



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 CO₂-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.

RESULTS

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

The results are summarized in **Table 1** and **Table**



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

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

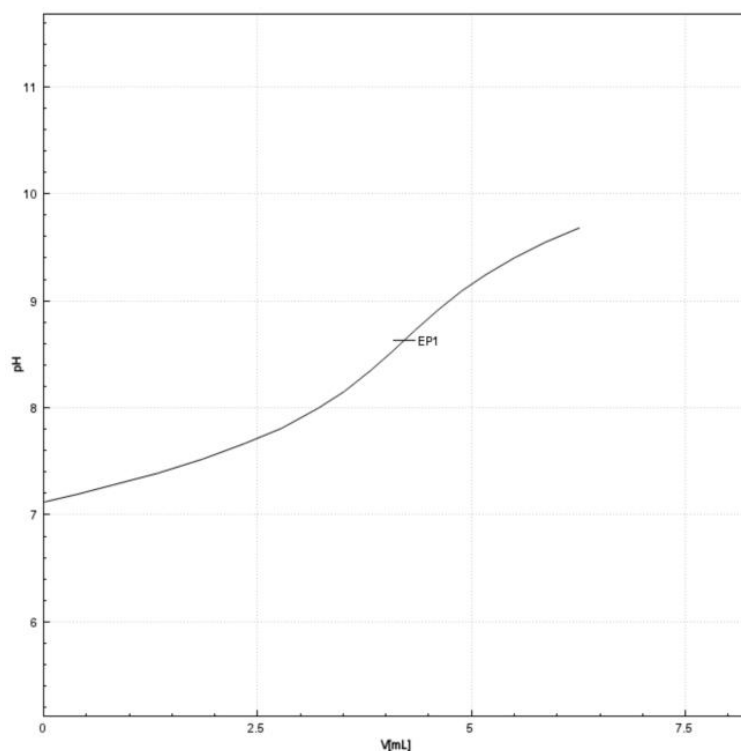


Figure 2. Titration curve of the determination of the TTA of bread dough on an Eco Titrator.

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.

Internal reference: AW TI CH1-1315-012021

CONTACT

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CONFIGURATION



Eco Titrator Acid/Base

The compact Eco Titrator with integrated magnetic stirrer and touch-sensitive user interface is ideal for routine analysis. It provides GLP-compliant results with minimum space requirements at all times (approx. DIN A4). The Eco Titrator Acid/Base offers you the complete package for acid-base titration in aqueous solutions. Included in the package are titrators, a 20 mL cylinder unit, and a combined Ecotrode plus pH electrode.



913 pH Meter

pH/mV および温度を測定するための持ち運び可能な2チャンネルpH測定装置。サポートスタンドの付いたこのバッテリー駆動の測定装置は、現場およびラボでの測定に最適です。

- 電氣的に絶縁されたpH電極インポート口を2つ備えたバッテリーパック内蔵の持ち運び可能なpHメータ。
- メトローム標準pH電極のためのアナログpH電極インポート口
- メトロームのインテリジェントなpH電極のためのデジタルpH電極インポート口
- 屋外およびラボでの過酷な使用のために防水性・防塵性を備えた頑丈なハウジング (IP67)
- 結果の読み取りが容易なバックライト付きLCDカラーディスプレイ
- パソコンまたはプリンターへのデータエクスポートが簡単なUSBインターフェース
- 大容量の内部メモリ (10000データセット)
- PINで保護されたユーザーモードおよびエキスパートモードにより、意図しないパラメータ変更を防止
- ユーザーIDおよびタイムスタンプ付きのGLP準拠の印刷およびデータエクスポート



Pt1000 Ecotrode Gel

類似サンプルにおける日常的なpH測定のための内蔵式温度センサー (Pt1000) 付きメンテナンスフリーpH電極 (ゲル電解質(げるでんかいしつ))。この電極は $c(\text{KCl}) = \text{sat.}$ (6.2308.000) に保管されており、低濃度イオンの溶液には適していません。

ライフタイムインジケータは、電極の交換時期を早期に表示します。