SUPPLEMENTARY MATERIAL

Figure S1. Mean of calibration curves to quantify formaldehyde by proposed SIA method

![Calibration Curve]

\[ y = 2064.84 \pm (55.08)x + 749.047 \pm (35.147) \]
\[ r = 0.9952 \]

Table S1. Cook's distance study to verify homocedasticity of the data of the mean of calibration curves

<table>
<thead>
<tr>
<th>Fila</th>
<th>Distancia de Cook</th>
</tr>
</thead>
<tbody>
<tr>
<td>47</td>
<td>0.190815</td>
</tr>
<tr>
<td>48</td>
<td>0.281808</td>
</tr>
<tr>
<td>50</td>
<td>0.124959</td>
</tr>
<tr>
<td>51</td>
<td>0.0845689</td>
</tr>
</tbody>
</table>
Table S2. Linear equation and error in each standard of formaldehyde for weighted regression line, no-weighted regression line and a non-parametric adjustment (Theil method) based on the residual graph.

<table>
<thead>
<tr>
<th>Concentration [mg/L]</th>
<th>No-weighted</th>
<th>Weighted</th>
<th>Theil</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>97.05 %</td>
<td>75.38 %</td>
<td>109.71 %</td>
</tr>
<tr>
<td>0.5</td>
<td>98.68 %</td>
<td>94.22 %</td>
<td>100.25 %</td>
</tr>
<tr>
<td>0.6</td>
<td>93.20 %</td>
<td>89.46 %</td>
<td>94.37 %</td>
</tr>
<tr>
<td>0.8</td>
<td>92.89 %</td>
<td>90.04 %</td>
<td>93.49 %</td>
</tr>
</tbody>
</table>
Table S3. Significance test for accuracy at different concentration of formaldehyde from calibration curve. $H_0$: there is no statistically significant difference between the experimental mean and the true value

<table>
<thead>
<tr>
<th>Concentration of formaldehyde [mg/L]</th>
<th>$t_{\text{experimental}}$</th>
<th>$t_{\text{critical}}$</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0.61</td>
<td>4.3</td>
<td>Accept $H_0$</td>
</tr>
<tr>
<td>0.5</td>
<td>1.94</td>
<td>2.78</td>
<td>Accept $H_0$</td>
</tr>
<tr>
<td>0.6</td>
<td>12.10</td>
<td>3.18</td>
<td>Reject $H_0$</td>
</tr>
<tr>
<td>0.8</td>
<td>11.58</td>
<td>3.18</td>
<td>Reject $H_0$</td>
</tr>
</tbody>
</table>
Table S4. Reported values of the errors of the materials and instruments used in the built of calibration curves and the experimental values obtained

<table>
<thead>
<tr>
<th>Material or instrument</th>
<th>Reported value</th>
<th>Distribution</th>
<th>Experimental value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytical balance</td>
<td>0.10 mg</td>
<td>Rectangular</td>
<td>5.77x10^3 g</td>
</tr>
<tr>
<td>Burette 25.0 mL</td>
<td>0.10 mL</td>
<td>Triangular</td>
<td>4.08x10^{-5} L</td>
</tr>
<tr>
<td>Pipette 4.0 mL</td>
<td>0.01 mL</td>
<td>Triangular</td>
<td>4.08x10^{-5} L</td>
</tr>
<tr>
<td>Pipette 10.0 mL</td>
<td>0.02 mL</td>
<td>Triangular</td>
<td>8.16x10^{-6} L</td>
</tr>
<tr>
<td>Flask 5.0 mL</td>
<td>0.02 mL</td>
<td>Normal</td>
<td>8.02x10^{-5} L</td>
</tr>
<tr>
<td>Flask 10.0 mL</td>
<td>0.02 mL</td>
<td>Normal</td>
<td>0.02x10^{-5} L</td>
</tr>
<tr>
<td>Micropipette 10-100 µL</td>
<td>0.56 %</td>
<td>Triangular</td>
<td>2.26x10^{-8} L</td>
</tr>
<tr>
<td>Micropipette 200-1000 µL</td>
<td>0.03 %</td>
<td>Triangular</td>
<td>2.45x10^{-8} L</td>
</tr>
</tbody>
</table>

Procedure to determine uncertainty

\[
\frac{u_{C_{HCOH}}}{C_{HCOH}} = \sqrt{\left(\frac{u_{C_{HCl}}}{C_{HCl}}\right)^2 + \left(\frac{u_{V_{gastado \ HCl}}}{V_{gastado \ HCl}}\right)^2 + \left(\frac{u_{PM_{HCOH}}}{PM_{HCOH}}\right)^2 + \left(\frac{u_{V_{aliquota \ HCOH}}}{V_{aliquota \ HCOH}}\right)^2}
\] (1)

