APPLYING THE CONCEPT OF TRUENESS TO ALLOY ANALYSIS USING WDXRF AND BORATE FUSION

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The concept of ***trueness*** was applied to the analysis of alloys using WDXRF and borate fusion. Metals were prepared for fusion by acid digestion. Examples for low alloy steel and an aerospace alloy (Ti/Al/Nb/W) will be discussed to illustrate the performance of the approach. The principal advantage is that the analyst does not need a suite of certified reference materials to calibrate the spectrometer. In fact, an industrial laboratory can use this approach for value assignment of reference materials because it provides an accurate realization of the SI unit for amount of substance: the mole.

Typical analysis methods for WDXRF involve calibration using artifact standards in the form of certified reference materials. Such a calibration represents one link in a chain of comparisons, which may be traced back to the supplier of the reference materials. Further traceability depends on the practices of the supplier. The concept of ***trueness*** promotes the direct comparison of the unknown to the mole by using primary reference materials. As stated by G. Staats, ***trueness*** comes from the comparison of the unknown number of atoms of an analyte with a known number of atoms of the analyte matching the value of a preceding analysis. The process includes removal of matrix effects by complete reconstitution of the sample from pure compounds according to the values of the preceding analysis. Stated differently, an unknown number of atoms of analyte in a specimen is compared directly to a known number of atoms of analyte in a synthetic specimen. A prior analysis of the unknown specimen is used to obtain estimates for all constituents from which the known specimen is created. Matrix effects must be completely controlled to eliminate the need for mathematical corrections.

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I do not intend to publish this presentation in Advances in X-Ray Analysis.