

LAMPIRAN

LAMPIRAN 1

PENENTUAN CaCO₃ DENGAN GRAVIMETRI

pengulangan	m₁ (g)	(m₂)	(m₃)	Kadar CO₂ (%)	Kadar CaCO₃ (%)
1	84,8381	1,0003	85,7062	13,2160	30,0364
2	82,5267	1,0001	83,4112	11,5588	26,2701
3	82,1360	1,0005	83,0291	10,7346	24,3969
4	82,1159	1,0003	82,9963	11,9864	27,2418
5	81,6654	1,0004	82,5387	12,7049	28,8748
6	82,5308	1,0000	83,4105	12,0300	27,3409
7	83,1280	1,0002	84,0093	11,8876	27,0173

Rumus persamaan CO₂ :

$$\text{CO}_2 = \frac{(X+S)-Y}{S} \times 100\%$$

Persamaan CaCO₃ :

$$\% \text{CaCO}_3 = \frac{\text{massa CaCO}_3(g)}{\text{massa sampel}} \times 100\%$$

Keterangan :

X = massa beker+HCl

S = massa sampel

Y = massa beker+HCl+sampel

Pengulangan 1

$$\begin{aligned} \text{CO}_2 &= \frac{(84,8381 \text{ g} + 1,0003 \text{ g}) - 85,7062 \text{ g}}{1,0003 \text{ g}} \times 100\% \\ &= 13,2160\% \end{aligned}$$

$$\begin{aligned} \text{g CO}_2 &= (84,8381 + 1,0003) - 85,7062 \\ &= 0,1322 \text{ g} \end{aligned}$$

$$\begin{aligned} \text{Mol CO}_2 &= \frac{\text{g CO}_2}{\text{Mr CO}_2} \\ &= \frac{0,1322}{44} \\ &= 0,0030 \text{ mol} \end{aligned}$$

Mol CO₂ ≈ mol CaCO₃

$$\begin{aligned}
\text{Gr CaCO}_3 &= \text{mol} \times \text{Mr CaCO}_3 \\
&= 0,0030 \text{ mol} \times 100 \\
&= 0,3005 \text{ gram CaCO}_3 \\
\% \text{CaCO}_3 &= \frac{\text{gr CaCO}_3}{\text{massa sampel}} \times 100\% \\
&= \frac{0,3005}{1,0003} \times 100\% \\
&= 30,0364\%
\end{aligned}$$

Pengulangan 2

$$\begin{aligned}
\text{CO}_2 &= \frac{(82,5267 \text{ g} + 1,0001 \text{ g}) - 83,4112 \text{ g}}{1,0001 \text{ g}} \times 100\% \\
&= 11,5588\% \\
\text{g CO}_2 &= (82,5267 + 1,0001) - 83,4112 \\
&= 0,1156 \text{ g} \\
\text{Mol CO}_2 &= \frac{\text{g CO}_2}{\text{Mr CO}_2} \\
&= \frac{0,1156}{44} \\
&= 0,0026 \text{ mol}
\end{aligned}$$

Mol CO₂ ≈ mol CaCO₃

$$\begin{aligned}
\text{gr CaCO}_3 &= \text{mol} \times \text{Mr CaCO}_3 \\
&= 0,0026 \text{ mol} \times 100 \\
&= 0,2627 \text{ gram CaCO}_3 \\
\% \text{CaCO}_3 &= \frac{\text{gr CaCO}_3}{\text{massa sampel}} \times 100\% \\
&= \frac{0,2627}{1,0001} \times 100\% \\
&= 26,2701\%
\end{aligned}$$

Pengulangan 3

$$\begin{aligned}
\text{CO}_2 &= \frac{(82,1360 \text{ g} + 1,0005 \text{ g}) - 83,0291 \text{ g}}{1,0001 \text{ g}} \times 100\% \\
&= 10,7346\% \\
\text{g CO}_2 &= (82,1360 + 1,0005) - 83,0291
\end{aligned}$$

$$= 0,1074 \text{ g}$$

$$\begin{aligned} \text{mol CO}_2 &= \frac{g \text{ CO}_2}{Mr \text{ CO}_2} \\ &= \frac{0,1074}{44} \end{aligned}$$

$$= 0,00224 \text{ mol}$$

$$\text{mol CO}_2 \approx \text{mol CaCO}_3$$

$$\begin{aligned} \text{gr CaCO}_3 &= \text{mol} \times \text{Mr CaCO}_3 \\ &= 0,0024 \text{ mol} \times 100 \\ &= 0,2441 \text{ gram CaCO}_3 \end{aligned}$$

$$\begin{aligned} \% \text{CaCO}_3 &= \frac{gr \text{ CaCO}_3}{massa sampel} \times 100\% \\ &= \frac{0,2441}{1,0005} \times 100\% \\ &= 24,3969\% \end{aligned}$$

