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|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-------------------------|
|  | <b>Catatan Hasil Kalibrasi Internal</b><br><i>Internal Calibration Record</i><br><b>Pipet Berskala / Graduated Pipet</b> | No. : F-PM-01-53        |
|                                                                                  |                                                                                                                          | Rev. : 00               |
|                                                                                  |                                                                                                                          | Date : 3 September 2014 |

|                                                                                                    |                                                       |
|----------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| <b>Merek</b> :<br><i>Brand</i>                                                                     | <b>Bidang/Lokasi</b> :<br><i>Department/Location</i>  |
| <b>Type/Kelas</b> :<br><i>Type/Class</i>                                                           | <b>Suhu ruang</b> :<br><i>Room temperature</i>        |
| <b>No.Seri</b> :<br><i>Serial no.</i>                                                              | <b>Kelembaban</b> :<br><i>Humidity</i>                |
| <b>Kode kalibrasi</b> :<br><i>Calibration code</i>                                                 | <b>No. Protap</b> :<br><i>SOP No.</i>                 |
| <b>Kapasitas / Resolusi</b> :      ml      /      ml<br><i>Capacity / Subdivision (Resolution)</i> | <b>Petugas</b> :<br><i>Operator</i>                   |
| <b>Syarat (kelas A)</b> :      ml<br><i>Requirement (Class A)</i>                                  | <b>Tanggal kalibrasi</b> :<br><i>Calibration date</i> |

| Kalibrator yang digunakan<br><i>Calibrator used</i> | Kode Kalibrasi<br><i>Calibration Code</i> | Tanggal kalibrasi Kalibrator<br><i>Cal. date of Calibrator</i> |
|-----------------------------------------------------|-------------------------------------------|----------------------------------------------------------------|
| 1. Neraca Analitik<br>2. Termometer                 |                                           |                                                                |

**Catatan/Note :**

$T_{Air} = 24.0 \text{ } ^\circ\text{C}$        $\rho_{Air} = 0.99729 \text{ g/ml}$        $\rho_{Air 20^\circ\text{C}} = 998.202 \text{ kg/m}^3$        $\rho_{AT} = 8 \text{ g/ml}$   
 $\rho_{Udara} = 0.0012 \text{ g/ml}$        $V_{borosilikat} = 1.E-05 \text{ } ^\circ\text{C}$        $V_{soda lime} = 2.5.E-05 \text{ } ^\circ\text{C}$        $LOP_{Neraca} = 0.0026 \text{ gram}$   
 $U_{Sert Termometer} = 0.7 \text{ } ^\circ\text{C}$        $\Delta\rho/\Delta T = -0.00026 \text{ g/ml}^\circ\text{C}$        $\Delta \text{Suhu} = 24.0 \text{ } ^\circ\text{C}$

**A. Data**

1.  $V_{nominal} =$       ml

| Ulangan<br><i>Rep.</i>                          | $W_{kosong}$<br>$W_{Empty}$<br>(g) | $W_{isi(air)}$<br>$W_{Water}$<br>(g) | $\Delta R$<br>$\Delta R$<br>(g) |
|-------------------------------------------------|------------------------------------|--------------------------------------|---------------------------------|
| 1                                               |                                    |                                      |                                 |
| 2                                               |                                    |                                      |                                 |
| 3                                               |                                    |                                      |                                 |
| 4                                               |                                    |                                      |                                 |
| 5                                               |                                    |                                      |                                 |
| $\Delta R_{rata-rata/average}$                  |                                    | g                                    |                                 |
| SD ( $\sigma_{n-1}$ )                           |                                    | g                                    |                                 |
| Isi / Volume, $V_{T20 \text{ } ^\circ\text{C}}$ |                                    | ml                                   |                                 |

