Evaluation of the suitability of the HCl reference measurement method for the increasingly stringent legislation on industrial plants


Examples of BAT-AEL for HCl

<table>
<thead>
<tr>
<th>Type of plant</th>
<th>BAT-AEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Incineration plant (Decision 2019/2010)</td>
<td>2-6 (new plant)</td>
</tr>
<tr>
<td>Large Combustion plant (Decision 2017/1442)</td>
<td>1-12 to 1-35</td>
</tr>
<tr>
<td>Production of cement plant (Decision 2013/163/EU)</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>Iron and steel production (2012/135/EU)</td>
<td>&lt; 1-3</td>
</tr>
</tbody>
</table>

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Principles

ECOSYSTEMS: all gas emissions collected during one sampling period (all sets of values from one sampling campaign) associated with BAT (BAT-AEL). Emission Limit Values (ELV) are to be defined based on the emission levels known to be relevent to BAT.

Emission levels: New atmospheric emissions for BAT-AEL will have to be lowered. Large Combustion plant (Decision 2017/1442) 1-12 to 1-35 Waste Incineration plant (Decision 2019/2010) 2-6 (new plant)

Test bench

Prerequisites for the organisation of ILC performed in June 2020

• Validate the possibility of generating concentrations below 10 mg/m³ for the increasingly stringent legislation on industrial plants
• Verify the homogeneity of concentration along the bench, i.e. between the 12 sampling ports
• Validate the possibility of generating concentrations below 10 mg/m³ for the increasingly stringent legislation on industrial plants
• Simulate gas matrix like those of industrial plants

Context

To further reduce the impact of air pollution on environment and health in Europe, the regulations are constantly evolving, through the revision of the Best Available Techniques Reference Documents. New atmospheric Emission Limit Values (ELV) are to be defined based on the emission levels associated with BAT (BAT-AEL). Thus, in the case of HCl, a compound with high toxicity and impact on ecosystems, the ELV defined today in Industrial Emission Directive (2010/75/EU) of 10 mg/m³ will have to be lowered.

Prerequisites for the organisation of ILC performed in June 2020

• 9 participants (i.e. logos at the bottom of the poster)
• 15 trials, 60 min each
• Variation of the compound of the matrix: concentration range of HCl: 3 to 16 mg/m³ NTP; evaluation of the impact of the presence of NaH, SO₂ may lead to the formation of salts
• 2 independent sampling systems implemented by each participant
• Duplicate analysis of each sample under repeatability conditions
• 3 field blanks and 2 absorption efficiency controls for each sampling line

NEXT STEP : processing and analysis of data from ILC

Equipments and controls metadata:
• Type of absorbers
• Field blank, absorption efficiency, temperature of filtration
• Analysis and measurement uncertainties provided by analysis and control laboratories

Statistical treatment based on Eurachem Guide/Citac (c) applied:

For each participant & for each trial

Statistical treatment based on ISO 13528 (a) and ISO 5725-2 (b)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uc,rel</td>
<td>uC / C mean (95%)</td>
</tr>
<tr>
<td>Sampling</td>
<td>S² between-participant</td>
</tr>
<tr>
<td>Analysis</td>
<td>S² between-trial</td>
</tr>
<tr>
<td>Variability of concentrations generated</td>
<td>S² between-laboratory</td>
</tr>
<tr>
<td>Statistical analysis of data</td>
<td>S² between-sampling</td>
</tr>
</tbody>
</table>

New database to assess the performance of the SHM in terms of uncertainty for concentrations below 10 mg/m³ NTP

Comparison of results with the LoQ and uncertainty requirements

Assessment of the contribution of sampling and analysis to the repeatability component of the method

Identification of parameters influencing the measurement, if possible

Identification of possible ways of improving the measurement method and revision of the standard in 1911

Perspectives

References

a) ISO 13528: Statistical methods for use in proficiency testing by interlaboratory comparison
b) ISO 5725-2: Accuracy (trueness and precision) of measurement methods and results - Part 2: basic method for the determination of repeatability and reproducibility of a standard measurement method
c) Eurachem Guide/Citac - Measurement uncertainty arising from sampling

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