Pengulangan 4

$$\begin{aligned} \text{CO}_2 &= \frac{(82,1159 \text{ g} + 1,0003 \text{ g}) - 82,9963 \text{ g}}{1,0003 \text{ g}} \times 100\% \\ &= 11,9864\% \end{aligned}$$

$$\begin{aligned} \text{g CO}_2 &= (82,1159 + 1,0003) - 82,9963 \\ &= 0,1199 \text{ g} \end{aligned}$$

$$\begin{aligned} \text{mol CO}_2 &= \frac{g \text{ CO}_2}{Mr \text{ CO}_2} \\ &= \frac{0,1199}{44} \\ &= 0,0027 \text{ mol} \end{aligned}$$

$$\text{mol CO}_2 \approx \text{mol CaCO}_3$$

$$\begin{aligned} \text{gr CaCO}_3 &= \text{mol} \times \text{Mr CaCO}_3 \\ &= 0,0027 \text{ mol} \times 100 \\ &= 0,2725 \text{ gram CaCO}_3 \end{aligned}$$

$$\begin{aligned} \% \text{CaCO}_3 &= \frac{gr \text{ CaCO}_3}{massa sampel} \times 100\% \\ &= \frac{0,2725}{1,0003} \times 100\% \end{aligned}$$

$$= 27,2418\%$$

Pengulangan 5

$$\text{CO}_2 = \frac{(81,6654 \text{ g} + 1,0004 \text{ g}) - 82,5387 \text{ g}}{1,0004 \text{ g}} \times 100\%$$

$$= 12,7049\%$$

$$\begin{aligned}\text{g CO}_2 &= (81,6654 + 1,0004) - 82,5387 \\ &= 0,1271 \text{ g}\end{aligned}$$

$$\begin{aligned}\text{mol CO}_2 &= \frac{\text{g CO}_2}{\text{Mr CO}_2} \\ &= \frac{0,1271}{44} \\ &= 0,0029 \text{ mol}\end{aligned}$$

$\text{mol CO}_2 \approx \text{mol CaCO}_3$

$$\begin{aligned}\text{gr CaCO}_3 &= \text{mol} \times \text{Mr CaCO}_3 \\ &= 0,0029 \text{ mol} \times 100 \\ &= 0,2889 \text{ gram CaCO}_3\end{aligned}$$

$$\begin{aligned}\% \text{CaCO}_3 &= \frac{\text{gr CaCO}_3}{\text{massa sampel}} \times 100\% \\ &= \frac{0,2889}{1,0004} \times 100\% \\ &= 28,8748\%\end{aligned}$$

Pengulangan 6

$$\text{CO}_2 = \frac{(82,5308 \text{ g} + 1,0000 \text{ g}) - 83,4105 \text{ g}}{1,0000 \text{ g}} \times 100\%$$

$$= 12,0300\%$$

$$\begin{aligned}\text{g CO}_2 &= (82,5308 + 1,0000) - 83,4105 \\ &= 0,1203 \text{ g}\end{aligned}$$

$$\begin{aligned}\text{mol CO}_2 &= \frac{\text{g CO}_2}{\text{Mr CO}_2} \\ &= \frac{0,1203}{44} \\ &= 0,0027 \text{ mol}\end{aligned}$$

$\text{mol CO}_2 \approx \text{mol CaCO}_3$

$$\begin{aligned}
 \text{gr CaCO}_3 &= \text{mol} \times \text{Mr CaCO}_3 \\
 &= 0,0027 \text{ mol} \times 100 \\
 &= 0,2734 \text{ gram CaCO}_3 \\
 \% \text{CaCO}_3 &= \frac{\text{gr CaCO}_3}{\text{massa sampel}} \times 100\% \\
 &= \frac{0,2734}{1,0000} \times 100\% \\
 &= 27,3409\%
 \end{aligned}$$

