

### O4 EAC3

## TRACE ELEMENTS IN LIGHT FUELS: DETERMINATION BY TOTAL REFLECTION X-RAY FLUORESCENCE AND COMPARISON WITH ICP-MS

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The presence of elemental impurities in fuels is a key topic with important consequences in several fields. They may adversely affect the performances of engines and of the catalytic converters employed for the abatement of noxious gases in the exhaust. As an example, lead is a well-known poison for automotive catalytic converters [1]. Moreover, they may contribute to the contamination of the environment, primarily air but also, on the long term, waters and soils: in this regard, the presence of sulfur causing air pollution by sulfur oxides and the consequent acid rain is highly representative (e.g. [2]).

Trace elements in fuels may originate from several sources [3]: natural origin, i.e. originate from the crude oil the fuel was distilled from, accidentally introduced together with additives and unintentionally present (catalyst residues, corrosion phenomena). Accordingly, the determination of trace elements in fuels is of the utmost importance in several fields, ranging from quality control to regulatory issues (e.g. emission control). Traditionally, atomic spectrometric techniques have been employed to this aim [4]: these techniques typically require a pretreatment step involving either sulfate ashing, microwave digestion or dilution in solvents. Here we propose a fast, direct and sensitive method for the quantification of V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As and Pb at trace level in light fuels, namely gasoline, racing and jet fuels based on Total Reflection X-Ray Fluorescence. A straightforward sample treatment procedure based on on-site enrichment, i.e. evaporation of high sample volumes (80 to 300  $\mu$ L) achieved very low detection limits below 1.5 ng/g for the investigated analytes. Optimization also involved the selection of the best internal standard for quantification in terms of element, its complex solubility and solvent miscibility with the fuels. Validation on real samples was performed by comparison with data obtained by Inductively Coupled Plasma Mass Spectrometry (ICP-MS).

### References

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