Application Note AN-T-086

橙汁中的维生素 C

Photometric titration according to ISO 6557-2

Vitamin C, also known as ascorbic acid or L-ascorbic acid, is an essential nutrient involved in the repair of tissues and the enzymatic production of certain neurotransmitters. It is required for the functioning of several enzymes and immune performance, and is also an important antioxidant. This nutrient is found in many foods and is often used as a dietary supplement.

This Application Note describes the photometric determination of ascorbic acid according to the standard ISO 6557-2. To increase the objectivity on the determined equivalence point and the reproducibility of the results, an autotitrator equipped with a photometric sensor, the Optrode, is used. The titrant 2,6-Dichlorophenol-indophenol (DCIP or DPIP) simultaneously serves as titrant and indicator.

SAMPLE AND SAMPLE PREPARATION

The method is demonstrated for orange and blood orange juice.
First, oxalic acid is added to the sample. Afterwards, the sample is centrifuged to remove any pulp.

EXPERIMENTAL

This photometric analysis is carried out on a 907 Titrando system equipped with a magnetic stirrer and an Optrode for indication purposes.
An aliquot of the prepared sample is added to the titration beaker, followed by oxalic acid. Then, the solution is titrated using standardized 2,6-Dichlorophenol-Indophenol (DPIP) until after the first equivalence point.

Figure 1. 907 Titrando with tiamo. Example setup for the photometric determination of vitamin C.

RESULTS

The analysis demonstrates acceptable and reproducible results and well-defined titration curves. The results are summarized in Table 1. An example titration curve is displayed in Figure 2.

Table 1. Mean vitamin C content of orange juices determined by titration (n = 3).

Sample	Mean / mg/L	SD(rel) in %
Orange juice	363.5	1.28
Blood orange juice	570.8	1.29

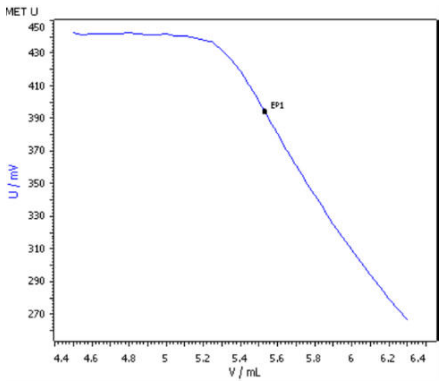

Figure 2. Example titration curve of the vitamin C determination in blood orange juice.

CONCLUSION

After sample extraction and centrifugation, the vitamin C content in orange juices is easily assessed according to ISO 6557-2 by using DPIP as titrant and a photometric sensor for indication. In this manner, the salmon pink coloration of the endpoint can be reproducibly and objectively determined regardless of the operator and sample color. Furthermore, using a photometric sensor enables the use of an automated system and with that, increased sample throughput.

Internal reference: AW TI CH1-1145-112013

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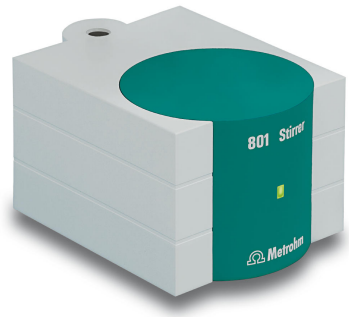
CONFIGURATION

907 Titrando

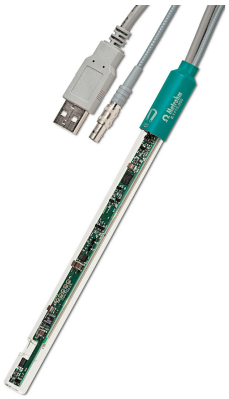
用于使用一个测量接口和 Dosino 加液单元电位分析和容量卡尔·费休滴定法滴定的电位滴定仪。

- 多达四套 800 Dosino 加液系统
- 动态(DET)、等量(MET)和终点滴定(SET),酶和 pH-STAT 滴定(STAT)、卡尔·费休容量滴定(KFT)
- 使用离子选择性电极测量(MEAS CONC)
- 智能电极“iTrode”
- 带监控的加液功能,LQH
- 用于其他搅拌器或加液器系统的四个 MSB 接口
- USB 接口
- 使用 OMNIS-Software、*tiamo*-软件或 Touch Control
- 如果需要,满足 GMP/GLP 和 FDA 要求,比如 21 CFR 第 11 部分



801 Stirrer

磁力搅拌器包括底盘、支架杆和电极座,可用于 Titrino plus、Dosimat plus、Titrando、Sample Processor、805 Dosimat 和 780/781 pH Meter 以及 856 和 867 测量模块。 带有固定安装的、用于 MSB(万通串行总线接口)的线缆。



Optrode

有 8 种可用波长的光度滴定用光学传感器。可以通过软件控制(tiamo 2.5 及以上版本)或通过磁铁来进行波长切换。该玻璃鞘对溶剂耐受,并且易于清洁。这种节省空间的传感器适用于,例如:

- 按照 USP 或 EP 的非水溶性滴定
- 羧基端基的测定
- TAN/TBN 根据 ASTM D974
- 硫酸测定
- 混凝土中的 Fe、Al、Ca
- 水硬度
- 根据 USP 的硫酸软骨素

传感器不适合通过测量颜色强度(比色法)来测定浓度。