AN-T-086

Vitamin C in orange juice

Photometric titration according to ISO 6557-2

Summary

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.

Configuration

2.907.0010 - 907 Titrando

High-end titrator for potentiometric and volumetric Karl Fischer titration with one measuring interface and Dosino dosing units. up to four dosing device systems of the 800 Dosino type; dynamic (DET), monotonic (MET) and endpoint titration (SET), enzymatic and pH-STAT titrations (STAT), Karl Fischer titration (KFT); Measurement with ion-selective electrodes (MEAS CONC); "iTrode" intelligent electrodes; Dosing functions with monitoring, liquid handling; four MSB connectors for additional stirrers or dosing device systems; USB connector; For use with OMNIS Software, tiamo software, or Touch Control; Complies with GMP/GLP and FDA regulations such as 21 CFR Part 11, if required;

2.801.0040 - 801 Stirrer with stand

Magnetic stirrer including base plate, support rod and electrode holder for supplementing the Titrino plus, Dosimat plus, Titrandos, Sample Processors, 805 Dosimat and 780/781 pH meters as well as the 856 and 867 measuring modules. With permanently attached cable for MSB (Metrohm Serial Bus).

6.1115.000 - Optrode

Optical sensor for photometric titrations offering 8 different wavelengths. The wavelength can be switched using the software (tiamo 2.5 or higher) or with a magnet. The glass shaft is completely solvent-resistant and easy to clean. For example, this space-saving sensor is suitable for:Non-aqueous titrations in accordance with USP or EP; Determinations of carboxyl end groups; TAN/TBN in accordance with ASTM D974; Sulfate determination; Fe, Al, Ca in cement; Water hardness; Chondroitin sulfate in accordance with USP; The sensor is not suitable for determinations of concentrations via measurement of color intensity (colorimetry).

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

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

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.

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

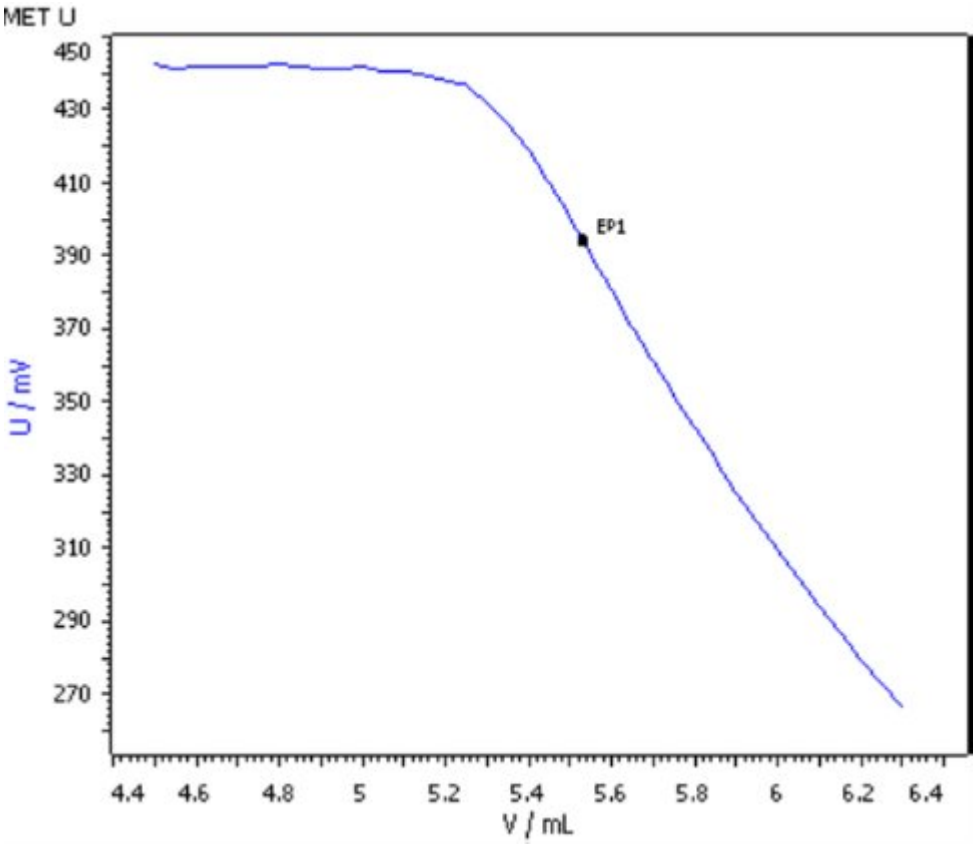

Figure 2. Example titration curve of the vitamin C determination in blood orange juice.

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.

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