

## Drying Oven vs. HMA White Paper Summary

**Moisture affects the quality, shelf-life and usability of many products, including chemicals, pharmaceutical substances, plastics and foodstuffs. Monitoring and determination of the moisture content is an important application. To measure moisture content, typically loss on drying (LOD) is performed using a drying oven as the reference method, but this method usually requires hours until results are available and it is a tedious procedure, with many manual steps. The White Paper "Drying Oven vs. Halogen Moisture Analyzer (HMA)" shows how the drying oven method can be replaced by rapid, easy to use halogen moisture analysis.**

Much faster determination of moisture content can be achieved with alternative methods, such as Halogen Moisture Analysis, which is easy to use and gives a direct result in a fraction of the time. Halogen Moisture Analyzers (HMA) also operate on the principle of LOD, but moisture determination normally takes 5 to 15 minutes, compared to 2 to 3 hours using a drying oven. The other key benefit of HMA's is ease of operation, delivering a direct measurement result with no calculations necessary. This makes HMA's well-suited for conducting reliable measurements both in the laboratory environment and at the production line.

**The main question then becomes:**

**"Can the drying oven method be replaced by fast halogen moisture analysis?"**

**The answer is:**

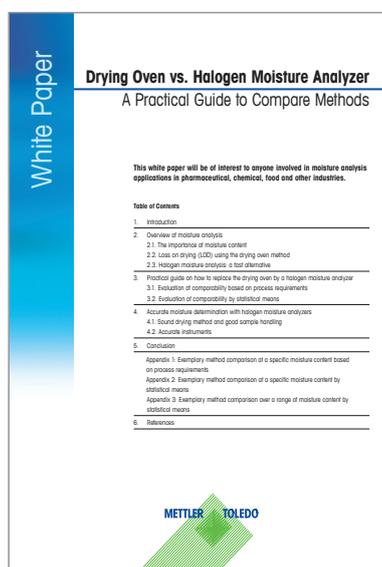
**"Yes, as long as the results obtained by the two methods are comparable."**

So, the challenge is to demonstrate that the results of the two methods are equivalent. Two alternative approaches can be used to establish whether the drying oven and HMA provide equivalent results. The first approach compares the data based on specific process requirements (tolerances). The accuracy and precision of the results obtained by the two methods are assessed. This can be achieved by a straightforward method comparison requiring less than 20 measurements and the evaluation of precision and accuracy based on process requirements. For example, a difference in percentage moisture content of less than 0.2%MC is typically considered good, with a precision comparable of HMA and drying oven (e.g. standard deviation of HMA smaller than 1.5 times that of the drying oven).

The second approach is based on comparison of the data by statistical analysis. A Student t-test is a typical statistical method applied for method comparison, which can test the significance of the differences between the drying oven and HMA methods. If the differences are not found to be significant, the methods are considered equivalent. For method comparison over a moisture range, linear regression analysis is often applied. Detailed examples of each type of analysis are presented in the full white paper.

In conclusion, the drying oven method can be replaced by fast halogen moisture analysis for moisture determination, if the two methods can be shown to be comparable. Typically, less than a day's work is required to establish documented evidence that halogen moisture analysis provides equivalent results - but with significant benefits in speed and ease of use.

To find out more request the White Paper "Drying Oven vs. Halogen Moisture Analyzer – A Practical Guide to Compare Methods" (Article No. 30244570).



#### Contents:

- Overview of moisture analysis
- Drying oven method for loss on drying (LOD)
- Halogen moisture analysis as an alternative
- Comparison of the results of both methods
- Comparability based on process requirements (with example)
- Comparability by statistical means (with examples)
- Accurate moisture determination with HMA

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For more information

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