



Application Note AN-T-219

面粉、面团和面包中的 pH 值和 TTA

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

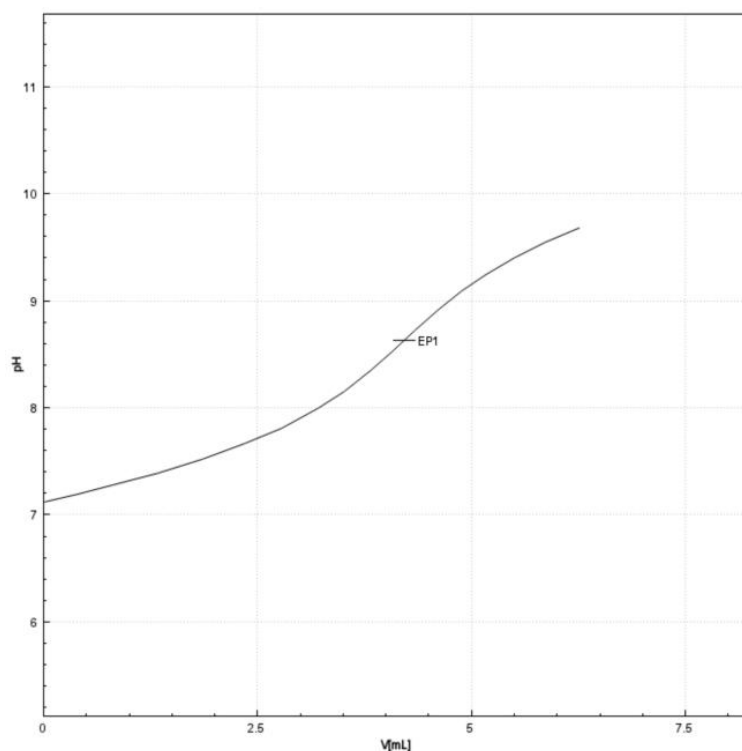


Figure 2. Titration curve of the determination of the TTA of bread dough on an Eco Titrator.

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.

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CONFIGURATION



Eco Titrator Acid/Base

紧凑型 Eco Titrator 具有内置磁力搅拌器和触摸感应式用户界面,可以满足日常分析需求。其始终提供符合 GLP 标准的结果。

Eco Titrator Acid/Base 提供了用于在水性溶液中酸碱滴定的完整套件。该套件包括了滴定仪、一个 20 mL 计量管单元以及一个组合式 pH 电极 Ecotrode plus。



913 pH Meter

便携式双通道 pH 测量设备,用于测量 pH/mV 和温度。通过这种电池供电且带有支架板的测量设备,您便可以实现面向现场和在实验室中测量的装备。

- 内置电池组和两个电流隔离 pH 测量输入端的便携式 pH 值计
- 模拟 pH 测量输入端,用于万通标准 pH 电极
- 数字 pH 测量输入端,用于万通智能 pH 电极
- 坚固实用的防水防尘外壳 (IP67),适合户外及实验室使用
- 背光 LCD 彩色显示屏,用于方便读取结果
- USB 接口,用于方便将数据从计算机导出到打印机上
- 更大的内存(10000 数据组)
- 引线保护型用户和专家模式,防止修改一些默认参数
- GLP 达标打印和数据导出,带用户 ID 和时间戳



Pt1000 Ecotrode Gel

免维护 pH 电极(凝胶电解质),带有集成温度传感器 (Pt1000),用于类似样品中的常规 pH 测量。电极储存在 $c(\text{KCl}) = \text{饱和}(6.2308.000)$,不适用于离子含量低的溶液。

老化指示器提前显示需要更换电极。