Uncertainty of the stock solution of formaldehyde

\[
\frac{u_{C_{HCOH}}}{C_{HCOH}} = \sqrt{\left(\frac{u_{C_{HCl}}}{C_{HCl}}\right)^2 + \left(\frac{u_{V_{gastado \ HCl}}}{V_{gastado \ HCl}}\right)^2 + \left(\frac{u_{PM_{HCOH}}}{PM_{HCOH}}\right)^2 + \left(\frac{u_{V_{aliquota \ HCOH}}}{V_{aliquota \ HCOH}}\right)^2}
\]

\[\bullet \ u_{C_{HCl}}\]

\[C_{HCl} = \frac{C_{NaOH} \times V_{gastado \ NaOH}}{V_{aliquota \ HCl}}\]

\[\frac{u_{C_{HCl}}}{C_{HCl}} = \sqrt{\left(\frac{u_{C_{NaOH}}}{C_{NaOH}}\right)^2 + \left(\frac{u_{V_{gastado \ NaOH}}}{V_{gastado \ NaOH}}\right)^2 + \left(\frac{u_{V_{aliquota \ HCl}}}{V_{aliquota \ HCl}}\right)^2}
\]

\[C_{NaOH} = \frac{m_{BFK}}{PM_{BFK} \times V_{gastado \ NaOH}}\]

\[\frac{u_{C_{NaOH}}}{C_{NaOH}} = \sqrt{\left(\frac{u_{m_{BFK}}}{m_{BFK}}\right)^2 + \left(\frac{u_{PM_{BFK}}}{PM_{BFK}}\right)^2 + \left(\frac{u_{V_{gastado \ NaOH}}}{V_{gastado \ NaOH}}\right)^2}
\]

\[u_{m_{BFK}} = \frac{1 \times 10^{-4}}{\sqrt{3}}\]

\[u_{PM_{BFK}} = \sqrt{(8u_{c})^2 + (5u_{H})^2 + (4u_{O})^2 + (u_{K})^2}
\]

\[u_{V_{gastado \ NaOH}} = \frac{1 \times 10^{-4}}{\sqrt{6}}\]

\[\bullet \ u_{V_{gastado \ HCl}}\]
$u_{V_{gastado \ HCl}} = \frac{1 \times 10^{-4}}{\sqrt{6}}$

- $u_{PM_{HCOH}}$

$u_{PM_{HCOH}} = \sqrt{(u_C)^2 + (2u_H)^2 + (u_O)^2}$

- $u_{V_{alicuota \ HCOH}}$

$u_{V_{alicuota \ HCOH}} = \frac{1 \times 10^{-5}}{\sqrt{6}}$
Table S5. Significance test of the recovery values for different kind of analyzed water. $t_{\text{critical}} = 4.30$

<table>
<thead>
<tr>
<th>Sample</th>
<th>Level low (0.2 mg/L)</th>
<th>Level high (0.8 mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottled water 1</td>
<td>3.92</td>
<td>2.88</td>
</tr>
<tr>
<td>Bottled water 2</td>
<td>0.77</td>
<td>0.08</td>
</tr>
<tr>
<td>Bottled water 3</td>
<td>2.41</td>
<td>1.23</td>
</tr>
<tr>
<td>Tap water 1</td>
<td>3.40</td>
<td>0.24</td>
</tr>
<tr>
<td>Tap water 2</td>
<td>0.13</td>
<td>1.06</td>
</tr>
<tr>
<td>Tap water 3</td>
<td>0.48</td>
<td>0.44</td>
</tr>
</tbody>
</table>
Table S6. Significance test from bias in water samples to demonstrated of truthfulness of the SIA method. $t_{\text{critical}} = 4.30$

<table>
<thead>
<tr>
<th>Sample</th>
<th>Level low (0.2 mg/L)</th>
<th>Level high (0.8 mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>bias</td>
<td>$T_{\text{exp}}$</td>
</tr>
<tr>
<td>Bottled water 1</td>
<td>0.0537</td>
<td>3.92</td>
</tr>
<tr>
<td>Bottled water 2</td>
<td>0.0320</td>
<td>0.77</td>
</tr>
<tr>
<td>Bottled water 3</td>
<td>-0.0223</td>
<td>2.41</td>
</tr>
<tr>
<td>Tap water 1</td>
<td>-0.0253</td>
<td>3.41</td>
</tr>
<tr>
<td>Tap water 2</td>
<td>-0.1035</td>
<td>3.70</td>
</tr>
<tr>
<td>Tap water 3</td>
<td>0.0102</td>
<td>0.48</td>
</tr>
</tbody>
</table>