac{\% (b/v) \times v}{100\%}$$

$$b = \frac{3\% \times 100 \text{ mL}}{100\%}$$

$$b = 3 \text{ gram}$$

➤ **Pembuatan 100 mL Larutan HCl 0,1 N**

Diketahui:

$$\rho \text{ HCl} = 1,18 \text{ g/cm}^3$$

$$M_r \text{ HCl} = 36,46 \text{ g/mol}$$

$$\% \text{ HCl} = 37 \%$$

Perhitungan :

$$M = \frac{10 \times \rho \times \%}{M_r}$$

$$M = \frac{10 \times 1,18 \frac{\text{g}}{\text{cm}^3} \times 37\%}{36,46 \frac{\text{g}}{\text{mol}}}$$

$$M = 11,97 \text{ M}$$

➤ **Mengubah Molaritas ke Normalitas**

Diketahui :

$$M \text{ HCl} = 11,97$$

$$n \text{ HCl} = 1$$

Perhitungan :

$$N \text{ HCl} = M \text{ HCl} \times n \text{ HCl}$$

$$N \text{ HCl} = 11,97 \times 1$$

$$N \text{ HCl} = 11,97$$

Pengenceran

Diketahui :

$$N_1 = 11,97 \text{ N}$$

$$V_2 = 100 \text{ mL}$$

$$N_2 = 0,1 \text{ N}$$

Perhitungan :

$$V_1 \times N_1 = V_2 \times N_2$$

$$V_1 = \frac{V_2 \times N_2}{N_1}$$

$$V_1 = \frac{100 \text{ mL} \times 0,1 \text{ N}}{11,97 \text{ N}}$$

$$V_1 = 0,835 \text{ mL}$$

➤ **Perhitungan Kadar Protein**

Sampel	V Titrasi	VA	VB	Berat Sampel	VA-VB	N HCL	Ar N	Faktor Konversi
Tanpa perlakuan	2,4	2,35	0,8	0,2	1,55	0,1	14	6,25
	2,3							
24 Jam	2,6	2,55	0,8	0,2	1,75	0,1	14	6,25
	2,5							
36 Jam	2,8	2,9	0,8	0,2	2,1	0,1	14	6,25
	3							
48 Jam	3,5	3,45	0,8	0,2	2,65	0,1	14	6,25
	3,4							

VA: Volume Rata-rata Titrasi (mL)

VB: Volume Titrasi Blanko (mL)

Rumus Perhitungan Kadar Protein

$$\% N = \frac{(VA-VB) \text{ HCl} \times N \text{ HCl} \times \text{Ar N}}{W \times 1000} \times 100 \%$$

$$\% \text{ Protein} = \% N \times \text{Faktor Konversi}$$

**1. Tanpa Perlakuan**

$$\% N = \frac{(2,35-0,8) \times 0,1 \times 14}{0,2 \times 1000} \times 100 \%$$

$$= \frac{2,17}{200} \times 100 \%$$

$$= 1,085 \%$$

$$\% \text{ Protein} = \% N \times \text{Faktor Konversi}$$

$$= 1,085 \times 6,25$$

$$= 6,78 \%$$

## 2. Fermentasi 24 Jam

$$\% N = \frac{(2,55-0,8) \times 0,1 \times 14}{0,2 \times 1000} \times 100 \%$$

$$= \frac{2,45}{200} \times 100 \%$$

$$= 1,225 \%$$

$$\% \text{ Protein} = \% N \times \text{Faktor Konversi}$$

$$= 1,225 \times 6,25$$

$$= 7,65 \%$$

## 3. Fermentasi 36 Jam

$$\% N = \frac{(2,9-0,8) \times 0,1 \times 14}{0,2 \times 1000} \times 100 \%$$

$$= \frac{2,94}{200} \times 100 \%$$

$$= 1,47 \%$$

$$\% \text{ Protein} = \% N \times \text{Faktor Konversi}$$

$$= 1,47 \times 6,25$$

$$= 9,18 \%$$

## 4. Fermentasi 48 Jam

$$\% N = \frac{(3,45-0,8) \times 0,1 \times 14}{0,2 \times 1000} \times 100 \%$$

$$= \frac{3,71}{200} \times 100 \%$$

$$= 1,855 \%$$

$$\begin{aligned}\% \text{ Protein} &= \% \text{ N} \times \text{Faktor Konversi} \\ &= 1,855 \times 6,25 \\ &= 11,593 \%\end{aligned}$$

➤ **Hasil Perhitungan Kadar Protein**

No	Sampel	% N	% Protein
1	Tanpa Perlakuan	1,085	6,78
2	Fermentasi 24 Jam	1,225	7,65
3	Fermentasi 36 Jam	1,47	9,18
4	Fermentasi 48 Jam	1,855	11,593