Pengulangan 7

$$\begin{aligned}
 \text{CO}_2 &= \frac{(83,1280 \text{ g} + 1,0002 \text{ g}) - 84,0093 \text{ g}}{1,0002 \text{ g}} \times 100\% \\
 &= 11,8876\% \\
 \text{g CO}_2 &= (83,1280 + 1,0002) - 84,0093 \\
 &= 0,1189 \text{ g} \\
 \text{mol CO}_2 &= \frac{\text{g CO}_2}{\text{Mr CO}_2} \\
 &= \frac{0,1189}{44} \\
 &= 0,0027 \text{ mol}
 \end{aligned}$$

$\text{mol CO}_2 \approx \text{mol CaCO}_3$

$$\begin{aligned}
 \text{gr CaCO}_3 &= \text{mol} \times \text{Mr CaCO}_3 \\
 &= 0,0027 \text{ mol} \times 100 \\
 &= 0,2702 \text{ gram CaCO}_3 \\
 \% \text{CaCO}_3 &= \frac{\text{gr CaCO}_3}{\text{massa sampel}} \times 100\% \\
 &= \frac{0,2702}{1,0002} \times 100\% \\
 &= 27,0173\%
 \end{aligned}$$

LAMPIRAN 2

PENETAPAN CaCO₃ DENGAN TITRASI

pengulangan	m₁ (g)	V₁ (mL)	V_b(mL)	warna TA	kadar CaCO₃ (%)
1	0,5100	0,38		merah muda	15,8804
2	0,5003	0,38		merah muda	16,1883
3	0,5076	0,38		merah muda	15,9555
4	0,5008	0,38	1,08	merah muda	16,1721
5	0,5003	0,32		merah muda	17,5759
6	0,5007	0,3		merah muda	18,0240
7	0,5003	0,36		merah muda	16,6508

Persamaan penentuan CaCO₃ :

$$\begin{aligned}\% \text{CaCO}_3 &= (V_b - V_c) \times N \text{ NaOH} \times 50 \times (100/m \text{ sampel(kg)}) \\ N \text{ NaOH} &= \frac{10 \times 0,25}{V_b} \\ &= \frac{10 \times 0,25}{1,08}\end{aligned}$$

Pengulangan 1 :

$$\begin{aligned}\% \text{CaCO}_3 &= (1,08 - 0,38) \times 2,314 \times 50 \times (100/510) \\ &= 15,8804\%\end{aligned}$$

Pengulangan 2 :

$$\begin{aligned}\% \text{CaCO}_3 &= (1,08 - 0,38) \times 2,314 \times 50 \times (100/500,3) \\ &= 16,883\%\end{aligned}$$

Pengulangan 3 :

$$\begin{aligned}\% \text{CaCO}_3 &= (1,08 - 0,38) \times 2,314 \times 50 \times (100/507,6) \\ &= 15,9555\%\end{aligned}$$

Pengulangan 4 :

$$\begin{aligned}\% \text{CaCO}_3 &= (1,08 - 0,38) \times 2,314 \times 50 \times (100/500,8) \\ &= 16,1721\%\end{aligned}$$

Pengulangan 5 :

$$\% \text{CaCO}_3 = (1,08 - 0,32) \times 2,314 \times 50 \times (100/500,3)$$

$$= 17,5759\%$$

Pengulangan 6 :

$$\begin{aligned}\% \text{CaCO}_3 &= (1,08 - 0,30) \times 2,314 \times 50 \times (100/500,7) \\ &= 18,0240\%\end{aligned}$$

Pengulangan 7 :

$$\begin{aligned}\% \text{CaCO}_3 &= (1,08 - 0,36) \times 2,314 \times 50 \times (100/500,3) \\ &= 16,6508\%\end{aligned}$$

LAMPIRAN 3

PENENTUAN PRESISI (%RSD)

Presisi metode gravimetri

Pengulangan	Kadar CaCo ₃	(Xi - \bar{X}) ²
1	30,0364	7,4269
2	26,2701	1,0838
3	24,3969	8,4930
4	27,2418	0,0048
5	28,8748	2,4449
6	27,3409	0,0009
7	27,0173	0,0864
	$\bar{X} = 27,3112$	$\sum = 19,5407$

$$\begin{aligned} SD &= \sqrt{\frac{\sum (Xi - \bar{X})^2}{n-1}} \\ &= \sqrt{\frac{19,5407}{7-1}} \\ &= 2,1335 \end{aligned}$$

$$\begin{aligned} \%RSD &= \frac{SD}{\bar{X}} \times 100\% \\ &= \frac{2,1335}{27,3112} \times 100\% \\ &= 7,8118\% \end{aligned}$$

