LAMPIRAN A
HASIL UJI KERAGAMAN BOBOT TABLET LIKUISOLID IBUPROFEN

Hasil Uji Keragaman Bobot Tablet Formulasi A

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Keterangan: PK = Penetapan Kadar
SD = Standart Deviasi
KV = Koefisien Variasi
Hasil Uji Keragaman Bobot Formulasi B

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Hasil Uji Keragaman Bobot Formula D

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LAMPIRAN B
HASIL UJI KESERAGAMAN KANDUNGAN TABLET LIKUISOLID IBUPROFEN

Hasil uji Keseragaman Kandungan Tablet Formula A Replikasi I

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<th>C sampel (µg/ml)</th>
<th>C teoritis (µg/ml)</th>
<th>Kadar (%)</th>
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<td>286,43</td>
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Rata-rata 99,37
SD 0,95
KV 0,95

Hasil Uji Keseragaman Kandungan Tablet Formula A Replikasi II

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KV 0,74
Hasil Uji Keseragaman Kandungan Tablet Formula A Replikasi III

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SD 1,01
KV 1,01

Hasil Uji Keseragaman Kandungan Tablet Formula B Replikasi I

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KV 0,56
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| Rata-rata | 99,57 |
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| KV        | 0,73  |

Hasil Uji Keragaman Kandungan Tablet Formula B Replikasi III

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| Rata-rata | 99,66 |
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| KV        | 0,73  |
Hasil Uji Keseragaman Kandungan Tablet Formula C Replikasi I

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Hasil Uji Keseragaman Kandungan Tablet Formula C Replikasi II

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### Hasil Uji Keseragaman Kandungan Tablet Formula D Replikasi II

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<th>Kadar (%)</th>
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KV: 0,80

### Hasil Uji Keseragaman Kandungan Tablet Formula D Replikasi III

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KV: 1,53
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**Dalam air**

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LAMPIRAN D
HASIL PENETAPAN KADAR TABLET LIKUISOLID IBUPROFEN

FORMULA A

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<th>% Kadar</th>
<th>Rata-rata</th>
<th>SD</th>
<th>KV</th>
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FORMULA B

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<th>% Kadar</th>
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<th>SD</th>
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FORMULA C

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<th>KV</th>
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LAMPIRAN E
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LAMPIRAN F
CONTOH PERHITUNGAN

Contoh perhitungan indeks kompresibilitas dan *Hausner ratio*:

Formula A :

Berat gelas = 111,29 g (W1)  
Berat gelas + granul = 148,3 g (W2)  
V1 = 100 ml  
V2 = 84 ml

\[
Bj \text{ nyata} = \frac{W_2 - W_1}{V_1} = \frac{(148,3 - 111,29)}{100} = 0,3701
\]

\[
Bj \text{ mampat} = \frac{W_2 - W_1}{V_2} = \frac{(148,3 - 111,29)}{84} = 0,4460
\]

\[
\% \text{ kompresibilitas} = \left(1 - \frac{Bj \text{ nyata}}{Bj \text{ mampat}}\right) \times 100\% = 16\%
\]

Formula A:

\[
HR = \frac{Bj \text{ mampat}}{Bj \text{ nyata}} = 1,19
\]

**Contoh perhitungan akurasi & presisi:**

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<th>Pipet</th>
<th>Dapar fosfat 0,2M pH7,2 Ad</th>
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Absorbansi = 0,558 → y = 0,0018x + 0,0061

Konsentrasi sebenarnya = 300,99 ppm

Konsentrasi teoritis = 300,45 ppm

% perolehan kembali = (kons. sebenarnya / kons. teoritis) x 100%
Untuk menghitung \% KV
\[
\text{\% KV} = \frac{SD}{X} \times 100\%
\]
\[
= \frac{1.01}{99.83} \times 100\%
\]
\[
= 1.01\%
\]

Contoh perhitungan \% obat terlepas:
\[
\% \text{obat terlepas} = \frac{W_t}{\left(\frac{PK}{100}\right) \times \text{dosis}} \times 100\%
\]

Formula A replikasi 1 pada t = 10 menit
\[
\% \text{obat terlepas} = \frac{106.9}{\left(\frac{100.30}{100}\right) \times 200} \times 100\% = 53.31\%
\]

Contoh perhitungan AUC pada disolusi:
Rumus:
Formula A replikasi 1
\[
W_{tn-1} = 106.9
\]
\[
W_{tn} = 119.2
\]
\[
t_n = 20 \text{ menit}
\]
\[
t_{n-1} = 10 \text{ menit}
\]
\[
AUC = \frac{1006.9 + 119.2}{2} x (20 - 10)
\]
\[
= 534.74
\]
Luas \(\square\) = 60 x penetapan kadar x dosis
\[
= 60 \times 100.30\% \times 200 \text{ mg}
\]
\[
= 12035.6
\]
\% ED Formula A replikasi 1 = \((\sum \text{AUC} / \text{luas }\square) \times 100\%
\]
\[
(7551,06/12035,6) \times 100\% = 62,74\%
\]