2.  $V_{nominal} =$       ml

| Ulangan<br><i>Rep.</i>                          | $W_{kosong}$<br>$W_{Empty}$<br>(g) | $W_{isi(air)}$<br>$W_{Water}$<br>(g) | $\Delta R$<br>$\Delta R$<br>(g) |
|-------------------------------------------------|------------------------------------|--------------------------------------|---------------------------------|
| 1                                               |                                    |                                      |                                 |
| 2                                               |                                    |                                      |                                 |
| 3                                               |                                    |                                      |                                 |
| 4                                               |                                    |                                      |                                 |
| 5                                               |                                    |                                      |                                 |
| $\Delta R_{rata-rata/average}$                  |                                    | g                                    |                                 |
| SD ( $\sigma_{n-1}$ )                           |                                    | g                                    |                                 |
| Isi / Volume, $V_{T20 \text{ } ^\circ\text{C}}$ |                                    | ml                                   |                                 |

3.  $V_{nominal} =$       ml

| Ulangan<br><i>Rep.</i>                          | $W_{kosong}$<br>$W_{Empty}$<br>(g) | $W_{isi(air)}$<br>$W_{Water}$<br>(g) | $\Delta R$<br>$\Delta R$<br>(g) |
|-------------------------------------------------|------------------------------------|--------------------------------------|---------------------------------|
| 1                                               |                                    |                                      |                                 |
| 2                                               |                                    |                                      |                                 |
| 3                                               |                                    |                                      |                                 |
| 4                                               |                                    |                                      |                                 |
| 5                                               |                                    |                                      |                                 |
| $\Delta R_{rata-rata/average}$                  |                                    | g                                    |                                 |
| SD ( $\sigma_{n-1}$ )                           |                                    | g                                    |                                 |
| Isi / Volume, $V_{T20 \text{ } ^\circ\text{C}}$ |                                    | ml                                   |                                 |

4.  $V_{nominal} =$       ml

| Ulangan<br><i>Rep.</i>                          | $W_{kosong}$<br>$W_{Empty}$<br>(g) | $W_{isi(air)}$<br>$W_{Water}$<br>(g) | $\Delta R$<br>$\Delta R$<br>(g) |
|-------------------------------------------------|------------------------------------|--------------------------------------|---------------------------------|
| 1                                               |                                    |                                      |                                 |
| 2                                               |                                    |                                      |                                 |
| 3                                               |                                    |                                      |                                 |
| 4                                               |                                    |                                      |                                 |
| 5                                               |                                    |                                      |                                 |
| $\Delta R_{rata-rata/average}$                  |                                    | g                                    |                                 |
| SD ( $\sigma_{n-1}$ )                           |                                    | g                                    |                                 |
| Isi / Volume, $V_{T20 \text{ } ^\circ\text{C}}$ |                                    | ml                                   |                                 |





|                                                                                   |                                                                                                                    |                         |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-------------------------|
|  | <b>Catatan Hasil Kalibrasi Internal</b><br>Internal Calibration Record<br><b>Pipet Berskala / Graduated Pippet</b> | No. : F-PM-01-53        |
|                                                                                   |                                                                                                                    | Rev. : 00               |
|                                                                                   |                                                                                                                    | Date : 3 September 2014 |

