Initial evaluation protocol of the limit of quantification within an analysis method in Ultra violet

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Introduction

Ultra violet absorption concerns the molecules which absorb in the field of wavelengths 190-400 nm. It is the spectral quantitative method analysis which determines the absorbance of a sample according to the wavelength. Therefore it gives information about the structure of molecules.
To ensure the reliability of this analysis method, an evaluation protocol is necessary.
Few studies were carried out; this article focuses on estimating the quantification limit of the method.

Material and methods

The spectrophotometer used in this study is a Perkin Elmer LAMDS XLS series, equipped with a pulsed xenon lamp and detector mosaic CCD sensor (1024 pixels).
The evaluation was made by using two compounds, Nitrobenzene and β naphtol, which absorb in the ultra violet domain. The matrix used contains in the same proportion water and methanol.
The French standard T90210 (05/2009) was used as the benchmark in this assessment.

Tests organization

Preparation of a sufficient volume of solvent which does not contain the element to be measured.
Addition of a quantity of the corresponding analyte within the limit of estimated quantification.
The repeatability and reproducibility of the method were tested as follows: 5 ranges (1 per day over 5 days), with 5 points of calibration and two measurements per point.

Tests organization

The study is to ensure the accuracy of the limit of estimated quantification, with a confidence interval of 40% where
(1) $z_{LQ} - 2 \times s_{LQ} > AMD + Reference$
(2) $z_{LQ} + 2 \times s_{LQ} < AMD - Reference$

z_{LQ} Calculated average
s_{LQ} Standard deviation of intermediate precision calculated
LQ Limit of estimated quantification
AMD Acceptable maximal distance
The reference value is 20.00 µmole / L

We obtained almost the same results for both compounds; therefore only the results of Nitrobenzene are mentioned in Table 1.

Reference	20.00
EMA = 40% × Reference	08.00
LQ + 40% × LQ	28,00
$z_{LQ} + 2 \times s_{LQ}$	27,09
$z_{LQ} - 2 \times s_{LQ}$	14,24
LQ - 40% × LQ	12,00

Table 1 *: results*

We can observe from table1 that the result obtained falls within the calculated limits.

What matters to industrial companies is the order of magnitude, ppm (10^{-6}), ppb (10^{-9}), ppt (10^{-12}) and not the value, therefore it could be possible to increase the confidence interval to 60%.However, the laboratory has imposed 40% to meet its own quality standards.
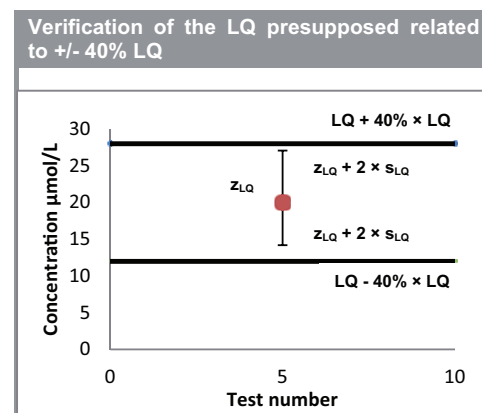
Conclusion

Although 40 % seems a relatively big value, for a concentration such as 20 µmol / L it falls easily within the statutory standards.
The study carried out shows that the limit of quantification is verified.

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