**LAMPIRAN G**

**HASIL UJI F KURVA BAKU**

**REPLIKASI I**

<table>
<thead>
<tr>
<th>KONSENTRASI</th>
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<th>(X^2)</th>
<th>(Y^2)</th>
<th>XY</th>
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<tbody>
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F hitung < F tabel $0,05 (3,9) = 0,3287 < 3,86$

Karena F hitung lebih kecil dari F tabel maka tidak ada perbedaan bermakna antar persamaan regresi.
LAMPIRAN H
HASIL UJI STATISTIK KEKERASAN TABLET LIKUISOLID IBUPROFEN ANTAR FORMULA

Descriptives

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<thead>
<tr>
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<th>N</th>
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<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
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Test of Homogeneity of Variances

<table>
<thead>
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<th>df1</th>
<th>df2</th>
<th>Sig.</th>
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ANOVA

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<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
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Karena F hitung > F tabel$_{0.05}(3,8) = 4.720 > 4.07$; maka $H_0$ ditolak dan ada perbedaan bermakna antar formula.
**Multiple Comparisons**

<table>
<thead>
<tr>
<th>(I) Formula</th>
<th>(J) Formula</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>95% Confidence Interval</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>Lower Bound</td>
<td>Upper Bound</td>
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<td></td>
</tr>
<tr>
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<td>Formula B</td>
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<td>.72358</td>
<td>.016</td>
<td>.5281</td>
</tr>
<tr>
<td></td>
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<td>1.67333*</td>
<td>.72358</td>
<td>.049</td>
<td>.0048</td>
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<tr>
<td></td>
<td>Formula D</td>
<td>2.48667*</td>
<td>.72358</td>
<td>.009</td>
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</tr>
<tr>
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<td>Formula A</td>
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<td>Formula A</td>
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<td>Formula B</td>
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<td>.72358</td>
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* The mean difference is significant at the 0.05 level.
LAMPIRAN I
HASIL UJI STATISTIK KERAPUHAN TABLET LIKUISOLID
IBUPROFEN ANTAR FORMULA

Descriptives

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<th>Std. Error</th>
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<td></td>
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Test of Homogeneity of Variances

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ANOVA

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Karena $F$ hitung < $F$ tabel$_{0.05}(3,8) = 2.565 < 4,07$; maka $H_0$ diterima dan tidak ada perbedaan bermakna antar formula.
LAMPIRAN J

HASIL UJI STATISTIK WAKTU HANCUR TABLET LIKUISOLID IBUPROFEN ANTAR FORMULA

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Test of Homogeneity of Variances

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ANOVA

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Karena $F$ hitung > $F$ tabel$_{0.05}$ (3,8) = 5,457 > 4,07; maka $H_0$ ditolak dan ada perbedaan bermakna antar formula.
Multiple Comparisons

<table>
<thead>
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<th>(J) Formula</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
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*. The mean difference is significant at the 0.05 level.
LAMPIRAN K
HASIL UJI STATISTIK PENETAPAN KADAR TABLET LIKUISOLID IBUPROFEN ANTAR FORMULA

Descriptives

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula A</td>
<td>3</td>
<td>100.2933</td>
<td>.82373</td>
<td>.47558</td>
<td>98.2471</td>
<td>102.3396</td>
<td>99.38</td>
<td>100.98</td>
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<tr>
<td>Formula B</td>
<td>3</td>
<td>99.8700</td>
<td>.47286</td>
<td>.27301</td>
<td>98.6953</td>
<td>101.0447</td>
<td>99.43</td>
<td>100.37</td>
</tr>
<tr>
<td>Formula C</td>
<td>3</td>
<td>99.8133</td>
<td>.68120</td>
<td>.39329</td>
<td>98.1211</td>
<td>101.5055</td>
<td>99.11</td>
<td>100.47</td>
</tr>
<tr>
<td>Formula D</td>
<td>3</td>
<td>99.6067</td>
<td>.68061</td>
<td>.39295</td>
<td>97.9159</td>
<td>101.2974</td>
<td>98.91</td>
<td>100.27</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>99.8958</td>
<td>.63289</td>
<td>.18270</td>
<td>99.4937</td>
<td>100.2980</td>
<td>98.91</td>
<td>100.98</td>
</tr>
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</table>

Test of Homogeneity of Variances

<table>
<thead>
<tr>
<th></th>
<th>Levene Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.335</td>
<td>3</td>
<td>8</td>
<td>.800</td>
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ANOVA

