

## The analysis of gold wire using SPARK OES.

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In the optical emission spectrometry analysis, the wire samples does not usually have an appropriate surface to meet the requirement for the placement on spark stand.

Different critical issues related to the form of sample occur: the non-planarity of sample influence the distance from the electrode, the small dimensions of sample generate the air gap that may influence the measure stability and the pin electrode used for the analysis of wire may reduce the reproducibility [1]. The present work has been performed to evaluate the influence of the sample form in the spark analysis, in particular It has been evaluated the suitability of wire samples.

The method used for the determination of trace elements in different high fineness wire gold samples is SPARK OES performed by Ametek LAB M7, with pin electrode and adapted stand. The comparative method used is ICP OES Agilent Varian 720 ES, with the application of ISO 15093:2020 for the Gold content determination by difference .

The comparison has been performed by F – test to assess whether the results of trace elements obtained by the two different methods, SPARK OES for wire and ICP OES, significantly differ from each other.

Eight different high fineness gold wire samples with diameter between 3 mm and 5 mm, including LBMA proficiency test (2015-2019), have been analysed with SPARK OES adapted stand and with ICP OES. In the first step, it has been compared the trace elements results obtained by SPARK OES with adapted stand to the results of ICP OES method: the measures of SPARK analysis are unstable, and the results significantly differ from the two methods.

In the second step the samples were treated to make the surface more compliant with the requirements of the SPARK analysis by using thickness programmed hydraulic press. The samples have been flattened until 2.5 mm of thickness, then the SPARK OES trace elements results have been compared to the data from ICP OES method: the results do not significantly differ from the two methods.

The results suggest the possibility to use SPARK OES adapted stand for the wire samples as alternative methods even if some instrument conditions such as calibration standards, electrode and SPARK stand could be improved.

### References

[1] Zaide Zhou, Kaizhong Zhou, Xiandeng Hou, Hong Luo, (2005) Arc/Spark Optical Emission Spectrometry: Principles, Instrumentation and Recent Applications, Applied Spectroscopy Reviews, 40:2, 165-185.

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