Penentuan CV Horwitz

$$\begin{aligned} CV_{Horwiz} &= 2^{(1-0,5 \log C)} \\ &= 2^{(1,2818)} \\ &= 2,4314 \end{aligned}$$

Presisi metode titrasi

Pengulangan	Kadar CaCo ₃	(X _i - X̄) ²
1	15,8804	0,5699
2	16,1883	0,1998
3	15,9555	0,4621
4	16,1721	0,2145
5	17,5759	0,8848
6	18,0240	1,9285
7	16,6508	0,0002
	X̄ = 16,6353	Σ = 4,2598

$$\begin{aligned}
 SD &= \sqrt{\frac{\sum (X_i - \bar{X})^2}{n-1}} \\
 &= \sqrt{\frac{4,2598}{7-1}} \\
 &= 0,8426
 \end{aligned}$$

$$\begin{aligned}
 \%RSD &= \frac{SD}{\bar{X}} \times 100\% \\
 &= \frac{0,8426}{16,6353} \times 100\% \\
 &= 5,0651\%
 \end{aligned}$$

Penentuan CV Horwitz

$$\begin{aligned}
 CV_{Horwiz} &= 2^{(1-0,5 \log C)} \\
 &= 2^{(1,3895)} \\
 &= 2,6199
 \end{aligned}$$

LAMPIRAN 4

PENENTUAN KETIDAKPASTIAN PENGUKURAN

Sumber Ketidakpastian Metode Gravimetri

Sumber ketidakpastian	nilai	Ketidakpastian asal	Ketidakpastian baku
Neraca	1	$5,7735 \times 10^{-5}$	$5,7735 \times 10^{-5}$
Mr CaCO ₃	-	0,0024	0,0024
Presisi	-	0,8063	0,8063
Ketidakpastian gabungan			0,8089
Ketidakpastian diperluas			1,6178

1. Massa sampel

Faktor kalibrasi neraca

$$\mu_{\text{kal}} = \frac{s}{\sqrt{3}} = \frac{0,0001}{\sqrt{3}} = 5,7735 \times 10^{-5}$$

2. Ketidakpastian Mr CaCO₃

Elemen	Berat atom	Ketidakpastian melekat U	Ketidakpastian standar $U(e)/\sqrt{3}$
Ca	40,078	0,004	0,0023
C	12,0107	0,0008	0,00046
O	15,9994	0,0003	0,00017

Menghitung berat molekul CaCO₃ :

$$\text{Mr CaCO}_3 = 40,078 + 12,0107 + (3 \times 15,9994)$$

$$= 100,0869 \text{ g/mol}$$

Menghitung ketidakpastian berat molekul CaCO₃ :

$$U(\text{Mr CaCO}_3) = \sqrt{0,0023^2 + 0,00046^2 + (3 \times 0,00017)^2}$$

$$= 0,0024 \text{ g/mol}$$

3. Ketidakpastian presisi metode gravimetri :

$$\mu_p = \frac{SD}{\sqrt{n}} = \frac{2,1335}{\sqrt{7}} = 0,8063$$

Sumber Ketidakpastian Metode Volumetri

Sumber ketidakpastian	Nilai	Ketidakpastian asal	Ketidakpastian baku
Buret 10mL	10	Fk = 0,0115 Fm = 0,0084	0,0142
Pipet ukur 10mL	10	Fk = 0,0375 Fm = 0,0084	0,0378
Labu ukur 100mL	100	Fk = 0,0704 Fm = 0,147	0,1629
Neraca analitik Presisi	0,5 -	5,7735×10 ⁻⁵ 0,3184	5,7735×10 ⁻⁵ 0,3184
Mr CaCO ₃	-	0,0024	0,0024
Ketidakpastian gabugan			0,3265
Ketidakpastian diperluas			0,653

