

Exploring the limits of quantification

As proof of the outstanding performance of the THEMYS **HIGH SENSITIVITY** balance, a series of tests were run with a decreasing initial sample mass of a well-characterized material : copper sulfate pentahydrate.

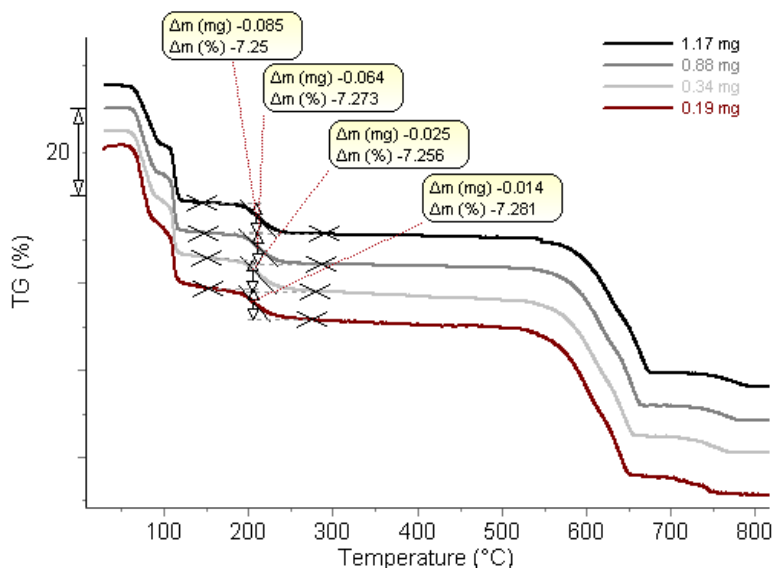


Figure 1

Experimental conditions

Copper Sulfate pentahydrate (CuSO₄, 5H₂O) samples were used. Four experiments were conducted with initial sample masses ranging from 1.17 to 0.19 mg. Scanning was performed from 30 °C up to 900 °C at a rate of 10 °C/min with helium flowing at a rate of 20 mL/min. For these experiments, 170 uL alumina crucibles were used. These experiments were conducted using the Setaram **HIGH SENSITIVITY balance**.

Results

The observed behavior is typical for copper sulfate pentahydrate : three dehydrations (2 water molecules, 2 more and then the fifth) lead to three mass losses before 250°C. Then at higher temperature, the sulfate decomposes, leading to copper oxide and sulfur based oxide gases.

The observed mass losses corresponding to the fifth water molecule theoretically lead to a mass loss of 7.23%. The experimental data, plotted on figure 1 agree with this, with values ranging between 7.25 and 7.28%.

Conclusion

This series of tests show the strong potential of the Highest Sensitivity balance, with an accurate quantification of a 0,014 mg mass loss.

At SETARAM Instrumentation, our thermobalances are designed specifically for thermal analysis applications, and not just adapted from existing laboratory balances.

THEMYS
RT to 1750°C



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