5. Perhitungan ketidakpastian volume nominal = 0 ml

Uncertainty calculation of nominal volume

| No.<br>No.                                                                                              | Sumber Ketidakpastian<br>Source of Uncertainty                               | Satuan<br>Unit | Distribusi<br>Distribution | Nilai $U_i$<br>$U_i$ value | Pembagi<br>Divisor | $u_i$    | Coeff. $C_i$        |           | $u_i C_i$<br>$u_i C_i$ | $V$<br>$V$ |
|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|----------------|----------------------------|----------------------------|--------------------|----------|---------------------|-----------|------------------------|------------|
|                                                                                                         |                                                                              |                |                            |                            |                    |          | Coeff.              | $C_i$     |                        |            |
| 1                                                                                                       | Reproducibility, $U_{Rep.} = \sigma_{n-1}$                                   | gram           | Normal                     |                            | $\sqrt{5}$         | 0.0000   | 1.003               | 1.003     | 0.00000                | 4          |
| 2                                                                                                       | LOP of Balance, $U_{Serf.} = LOP$                                            | gram           | Normal                     |                            | 2.0                | 0.0000   | 1.003               | 1.003     | 0.00000                | $\infty$   |
| 3                                                                                                       | Density of Air ( $\rho_{Air}$ ) = 10% x 0,0012                               | g/ml           | Rectangular                |                            | $\sqrt{3}$         | 0.00000  | 1,003 $\Delta R$    | 0.00.E+00 | 0.00000                | $\infty$   |
| 4                                                                                                       | Density of Water, $U(\rho_{H_2O}) = T_{serf.} \times \Delta \rho / \Delta T$ | g/ml           | Normal                     |                            | 1.0                | 0.00000  | -1,003 $\Delta R$   | 0.00.E+00 | 0.000000               | $\infty$   |
| 5                                                                                                       | Density of Weights, $U_{Weights} = 10\% \times \rho_{Weights}$               | g/ml           | Rectangular                |                            | $\sqrt{3}$         | 0.00     | 1,88E-5 $\Delta R$  | 0.00E+00  | 0.0.E+00               | $\infty$   |
| 6                                                                                                       | Temp. of water, $u_{(TH_2O)} = U_{\Delta T_{room}}$                          | °C             | Normal                     |                            | $\sqrt{3}$         | 0.0000   | 1,003E-6 $\Delta R$ | 0.00E+00  | 0.000000               | $\infty$   |
| 7                                                                                                       | Coef. thermal, $(U_y) = 10\% \times \gamma$                                  | /°C            | Rectangular                |                            | $\sqrt{3}$         | 0.E+00   | -5,015 $\Delta R$   | 0.00E+00  | 0.00000                | $\infty$   |
| 8                                                                                                       | Resolution, $U_{Res} = 1/2 \times \text{Resolution}$                         | ml             | Rectangular                |                            | $\sqrt{3}$         | 0.0000   | 1.00                | 1.00      | 0.0000                 | $\infty$   |
| 9                                                                                                       | Drift of Balance, $U_{Drift} = 10\% \times LOP$                              | gram           | Rectangular                |                            | $\sqrt{3}$         | 0.00E+00 | 1.003               | 1.003     | 0.00000                | $\infty$   |
| Ketidakpastian baku gabungan / Combined Uncertainty, $u(D) = \text{SQRT}(\sum (u_i C_i)^2)$             |                                                                              |                |                            |                            |                    |          |                     |           | 0.00000                |            |
| Derajat kebebasan efektif / Effective degree of freedom, $V_{eff}$                                      |                                                                              |                |                            |                            |                    |          |                     |           | #DIV/0!                |            |
| Faktor cakupan pada tingkat kepercayaan 95 % / Coverage Factor on uncertainty 95%, $K_{95\%}$           |                                                                              |                |                            |                            |                    |          |                     |           | 2                      |            |
| Ketidakpastian gabungan perluasan / Expanded Uncertainty, $U(D) = u(D) \times K_{95\%}$ , dalam / in ml |                                                                              |                |                            |                            |                    |          |                     |           | 0.000                  |            |

### C. Hasil Kalibrasi

Calibration Results

| No. | $V_{Nominal}$<br>$V_{Nominal}$<br>(°C) | $V_{Kalibrasi}$<br>$V_{Calibration}$<br>(°C) | Koreksi<br>Correction<br>(°C) | Ketidakpastian, $U_{95\%}$<br>Uncertainty, $U_{95\%}$<br>(°C) |
|-----|----------------------------------------|----------------------------------------------|-------------------------------|---------------------------------------------------------------|
| 1   |                                        |                                              |                               |                                                               |
| 2   |                                        |                                              |                               |                                                               |
| 3   |                                        |                                              |                               |                                                               |
| 4   |                                        |                                              |                               |                                                               |
| 5   |                                        |                                              |                               |                                                               |

| Dihitung Oleh<br>Calculated by | Tanggal<br>Date | Diperiksa oleh<br>Checked by | Tanggal<br>Date | Catatan / Kesimpulan<br>Note / Conclusion |
|--------------------------------|-----------------|------------------------------|-----------------|-------------------------------------------|
|                                |                 |                              |                 |                                           |