1. Ketidakpastian buret 10 mL

a. Faktor kalibrasi

$$\mu_{\text{kal}} = \frac{S}{\sqrt{3}} = \frac{0,02}{\sqrt{3}} = 0,0115$$

b. Faktor muai

$$\begin{aligned} \mu_{\text{FM}} &= \frac{\text{volume labu} \times 0,00021 \times \Delta T}{\sqrt{3}} \\ &= \frac{10 \text{ mL} \times 0,00021 \times (27-20)^\circ\text{C}}{\sqrt{3}} \\ &= 0,0084 \end{aligned}$$

$$\begin{aligned} \mu_c (\text{LU}) &= \sqrt{(\mu_{\text{kal}})^2 + (\mu_{\text{FM}})^2} \\ &= \sqrt{(0,0115)^2 + (0,0084)^2} \\ &= 0,0142 \end{aligned}$$

2. Ketidakpastian pipet ukur 10 mL

a. Faktor kalibrasi pipet

$$\mu_{\text{kal}} = \frac{S}{\sqrt{3}} = \frac{0,065}{\sqrt{3}} = 0,0375$$

b. Faktor muai

$$\begin{aligned} \mu_{\text{FM}} &= \frac{\text{volume pipet} \times 0,00021 \times \Delta T}{\sqrt{3}} \\ &= \frac{10 \text{ mL} \times 0,00021 \times (27-20)^\circ\text{C}}{\sqrt{3}} \\ &= 0,0084 \end{aligned}$$

$$\begin{aligned}\mu c (PV) &= \sqrt{(\mu_{\text{kal}})^2 + (\mu_{\text{FM}})^2} \\ &= \sqrt{(0,0375)^2 + (0,0048)^2} \\ &= 0,0378\end{aligned}$$

3. Ketidakpastian labu ukur 100 mL

a. Faktor kalibrasi labu ukur

$$\mu_{\text{kal}} = \frac{S}{\sqrt{3}} = \frac{0,122}{\sqrt{3}} = 0,0704$$

b. Faktor muai

$$\begin{aligned}\mu_{\text{FM}} &= \frac{\text{volume pipet} \times 0,00021 \times \Delta T}{\sqrt{3}} \\ &= \frac{100\text{mL} \times 0,00021 \times (27-20)^\circ\text{C}}{\sqrt{3}} \\ &= 0,147 \\ \mu c (PU) &= \sqrt{(\mu_{\text{kal}})^2 + (\mu_{\text{FM}})^2} \\ &= \sqrt{(0,0704)^2 + (0,147)^2} \\ &= 0,1629\end{aligned}$$

4. Massa sampel

Faktor kalibrasi neraca

$$\mu_{\text{kal}} = \frac{S}{\sqrt{3}} = \frac{0,0001}{\sqrt{3}} = 5,7735 \times 10^{-5}$$

5. Ketidakpastian Mr CaCO₃

Elemen	Berat atom	Ketidakpastian melekat U	Ketidakpastian standar U(e)/\sqrt{3}
Ca	40,078	0,004	0,0023
C	12,0107	0,0008	0,00046
O	15,9994	0,0003	0,00017

Menghitung berat molekul CaCO₃ :

$$\text{Mr CaCO}_3 = 40,078 + 12,0107 + (3 \times 15,9994)$$

$$= 100,0869 \text{ g/mol}$$

Menghitung ketidakpastian berat molekul CaCO₃ :

$$\begin{aligned} U(\text{Mr CaCO}_3) &= \sqrt{0,0023^2 + 0,00046^2 + (3 \times 0,00017)^2} \\ &= 0,0024 \text{ g/mol} \end{aligned}$$

6. Ketidakpastian presisi metode volumetri :

$$\mu_p = \frac{SD}{\sqrt{n}} = \frac{0,8426}{\sqrt{7}} = 0,3184$$

LAMPIRAN 5

PENENTUAN KETIDAKPASTIAN GABUNGAN

METODE GRAVIMETRI

Sumber ketidakpastian	nilai	Ketidakpastian asal	Ketidakpastian baku
Neraca	1	$5,7735 \times 10^{-5}$	$5,7735 \times 10^{-5}$
Mr CaCO ₃	-	0,0024	0,0024
Presisi	-	0,8063	0,8063
Ketidakpastian gabungan			0,8089
Ketidakpastian diperluas			1,6178

Rumus ketidakpastian gabungan :

$$\mu G = \sqrt{\left(\frac{\mu a}{v}\right)^2 + \left(\frac{\mu b}{v}\right)^2 + \dots} \times \text{kadar \%}$$