<table>
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<tr>
<th></th>
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<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.747</td>
<td>3</td>
<td>.249</td>
<td>.545</td>
<td>.665</td>
</tr>
<tr>
<td>Within Groups</td>
<td>3.659</td>
<td>8</td>
<td>.457</td>
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<td></td>
</tr>
<tr>
<td>Total</td>
<td>4.406</td>
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<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Karena F hitung < F tabel\(_{0.05 (3,8)}\) = 0,545 < 4,07; maka H\(_0\) diterima dan tidak ada perbedaan bermakna antar formula.
LAMPIRAN L

HASIL UJI STATISTIK DISOLUSI BERDASARKAN %ED$_{60}$ TABLET LIKUISOLID IBUPROFEN ANTAR FORMULA

Descriptives

<table>
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<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persen_Efisiensi_Disolusi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formula A</td>
<td>3</td>
<td>62.7133</td>
<td>.31086</td>
<td>.17947</td>
<td>61.9411 - 63.4855</td>
<td>62.39</td>
<td>63.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formula B</td>
<td>3</td>
<td>74.8400</td>
<td>.26058</td>
<td>.15044</td>
<td>74.1927 - 75.4873</td>
<td>74.67</td>
<td>75.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formula C</td>
<td>3</td>
<td>75.7633</td>
<td>.18009</td>
<td>.10398</td>
<td>75.3160 - 76.2107</td>
<td>75.58</td>
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<tr>
<td>Formula D</td>
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<td>77.7733</td>
<td>.15044</td>
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<td>77.3996 - 78.1471</td>
<td>77.63</td>
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<td>Total</td>
<td>12</td>
<td>72.7725</td>
<td>6.16945</td>
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<td>68.8526 - 76.6924</td>
<td>62.39</td>
<td>77.93</td>
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Test of Homogeneity of Variances

<table>
<thead>
<tr>
<th></th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persen_Efisiensi_Disolusi</td>
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<td>.568</td>
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ANOVA

<table>
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<tr>
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<th>Mean Square</th>
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<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>418.244</td>
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<td>139.415</td>
<td>2539.432</td>
<td>.000</td>
</tr>
<tr>
<td>Within Groups</td>
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<td>8</td>
<td>.055</td>
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<td>418.684</td>
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</table>

Karena F hitung $> F_{table}^{0.05 (3,8)} = 2539.432 > 4.07$; maka $H_0$ ditolak dan ada perbedaan bermakna antar formula.
### Multiple Comparisons

<table>
<thead>
<tr>
<th>(I) Formula</th>
<th>(J) Formula</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower Bound</td>
<td>Upper Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formula A</td>
<td>Formula B</td>
<td>-12.12667*</td>
<td>.19131</td>
<td>.000</td>
<td>-12.5678</td>
</tr>
<tr>
<td>Formula C</td>
<td>Formula D</td>
<td>-13.05000*</td>
<td>.19131</td>
<td>.000</td>
<td>-13.4912</td>
</tr>
<tr>
<td>Formula D</td>
<td></td>
<td>-15.06000*</td>
<td>.19131</td>
<td>.000</td>
<td>-15.5012</td>
</tr>
<tr>
<td>Formula B</td>
<td>Formula A</td>
<td>12.12667*</td>
<td>.19131</td>
<td>.000</td>
<td>11.6855</td>
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<tr>
<td>Formula C</td>
<td>Formula D</td>
<td>-.92333*</td>
<td>.19131</td>
<td>.001</td>
<td>-1.3645</td>
</tr>
<tr>
<td>Formula D</td>
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<td>-2.93333*</td>
<td>.19131</td>
<td>.000</td>
<td>-3.3745</td>
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<tr>
<td>Formula C</td>
<td>Formula A</td>
<td>13.05000*</td>
<td>.19131</td>
<td>.000</td>
<td>12.6088</td>
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<tr>
<td>Formula B</td>
<td>Formula D</td>
<td>.92333*</td>
<td>.19131</td>
<td>.001</td>
<td>.4822</td>
</tr>
<tr>
<td>Formula D</td>
<td></td>
<td>-2.01000*</td>
<td>.19131</td>
<td>.000</td>
<td>-2.4512</td>
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<tr>
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<td>Formula A</td>
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<td>.19131</td>
<td>.000</td>
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<tr>
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<td>Formula C</td>
<td>2.93333*</td>
<td>.19131</td>
<td>.000</td>
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<tr>
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<td></td>
<td>2.01000*</td>
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<td>.000</td>
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</table>

* The mean difference is significant at the 0.05 level.
LAMPIRAN M
HASIL UJI STATISTIK KONSTANTA LAJU DISOLUSI TABLET LIKUISOLID IBUPROFEN ANTAR FORMULA

