Application Note AN-T-219

pH value and TTA in flour, dough, and bread

Determination of the pH value and the total titratable acidity according to AOAC 943.02, 981.12, and AACC 02-31.01

Bread is one of our most important staple foods. In order to consistently manufacture a high quality product, it is critical to measure certain parameters e.g. pH value or the acidity content in the raw materials and during the production steps. These factors have a major influence on the taste and storage lifetime of the final product.

Many bakers rely on precise weighing of their raw materials, or empirical values. However, these methods only work to a limited extent. With sourdough for example, the contained lactic acid changes the pH value and the degree of acidity, among other things. These parameters determine factors including taste, aroma, consistency, and shelf life—in short, the quality. Therefore, consistent product quality is only possible with precise measurements during the process.

SAMPLE AND SAMPLE PREPARATION

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

No sample preparation is required.

EXPERIMENTAL

The determinations are carried out on an Eco Titrator equipped with an Ecotrode Gel with NTC, a 913 pH Meter, and a Polytron for sample size reduction.

An appropriate amount of sample is weighed into the sample beaker and CO_2-free water is added. If necessary (e.g. for dough or bread), the sample is homogenized with the Polytron and the sample is allowed to stand for 30 minutes.

For determination of the pH value, the supernatant is carefully decanted and the pH is measured immediately with the 913 pH Meter.

For the TTA measurement, the solution is titrated until after the first equivalence point with standardized sodium hydroxide solution is reached.

Figure 1. Eco Titrator and a 913 pH Meter with a maintenance-free Ecotrode Gel with NTC.

RESULTS

Well-defined pH values and titration curves are obtained for the tested samples.

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

Table 1. Results for the pH value according to AOAC 943.02 and AOAC 981.12 with a 913 pH Meter equipped with an Ecotrode Gel with NTC.

Sample (n = 6)	CMean pH value	SD(rel) in %
White flour	6.19	0.0
Bread dough	7.09	0.2
Unbaked sourdough (wheat flour)	5.64	0.3
Unbaked sourdough (rye flour)	4.87	0.1
White bread	5.50	0.2
Whole wheat bread	6.10	0.2

Table 2. Results for the TTA measurement according to AACC 02-31.01 with an Eco Titrator equipped with an Ecotrode Gel with NTC.

Sample (n = 6)	Mean in mL c(NaOH) = 0.1 mol/L per 10 g sample	SD(rel) in %
White flour	2.72	2.2
Bread dough	4.18	0.9
Unbaked sourdough (wheat flour)	5.07	2.2
Unbaked sourdough (rye flour)	6.70	1.5
White bread	4.55	5.5
Whole wheat bread	3.34	4.0

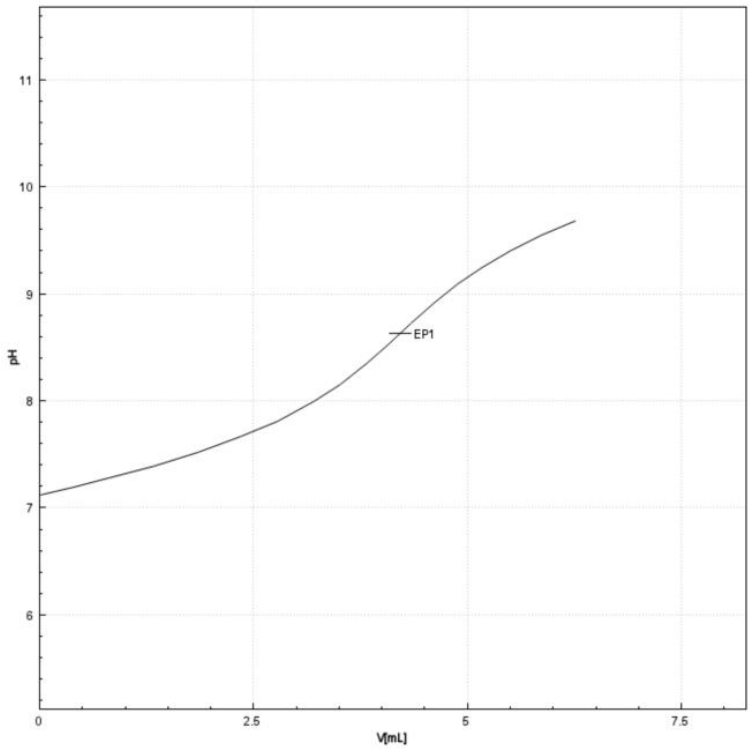

Figure 2. Titration curve of the determination of the TTA of bread dough on an Eco Titrator.

CONCLUSION

Both the Eco Titrator and the 913 pH Meter are unbeatable in combination to determine the reliable key figures pH value and the total titratable acidity. They are low-priced, user-friendly, and take up little space. Pre-installed methods on the Eco Titrator make it easier for users without laboratory experience to get started with precise and fast titrations, perfect for bakeries.

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