Hasil perhitungan ketidakpastian gabungan :

$$\mu G = \sqrt{\left(\frac{\mu \text{ neraca}}{m}\right)^2 + (\text{Mr CaCO}_3)^2 + \left(\frac{\mu \text{ presisi}}{n}\right)^2} \times \%$$

$$\mu G = \sqrt{\left(\frac{5,7735 \times 10^{-5}}{1}\right)^2 + (0,0024)^2 + \left(\frac{0,8063}{27,3112}\right)^2} \times 27,3112 \%$$

$$\mu G = 0,8089\%$$

METODE VOLUMETRI

Sumber ketidakpastian	Nilai	Ketidakpastian asal	Ketidakpastian baku
buret 10mL	10	Fk = 0,0115 Fm = 0,0084	0,0142
Pipet ukur 10mL	10	Fk = 0,0375 Fm = 0,0084	0,0378
Labu ukur 100mL	100	Fk = 0,0704 Fm = 0,147	0,1629
Neraca analitik	0,5	$5,7735 \times 10^{-5}$	$5,7735 \times 10^{-5}$
Presisi	-	0,3184	0,3184
Ketidakpastian gabungan			0,3265
Ketidakpastian diperluas			0,653

Rumus ketidakpastian gabungan :

$$\mu G = \sqrt{\left(\frac{\mu a}{v}\right)^2 + \left(\frac{\mu b}{v}\right)^2 + \dots} \times \text{kadar \%}$$

Hasil perhitungan ketidakpastian gabungan :

$$\mu G = \sqrt{\left(\frac{\mu \text{ buret}_{10}}{v}\right)^2 + \left(\frac{\mu P_{10}}{v}\right)^2 + \left(\frac{\mu LU_{100}}{v}\right)^2 + \left(\frac{\mu \text{ neraca}}{m}\right)^2 + \left(\frac{\mu \text{ presisi}}{n}\right)^2} \times \text{kadar \%}$$

$$\mu G = \sqrt{\left(\frac{0,0142}{10}\right)^2 + \left(\frac{0,0378}{10}\right)^2 + \left(\frac{0,1629}{100}\right)^2 + \left(\frac{5,77 \times 10^{-5}}{0,5}\right)^2 + \left(\frac{0,3184}{16,6353}\right)^2} \times 16,6353 \%$$

$$\mu G = 0,3265\%$$

LAMPIRAN 6

KETIDAKPASTIAN DIPERLUAS

Selang kepercayaan 95%

Rumus ketidakpastian diperluas :

$$U = K \times \mu G$$

Keterangan:

U : ketidakpastian diperluas

K : faktor cakupan

μG : ketidakpastian gabungan

hasil perhitungan ketidakpastian dierluas metode gravimetri:

$$U = 2 \times 0,8089 \%$$

$$U = 1,6178 \%$$

hasil perhitungan ketidakpastian dierluas metode volumetri:

$$U = 2 \times 0,3265 \%$$

$$U = 0,653 \%$$

LAMPIRAN 7

Uji t

No	Gravimetri		Volumetri	
	Kadar (%)	$(x_i - \bar{x})^2$	Kadar (%)	$(x_i - \bar{x})^2$
1	30,0364	7,4270	15,8804	0,5698
2	26,2701	1,0839	16,1883	0,1998
3	24,3969	8,4931	15,9555	0,4621
4	27,2418	0,0048	16,1721	0,2145
5	28,8748	2,4449	17,5759	0,8847
6	27,3409	0,0009	18,0240	1,9285
7	27,0173	0,0864	16,6508	0,0002
$\bar{x} = 27,3112$		$\Sigma = 19,5410$	$\bar{x} = 16,6353$	$\Sigma = 4,2591$
SD		1,8046		0,8425
SD^2		3,2568		0,7099
$db = 12$				

Persamaan yang digunakan :

