

Application Note AN-K-071

Water content in flour, dough, and bread

Reliable and reproducible water content determination by volumetric Karl Fischer titration

Water content determination by volumetric Karl Fischer titration is one of the most important analyses worldwide, particularly when it comes to food quality. The water content has a major influence on the growth of microorganisms, and thus indirectly affects the storability of the products. It is therefore of significant interest for manufacturers to know this parameter.

To ensure that bakeries can guarantee quality goods for customers, it is imperative to quantify the exact water content in the raw materials and in the final products. Therefore, consistent quality is only possible with precise measurements during the process.
This measurement is performed with the Metrohm Eco KF Titrator for flour, dough, and baked goods.

SAMPLE AND SAMPLE PREPARATION

This application is demonstrated on white flour, bread dough made from white flour, and whole wheat bread.

An appropriate amount of sample is weighed into a flask and water-free methanol is added. Then the flask is closed and the solution is extracted for 24 hours. The blank measurement is made in the same way without sample.

EXPERIMENTAL

The determinations are carried out on an Eco KF Titrator equipped with a Polytron, a Solvent Pump, and a double Pt-wire electrode for volumetry.

An appropriate volume of sample is injected into the sample beaker and the sample size is weighed back. Alternatively, the sample can also be weighed in directly. However, the solution is homogenized with the Polytron and titrated with standardized Karl Fischer titrant to the endpoint.



Figure 1. Eco KF Titrator equipped with a Polytron, a Solvent Pump, and a double Pt-wire electrode for volumetric Karl-Fischer titration.

RESULTS

For the tested samples, well-defined water contentand titration curves are obtained.

The results are summarized in Table 1. An example titration curve is displayed in Figure 2.

Table 1. Results for the water content by Karl Fischer titration with an Eco KF Titrator equipped with a double Pt-wire electrode for volumetry.

Sample (n = 6)	Mean H_2O content in %	SD(rel) in %
White flour	12.4	0.8
Bread dough	34.7	0.8
Whole wheat bread	44.4	0.4

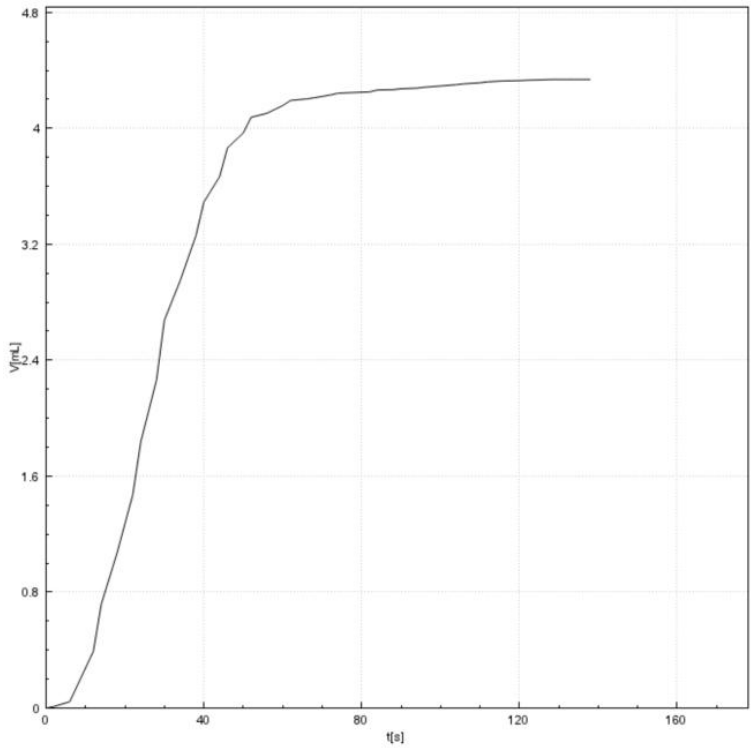


Figure 2. Titration curve of the determination of water content of bread dough on an Eco KF Titrator.

CONCLUSION

Karl Fischer titration is a precise and reliable method to determine the water content in flour, dough, and bread products.

Using the Eco KF Titrator equipped with a Polytron, a Solvent Pump, and a double Pt-wire electrode for volumetry allows a fast and reproducible determination with or without sample preparation.

The system offers both a low-price and user-friendly handling. Pre-installed methods on the Eco Titrator makes it easier for customers without laboratory experience to get started with precise and fast titrations, perfect for bakeries.

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CONFIGURATION



Eco KF Titrator assembly

The new Eco KF Titrator with integrated magnetic stirrer and touch-sensitive display is ideal for routine water content determination. Predefined methods enable a smooth and easy instrument start-up. In addition to GLP-compliant printouts on paper or as PDFs, the Eco KF Titrator also offers the option of connecting balances or of sending the determination data to a PC via PC / LIMS reports.
Complete package including Solvent Pump for rapid reagent replacement without chemical contact.



Polytron PT 1300 D

Polytron PT 1300 D - Metrohm version
Homogenizer that can be controlled directly by OMNIS Software, tiamoTM or Touch Control.
The Polytron PT 1300 D is comprised of a control unit and a drive. The coupling system on the drive permits simple and rapid replacement of the aggregates without additional tools.
Solid samples can be pulverized without difficulty. However the instrument is also highly suitable for ensuring thorough mixing in viscous samples.



Dispersing aggregate for Polytron, 125 mm

Standard dispersing aggregate for Polytron 1300 D



KFT equipment for Eco KF Titrator with Polytron

Complete accessory set for volumetric Karl Fischer titration with Polytron



Cylinder unit OMNIS 20 mL

Intelligent 20 mL cylinder unit for an OMNIS Titrator, Titration Module or Dosing Module. Includes dosing tubing and antidiffusion tip.



Double Pt ring electrode for volumetry

Indicator electrode for Karl Fischer titration which, thanks to its two fused platinum rings, is more robust and easier to clean than the conventional platinum pin electrode (6.0338.100).