Descriptives

<table>
<thead>
<tr>
<th>Konstanta_Laju_Disolusi</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula A</td>
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<td>.054367</td>
<td>.0021595</td>
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<td>.0564</td>
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<tr>
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<td>.3913864</td>
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<td>.083867</td>
<td>.0020841</td>
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<td>.0035796</td>
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<td>.0912</td>
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<td>.130108</td>
<td>.1941739</td>
<td>.0560532</td>
<td>.006736</td>
<td>.253481</td>
<td>.0521</td>
<td>.7450</td>
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</table>

Test of Homogeneity of Variances

<table>
<thead>
<tr>
<th>Konstanta_Laju_Disolusi</th>
<th>Levene Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
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</thead>
<tbody>
<tr>
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<td>15.793</td>
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ANOVA

<table>
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<tr>
<th>Konstanta_Laju_Disolusi</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.108</td>
<td>3</td>
<td>.036</td>
<td>.943</td>
<td>.464</td>
</tr>
<tr>
<td>Within Groups</td>
<td>.306</td>
<td>8</td>
<td>.038</td>
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<td>Total</td>
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</table>

Karena F hitung < F tabel\_{0.05 (3,8)} = 0.943 < 4.07; maka H\_0 diterima dan tidak ada perbedaan bermakna antar formula.
# LAMPIRAN N

**SERTIFIKAT ANALISIS IBUPROFEN**

---

**Shasun Chemicals And Drugs Ltd.**

---

**IBUPROFEN BP/Ph. Eur. (SN Grade)**

**CERTIFICATE OF ANALYSIS**

<table>
<thead>
<tr>
<th>No.</th>
<th>TESTS</th>
<th>RESULTS</th>
<th>LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Appearance</td>
<td>White crystalline powder</td>
<td>White, crystalline powder or colourless crystals</td>
</tr>
<tr>
<td>2</td>
<td>Solubility</td>
<td>Complies</td>
<td>Precipitation in acetone, methanol, and in ethylene chloride. Dissolves in dilute solutions of alkali hydroxides and carbonates. Practically insoluble in water</td>
</tr>
<tr>
<td>3</td>
<td>Clarify and colour of solution</td>
<td>Complies</td>
<td>10% w/v solution (5g in 50 ml of the solution) in methanol should be clear and colourless</td>
</tr>
<tr>
<td>4</td>
<td>Identification</td>
<td>(a) By IR</td>
<td>Conform</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(b) By UV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(c) By TLC</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>5</td>
<td>Optical rotation</td>
<td>0.90° *</td>
<td>0.05° to +0.05°</td>
</tr>
<tr>
<td>6</td>
<td>Heavy metals</td>
<td>I.T 10 PPM</td>
<td>NMT 10 PPM</td>
</tr>
<tr>
<td>7</td>
<td>Related substances (by HPLC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) 2-[(4-Isobutyl Phenyl)</td>
<td>0.06 % (Area %)</td>
<td>NMT 0.20 % (Area %)</td>
</tr>
<tr>
<td></td>
<td>Phenyl] Propionic Acid (Impurity 2)</td>
<td></td>
<td>NMT 0.30 % (w/w)</td>
</tr>
<tr>
<td></td>
<td>b) 2-(4-Benzyl phenylglyoxylic acid</td>
<td>Not Detected</td>
<td>NMT 0.30 % (Area %)</td>
</tr>
<tr>
<td></td>
<td>(Impurity 3)</td>
<td></td>
<td>NMT 0.10 % (Area %)</td>
</tr>
<tr>
<td></td>
<td>c) 4-Isobutylcinnamophenone</td>
<td>Not Detected</td>
<td>NMT 0.30 % (Area %)</td>
</tr>
<tr>
<td></td>
<td>(Impurity 4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>d) Any unidentified impurity</td>
<td>0.04 % (Area %)</td>
<td>NMT 0.10 % (Area %)</td>
</tr>
<tr>
<td></td>
<td>e) Total impurities</td>
<td>0.14 % (Area %)</td>
<td>NMT 0.30 % (Area %)</td>
</tr>
<tr>
<td></td>
<td>(Apart from impurity E)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Sulphated ash</td>
<td>0.04 % (w/w)</td>
<td>NMT 0.10 % (w/w)</td>
</tr>
<tr>
<td>9</td>
<td>Loss on drying</td>
<td>0.10 % (w/w)</td>
<td>NMT 0.50 % (w/w)</td>
</tr>
<tr>
<td>10</td>
<td>Assay (Dry basis)</td>
<td>99.8 % (w/w)</td>
<td>98.5% -101.0% (w/w)</td>
</tr>
</tbody>
</table>

