Quantifying aromatic amines in the follow-up of professional expositions

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Introduction

Aromatic amines had been used for a long time in several fields. O-toluidine and aniline are above all used in pharmaceutical and phytosanitary industries to produce drugs or colouring agents. The three other studied compounds, 2,4- and 2,6-TDA and MDA are used in polyurethane synthesis. Although these compounds are useful, their toxicity on human health was proved. The toxicological laboratory of Lille's CHR received requests to measure these five amines. Thus, the work consisted in extending an analytical method to quantify these five compounds in urinary samples, beginning with a technique that already exists for o-toluidine.

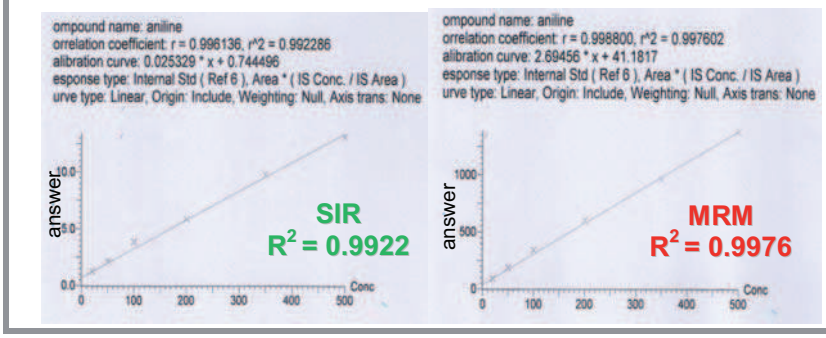
Analytical Method

Analyses were performed using gas chromatography coupled with mass spectrometry (GC-MSMS). The hybrid equipment was constituted with an Agilent autosampler and a gas chromatograph equipped with an non polar capillary column (AT-5ms). The chromatograph was coupled with a Waters Micromass Quattro micro GC with a chemical ionisation source used in negative mode and a triple quadrupole analyzer. Samples were prepared following an existing method. A volume of urine sample underwent hexane extraction before a derivation in acetonitrile with PFPA. Then, the sample was dried under a cold nitrogen flow and taken up with isooctane before an injection in the chromatographic column.

Results and discussion

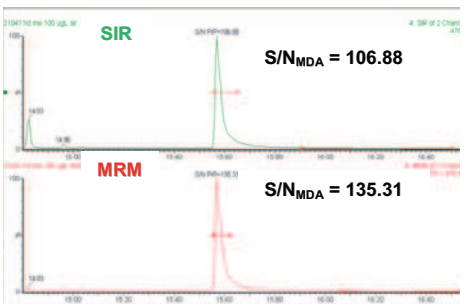
After having set up the method, the last step before validation consisted in choosing a detection mode. To speak about linearity, the SIR mode was not very different from the MRM mode: linear regression coefficients were almost the same (Fig. 1).

Figure 1 : Linear equations of aniline in SIR and MRM modes



Finally, there was another important point in making a choice : the signal to noise ratio. When this ratio was calculated, it became clear that the MRM mode gave a better signal-to-noise ratio than the SIR mode (Fig. 2).

Figure 2 : Comparison of S/N ratio in SIR and MRM modes



Conclusion

In short, it was better to detect in the MRM mode because a signal is more significant. Moreover, the MRM mode gives a security: it is the wanted compound which is detected and quantified.

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