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{S \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Nilai t hitung

dengan

$$S = \frac{(n_1 - 1)SD_1^2 + (n_2 - 1)SD_2^2}{(n_1 + n_2) - 2}$$

$$S = \frac{(7 - 1) \times 3,2568 + (7 - 1) \times 0,7099}{(7 + 7) - 2}$$

$$= \frac{19,5408 + 4,2594}{12}$$

$$= 1,98335$$

$$t = \frac{(27,3112 - 16,6353)}{1,98335 \sqrt{\frac{1}{7} + \frac{1}{7}}}$$

$$= \frac{10,6759}{1,98335 \sqrt{\frac{1}{7} + \frac{1}{7}}}$$

$$= 10,0702$$

LAMPIRAN 8

TABEL TITIK PRESENTASE DISTRIBUSI T

Titik Persentase Distribusi t (df = 1 – 40)

Pr df	0.25	0.10	0.05	0.025	0.01	0.005	0.001
	0.50	0.20	0.10	0.050	0.02	0.010	0.002
1	1.00000	3.07768	6.31375	12.70620	31.82052	63.65674	318.30884
2	0.81650	1.88562	2.91999	4.30265	6.96456	9.92484	22.32712
3	0.76489	1.63774	2.35338	3.18245	4.54070	5.84091	10.21453
4	0.74070	1.53321	2.13185	2.77645	3.74695	4.60409	7.17318
5	0.72669	1.47588	2.01505	2.57058	3.36493	4.03214	5.89343
6	0.71756	1.43976	1.94318	2.44691	3.14267	3.70743	5.20763
7	0.71114	1.41492	1.89458	2.36462	2.99795	3.49948	4.78529
8	0.70639	1.39682	1.85955	2.30600	2.89646	3.35539	4.50079
9	0.70272	1.38303	1.83311	2.26216	2.82144	3.24984	4.29681
10	0.69981	1.37218	1.81246	2.22814	2.76377	3.16927	4.14370
11	0.69745	1.36343	1.79588	2.20099	2.71808	3.10581	4.02470
12	0.69548	1.35622	1.78229	2.17881	2.68100	3.05454	3.92963
13	0.69383	1.35017	1.77093	2.16037	2.65031	3.01228	3.85198
14	0.69242	1.34503	1.76131	2.14479	2.62449	2.97684	3.78739
15	0.69120	1.34061	1.75305	2.13145	2.60248	2.94671	3.73283
16	0.69013	1.33676	1.74588	2.11991	2.58349	2.92078	3.68615
17	0.68920	1.33338	1.73961	2.10982	2.56693	2.89823	3.64577
18	0.68836	1.33039	1.73406	2.10092	2.55238	2.87844	3.61048
19	0.68762	1.32773	1.72913	2.09302	2.53948	2.86093	3.57940
20	0.68695	1.32534	1.72472	2.08598	2.52798	2.84534	3.55181
21	0.68635	1.32319	1.72074	2.07961	2.51765	2.83136	3.52715
22	0.68581	1.32124	1.71714	2.07387	2.50832	2.81876	3.50499
23	0.68531	1.31946	1.71387	2.06866	2.49987	2.80734	3.48496
24	0.68485	1.31784	1.71088	2.06390	2.49216	2.79694	3.46678
25	0.68443	1.31635	1.70814	2.05954	2.48511	2.78744	3.45019
26	0.68404	1.31497	1.70562	2.05553	2.47863	2.77871	3.43500
27	0.68368	1.31370	1.70329	2.05183	2.47266	2.77068	3.42103
28	0.68335	1.31253	1.70113	2.04841	2.46714	2.76326	3.40816
29	0.68304	1.31143	1.69913	2.04523	2.46202	2.75639	3.39624
30	0.68276	1.31042	1.69726	2.04227	2.45726	2.75000	3.38518
31	0.68249	1.30948	1.69552	2.03951	2.45282	2.74404	3.37490
32	0.68223	1.30857	1.69389	2.03693	2.44868	2.73848	3.36531
33	0.68200	1.30774	1.69236	2.03452	2.44479	2.73328	3.35634
34	0.68177	1.30695	1.69092	2.03224	2.44115	2.72839	3.34793
35	0.68156	1.30621	1.68957	2.03011	2.43772	2.72381	3.34005
36	0.68137	1.30551	1.68830	2.02809	2.43449	2.71948	3.33262
37	0.68118	1.30485	1.68709	2.02619	2.43145	2.71541	3.32563
38	0.68100	1.30423	1.68595	2.02439	2.42857	2.71156	3.31903
39	0.68083	1.30364	1.68488	2.02269	2.42584	2.70791	3.31279
40	0.68067	1.30308	1.68385	2.02108	2.42326	2.70446	3.30688