---

**Shasun Road, Periyakalapet, Pondicherry - 605 014, India**

**Ph:** 91-413-2655202, 2655156, 2655157, 2655441, 2655442, 2655827, 2655828, 2655829, 2655830

**Fax:** 91-413-2655154, e-mail: shapody@md4.vsnl.net.in

shapody@shasun.com

Page 1/2
**Shasun Chemicals And Drugs Ltd.**

**IBUPROFEN BP/Ph.Eur. (SN Grade)**

**CERTIFICATE OF ANALYSIS**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>TESTS</th>
<th>RESULTS</th>
<th>LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Bulk Density</td>
<td>0.45 g/ml.</td>
<td>0.35-0.55 g/ml.</td>
</tr>
<tr>
<td></td>
<td>Unstepped</td>
<td>0.64 g/ml.</td>
<td>0.50-0.75 g/ml.</td>
</tr>
<tr>
<td></td>
<td>Tapped (750 tappings)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>Mean Particle Size</td>
<td>76.4 micron</td>
<td>60.0 - 130.0 microns</td>
</tr>
<tr>
<td>c.</td>
<td>Residual solvents</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Acetone</td>
<td>17 PPM</td>
<td>NMT 100 PPM</td>
</tr>
<tr>
<td></td>
<td>b) Isopropyl alcohol</td>
<td>LT 0.09 PPM</td>
<td>NMT 250 PPM</td>
</tr>
<tr>
<td></td>
<td>c) Hexanes</td>
<td>29 PPM</td>
<td>NMT 200 PPM</td>
</tr>
<tr>
<td></td>
<td>d) Tri cimento ethylene</td>
<td>LT 0.19 PPM</td>
<td>NMT 50 PPM</td>
</tr>
<tr>
<td></td>
<td>e) Methanol</td>
<td>Not Detected</td>
<td>NMT 200 PPM</td>
</tr>
</tbody>
</table>

**OPINION:** The Material Complies As Per BP/Ph.Eur. Standard.

*Note: NMT = Not more than, NLT = Not less than, LT = Less than*

*Φ NOT USED IN THE PROCESS, TEST INCLUDED FOR COMPLIANCE WITH CERTIFICATE OF SUITABILITY.*

Compiled by: (E. Sundhikumar)

Reviewed by: (S. Raja Samudrala)

Approved by: (N. Vinyagapoornam)

**SCQC/F-024/F/06**

---

Shasun Road, Periyakulam, Pondicherry - 605 014, India

Ph: 91-413-2655202, 2655156, 2655157, 2655441, 2655442

Fax: 91-413-2655154, e-mail: shagody@msn.com

Page 2/2
CERTIFICATE OF ANALYSIS

Compendial name: Microcrystalline Cellulose, NF, Ph. Eur., JP
Trade name: CEOLUS®
Grade: PH-102
Lot No. 2122 (200 bags)

Manufacturing Date: 05-FEB-2011
Re-evaluation Date: 05-FEB-2014
Organic Solvent: not used in our process

<table>
<thead>
<tr>
<th>Compendial Standards</th>
<th>Specifications</th>
<th>Lot Analysis</th>
</tr>
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<tbody>
<tr>
<td>Description</td>
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<td>Passes</td>
</tr>
<tr>
<td>Identification</td>
<td>Passes</td>
<td>Passes</td>
</tr>
<tr>
<td>Degree of polymerization</td>
<td>100 - 300</td>
<td>Passes</td>
</tr>
<tr>
<td>Loss on drying (%)</td>
<td>2.0 - 5.0</td>
<td>Passes</td>
</tr>
<tr>
<td>Water-soluble substances (mg)</td>
<td>NMT 12.5</td>
<td>Passes</td>
</tr>
<tr>
<td>Ether-soluble substances (mg)</td>
<td>NMT 5.0</td>
<td>Passes</td>
</tr>
<tr>
<td>Conductivity (uS/cm)</td>
<td>NMT 75</td>
<td>Passes</td>
</tr>
<tr>
<td>Heavy metals (ppm)</td>
<td>NMT 10</td>
<td>Passes</td>
</tr>
<tr>
<td>Solubility</td>
<td>NMT 0.1</td>
<td>Passes</td>
</tr>
<tr>
<td>Residue on ignition (%)</td>
<td>0.28 - 0.33</td>
<td>0.316</td>
</tr>
<tr>
<td>Bulk density (g/cm³)</td>
<td>5.0 - 7.5</td>
<td>6.2</td>
</tr>
<tr>
<td>Total aerobic microbial count (cfu/g)</td>
<td>NMT 1000</td>
<td>Passes</td>
</tr>
<tr>
<td>Total combined molds and yeasts count (cfu/g)</td>
<td>None Present</td>
<td>None Present</td>
</tr>
<tr>
<td>Escherichia coli</td>
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<td>None Present</td>
</tr>
<tr>
<td>Salmonella species</td>
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<td>Pseudomonas Aeruginosa</td>
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<tr>
<td>Staphylococcus Aureus</td>
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ASAHI Standards

| Particle size, wt. % >250 μm (60 mesh) | LT 8.0 | 0.5 |
| Particle size, wt. % >150 μm (100 mesh) | 20 - 40 | 28 |

NMT — Not More Than; LT — Less Than

We certify that the product complies with the standards of the NF, Ph. Eur., JP.

