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Supplement of

Clues for a standardised thermal-optical protocol for the assessment of organic and elemental carbon within ambient air particulate matter

L. Chiappini et al.

Correspondence to: O. Favez (olivier.favez@ineris.fr)

Supplementary materials

Interlaboratory comparison exercice (ILC) organisation

September 2009
Test materials sampling. The materials have been stored under refrigerated conditions until the ILC.

April 2010
A electronic message has been sent to the French laboratories performing routine EC/OC measurement to invite them to participate to the ILC.

May 2010
Each laboratory received a message confirming its inscription to the ILC and an individual identification code.

June 7th 2010
The tests materials have been sent to the laboratories

Formulae used for data statistical processing

Formulae used for data statistical processing as described in the International Standard ISO 5725-2, 1994, are given here:

In the following formulae;

n_{ij} :stands for number of test result for a laboratory j at a level i

y_{ijk} is anyone of these tests results

p_i is the number of laboratory reporting at least one test result for a level i

The standard deviation for a laboratory j at a level i is defined as follows:

$$S_{ij} = \sqrt{\frac{1}{n_{ij}} \sum_{k=1}^{n_{ij}} (y_{ijk} - \bar{y}_{ij})^2}$$

Arithmetic mean for a laboratory j at a level i:

$$\bar{y}_{ij} = \frac{1}{n_{ij}} \sum_{k=1}^{n_{ij}} y_{ijk}$$

General arithmetic mean for all the laboratories:

$$\hat{m}_j = \bar{\bar{y}}_j = \frac{\sum_{i=1}^{p} n_{ij} \bar{y}_{ij}}{\sum_{i=1}^{p} n_{ij}}$$

Repeatability standard deviation for a laboratory j

$$S_{rj}^2 = \frac{\sum_{i=1}^{p} (n_{ij} - 1) S_{ij}^2}{\sum_{i=1}^{p} (n_{ij} - 1)}$$

Interlaboratory standard deviation

$$S_{Lj}^2 = \frac{S_{dj}^2 - S_{rj}^2}{\bar{n}_j}$$

Where

$$S_{dj}^2 = \frac{1}{p-1}\sum_{i=1}^{p} n_{ij}(\bar{y}_{ij} - \bar{\bar{y}}_j)^2 = \frac{1}{p-1}\left[\sum_{i=1}^{p} n_{ij}(\bar{y}_{ij})^2 - (\bar{\bar{y}}_j)^2 \sum_{i=1}^{p} n_{ij}\right]$$

And

$$\bar{\bar{n}}_j = \frac{1}{p-1}\left[\sum_{i=1}^{p} n_{ij} - \frac{\sum_{i=1}^{p} n_{ij}^2}{\sum_{i=1}^{p} n_{ij}}\right]$$

Reproducibility variance

$$S_{Rj}^2 = S_{rj}^2 + S_{Lj}^2$$