Storage conditions: Store at ambient conditions. Keep containers sealed; material is hygroscopic.

Re-evaluation Date: Three years after manufacturing, if stored as recommended.

Asahi Kasei Chemicals recommends that the customer’s quality control unit may re-evaluate the quality of this material at the given time e.g. for loss on drying and extend the shelf life of this lot on its own responsibility.

[Signature]
Shigatsu Onishi
Manager
Quality Assurance Division
CEOLUS Production Department
# LAMPIRAN P

**SERTIFIKAT ANALISIS SODIUM STRACH GLYCOLATE**

---

**CERTIFICATE OF ANALYSIS**

**DST**  
(Sodium Starch Glycolate)

Lot No.: SSGA02121  
Mfg. Date: Nov. 29, 2007  
Exp. Date: Nov. 28, 2010

<table>
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<tr>
<th>ITEMS</th>
<th>SPECIFICATIONS</th>
<th>RESULTS</th>
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<tr>
<td>Description</td>
<td>A white, tasteless, odorless, relatively free-flowing powder.</td>
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<td>Identification</td>
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<td>Microbial limits</td>
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<td></td>
<td>E. Coli</td>
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<tr>
<td>pH</td>
<td>Between 5.5 and 7.5</td>
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<td>Loss on drying</td>
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<td>2.5 %</td>
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<tr>
<td>Iron</td>
<td>Not more than 0.002 %</td>
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<tr>
<td>Heavy metals</td>
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<tr>
<td>Sodium chloride</td>
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<td>4.0 %</td>
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<tr>
<td>Sodium glycolate</td>
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<td>1.8 %</td>
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<tr>
<td>Assay</td>
<td>Sodium (Na) (2.8% to 4.2%)</td>
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**Conclusion:** Passed

---

Chien-Sheng Tsang  
Director Quality Assurance  
Date 12/28/2007/40653
**CERTIFICATE OF ANALYSIS**

**customer:** PT BRATACO  
**contact person:**  
**FAX:**  
**your order-number:** PTB0735/V1104  
**our order-number:** 4011748  
**delivered on:** 04.08.2004  
**quantity:** 9000  
**brand:** LIGA MAGNESIUM STEARATE MF-2-V VEGETABLE  
**charge-no:** C47176  
**manufacturing date:** 2004-07-19  
**expiry date:** 2005-07-19


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<td>Sulfate</td>
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<tr>
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<td>Ph.Eur</td>
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<td>Salts</td>
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<tr>
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<tr>
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<td>in accordance</td>
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</table>

**Venlo,** 27.08.04

*The above mentioned delivery are based upon careful test according to the guidelines of our quality assurance system. They do not release the customer from entry control. Besides we do not guarantee chemical properties for concrete applications. The certificate was issued by EDV and does not bear a signature.*
| $V_1$ = dk pemibang | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | 16 | 20 | 24 | 30 | 40 | 50 | 75 | 100 | 200 | 500 | -- |
| $V_2$ = dk penyebul | 1 | 161 | 200 | 216 | 225 | 230 | 234 | 237 | 239 | 241 | 242 | 243 | 244 | 245 | 246 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 254 | 254 |
|                 | 2 | 4052 | 4999 | 5403 | 5625 | 5764 | 5859 | 5928 | 5961 | 6022 | 6056 | 6082 | 6106 | 6142 | 6169 | 6208 | 6234 | 6258 | 6280 | 6302 | 6323 | 6334 | 6352 | 6361 | 6366 |
|                 | 3 | 18,51 | 18,00 | 19,16 | 19,72 | 19,89 | 19,93 | 19,94 | 19,94 | 19,94 | 19,94 | 19,94 | 19,94 | 19,94 | 19,94 | 19,94 | 19,94 | 19,94 | 19,94 | 19,94 | 19,94 | 19,94 | 19,94 | 19,94 | 19,94 |
|                 | 5 | 34,12 | 30,81 | 29,46 | 28,71 | 28,24 | 27,91 | 27,67 | 27,49 | 27,34 | 27,23 | 27,13 | 27,05 | 26,92 | 26,83 | 26,69 | 26,60 | 26,50 | 26,41 | 26,30 | 26,27 | 26,23 | 26,18 | 26,14 | 26,12 |
|                 | 6 | 7,71 | 6,94 | 6,59 | 6,39 | 6,26 | 6,16 | 6,09 | 6,04 | 6,00 | 5,96 | 5,93 | 5,91 | 5,87 | 5,84 | 5,80 | 5,77 | 5,74 | 5,71 | 5,70 | 5,68 | 5,66 | 5,65 | 5,64 | 5,53 |
|                 | 7 | 21,20 | 18,00 | 16,89 | 15,98 | 15,52 | 15,21 | 14,98 | 14,80 | 14,66 | 14,54 | 14,45 | 14,37 | 14,24 | 14,15 | 14,02 | 13,93 | 13,83 | 13,74 | 13,69 | 13,61 | 13,57 | 13,52 | 13,48 | 13,46 |
|                 | 8 | 6,01 | 5,79 | 5,41 | 5,19 | 5,05 | 4,95 | 4,88 | 4,82 | 4,78 | 4,74 | 4,70 | 4,68 | 4,64 | 4,60 | 4,56 | 4,53 | 4,50 | 4,46 | 4,44 | 4,42 | 4,40 | 4,38 | 4,37 | 4,36 |
|                 | 9 | 16,26 | 13,27 | 12,06 | 11,39 | 10,97 | 10,67 | 10,45 | 10,27 | 10,15 | 10,05 | 10,05 | 9,96 | 9,89 | 9,77 | 9,68 | 9,55 | 9,47 | 9,38 | 9,29 | 9,24 | 9,17 | 9,13 | 9,07 | 9,04 | 9,02 |
|                 | 10 | 5,99 | 5,14 | 4,76 | 4,53 | 4,39 | 4,28 | 4,21 | 4,15 | 4,10 | 4,06 | 4,03 | 4,00 | 3,96 | 3,92 | 3,87 | 3,84 | 3,81 | 3,77 | 3,75 | 3,72 | 3,71 | 3,69 | 3,68 | 3,67 |
|                 | 11 | 13,74 | 10,92 | 9,78 | 9,15 | 8,75 | 8,47 | 8,26 | 8,10 | 7,98 | 7,87 | 7,79 | 7,72 | 7,60 | 7,52 | 7,39 | 7,31 | 7,23 | 7,14 | 7,09 | 7,02 | 6,59 | 6,94 | 6,90 | 6,88 |
|                 | 13 | 12,25 | 9,55 | 8,45 | 7,85 | 7,46 | 7,19 | 6,84 | 6,81 | 6,64 | 6,54 | 6,47 | 6,35 | 6,27 | 6,15 | 6,07 | 5,90 | 5,90 | 5,85 | 5,78 | 5,75 | 5,70 | 5,67 | 5,65 |
|                 | 14 | 5,32 | 4,46 | 4,07 | 3,84 | 3,69 | 3,58 | 3,50 | 3,44 | 3,39 | 3,34 | 3,31 | 3,28 | 3,23 | 3,20 | 3,15 | 3,12 | 3,08 | 3,05 | 3,03 | 3,00 | 2,98 | 2,96 | 2,94 | 2,93 |
|                 | 15 | 11,26 | 8,65 | 7,59 | 7,01 | 6,63 | 6,37 | 6,19 | 6,03 | 5,91 | 5,82 | 5,74 | 5,67 | 5,56 | 5,48 | 5,36 | 5,28 | 5,20 | 5,11 | 5,06 | 5,00 | 4,98 | 4,91 | 4,88 | 4,86 |
|                 | 16 | 5,12 | 4,26 | 3,86 | 3,63 | 3,48 | 3,37 | 3,29 | 3,23 | 3,18 | 3,13 | 3,10 | 3,07 | 3,02 | 2,98 | 2,93 | 2,90 | 2,86 | 2,82 | 2,78 | 2,77 | 2,75 | 2,73 | 2,72 | 2,71 |
|                 | 17 | 10,56 | 8,02 | 6,99 | 6,42 | 6,06 | 6,00 | 5,90 | 5,62 | 5,47 | 5,35 | 5,26 | 5,18 | 5,11 | 5,00 | 4,92 | 4,80 | 4,73 | 4,61 | 4,56 | 4,51 | 4,45 | 4,41 | 4,36 | 4,33 | 4,34 |
| $V_p = \text{dk penyebut}$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 10              | 4.96 | 4.10 | 3.71 | 3.48 | 3.33 | 3.22 | 3.14 | 3.07 | 3.02 | 2.97 | 2.94 | 2.91 | 2.86 | 2.82 | 2.77 | 2.74 | 2.70 | 2.67 | 2.64 | 2.61 | 2.59 | 2.56 | 2.55 | 2.54 |
| 11              | 4.84 | 3.98 | 3.59 | 3.36 | 3.20 | 3.09 | 3.01 | 2.95 | 2.90 | 2.86 | 2.82 | 2.79 | 2.74 | 2.70 | 2.65 | 2.61 | 2.57 | 2.53 | 2.50 | 2.47 | 2.45 | 2.42 | 2.41 | 2.40 |
| 12              | 4.74 | 3.88 | 3.49 | 3.26 | 3.11 | 3.00 | 2.92 | 2.85 | 2.80 | 2.76 | 2.72 | 2.69 | 2.64 | 2.60 | 2.58 | 2.50 | 2.46 | 2.42 | 2.40 | 2.36 | 2.35 | 2.32 | 2.31 | 2.30 |
| 13              | 4.67 | 3.80 | 3.41 | 3.18 | 3.02 | 2.92 | 2.84 | 2.77 | 2.72 | 2.67 | 2.63 | 2.60 | 2.55 | 2.51 | 2.46 | 2.42 | 2.38 | 2.34 | 2.32 | 2.28 | 2.26 | 2.24 | 2.22 | 2.21 |
| 14              | 4.60 | 3.74 | 3.34 | 3.11 | 2.96 | 2.85 | 2.77 | 2.70 | 2.65 | 2.60 | 2.56 | 2.53 | 2.48 | 2.44 | 2.40 | 2.36 | 2.32 | 2.28 | 2.26 | 2.22 | 2.20 | 2.18 | 2.16 | 2.15 |
| 15              | 4.54 | 3.68 | 3.29 | 3.06 | 2.90 | 2.79 | 2.70 | 2.64 | 2.59 | 2.55 | 2.51 | 2.48 | 2.43 | 2.39 | 2.35 | 2.31 | 2.27 | 2.23 | 2.20 | 2.16 | 2.12 | 2.10 | 2.10 | 2.09 |
| 16              | 4.49 | 3.63 | 3.24 | 3.01 | 2.85 | 2.74 | 2.66 | 2.59 | 2.54 | 2.49 | 2.45 | 2.42 | 2.37 | 2.33 | 2.28 | 2.24 | 2.20 | 2.17 | 2.14 | 2.11 | 2.08 | 2.05 | 2.05 | 2.07 |
| 17              | 4.41 | 3.56 | 3.19 | 2.96 | 2.81 | 2.70 | 2.67 | 2.55 | 2.50 | 2.45 | 2.41 | 2.38 | 2.33 | 2.29 | 2.25 | 2.21 | 2.17 | 2.13 | 2.10 | 2.07 | 2.04 | 2.02 | 2.02 | 2.02 |
| 18              | 4.38 | 3.52 | 3.13 | 2.90 | 2.74 | 2.63 | 2.55 | 2.48 | 2.43 | 2.38 | 2.34 | 2.31 | 2.26 | 2.22 | 2.18 | 2.15 | 2.11 | 2.08 | 2.04 | 2.02 | 1.99 | 1.99 | 1.99 | 1.99 |
| 19              | 4.32 | 3.49 | 3.10 | 2.87 | 2.71 | 2.60 | 2.52 | 2.45 | 2.40 | 2.35 | 2.31 | 2.26 | 2.23 | 2.19 | 2.16 | 2.13 | 2.11 | 2.08 | 2.04 | 2.00 | 1.98 | 1.98 | 1.98 | 1.98 |
| 20              | 4.31 | 3.47 | 3.10 | 2.71 | 2.60 | 2.52 | 2.45 | 2.40 | 2.35 | 2.31 | 2.26 | 2.23 | 2.19 | 2.16 | 2.13 | 2.10 | 2.07 | 2.03 | 2.00 | 1.98 | 1.98 | 1.95 | 1.98 | 1.85 |
| 21              | 4.29 | 3.44 | 3.03 | 2.82 | 2.66 | 2.55 | 2.47 | 2.40 | 2.35 | 2.30 | 2.26 | 2.23 | 2.18 | 2.16 | 2.13 | 2.10 | 2.07 | 2.03 | 1.99 | 1.98 | 2.00 | 2.04 | 2.07 | 1.82 |
| 22              | 4.03 | 3.44 | 3.05 | 2.82 | 2.66 | 2.55 | 2.47 | 2.40 | 2.35 | 2.30 | 2.26 | 2.23 | 2.18 | 2.16 | 2.13 | 2.10 | 2.07 | 2.03 | 1.99 | 1.95 | 1.95 | 1.95 | 1.95 | 1.81 |
| 23              | 4.28 | 3.42 | 3.03 | 2.60 | 2.64 | 2.53 | 2.45 | 2.38 | 2.28 | 2.28 | 2.24 | 2.20 | 2.14 | 2.10 | 2.04 | 2.00 | 1.96 | 1.91 | 1.88 | 1.84 | 1.82 | 1.79 | 1.77 | 1.75 | 1.76 |
LAMPIRAN S
TABEL UJI R

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