

Titration of Total Acidity in fruit juice

Description

Almost all drinks contain acids that are usually already contained in the raw fruit materials. They improve the taste and the durability. Acids are still added to some soft drinks. As drinks often also contain other acids, a titration to an equivalence point is not suitable. It is titrated to an endpoint, mostly pH 8.2, in some cases also 8.1, 8.3 or 8.5.

The acidity in beverages is usually calculated as g/l citric acid, a tri-basic acid. Sometimes, however, another acid such as Malic acid is used for calculation. In this case the calculation in the standard method have to be changed.

Instruments

Titration	TL 5000, TL 7000 or higher
Exchange Unit	WA 20
Electrode	N 62 or A 7780 1M-DIN-ID or similar
Cable	L1A (only for electrodes with plug head)
Stirrer	Magnetic stirrer TM 235 or similar
Lab accessory	Glass beaker 50 ml
	Magnetic stirrer bar 30 mm

Reagents

1	Sodium hydroxide solution 0.1 mol/l
2	DIN-NIST buffer pH 4.01 or technical buffer 4.00
3	DIN-NIST buffer pH 6.87 or technical buffer 7.00
4	KCl solution 3 mol/l
5	Soda lime
All reagents should be of analytical grade or better.	

Titration procedure

Reagents

The titer determination of the NaOH 0.1 mol/l is carried out as described in the application report "Titer determination of strong bases". The sodium hydroxide must be protected with a CO₂ absorption tube filled with Soda lime.

Cleaning of the electrode

The electrode is cleaned with distilled water. Suitable for storage is KCl solution 3 mol/l or electrolyte solution L 911.

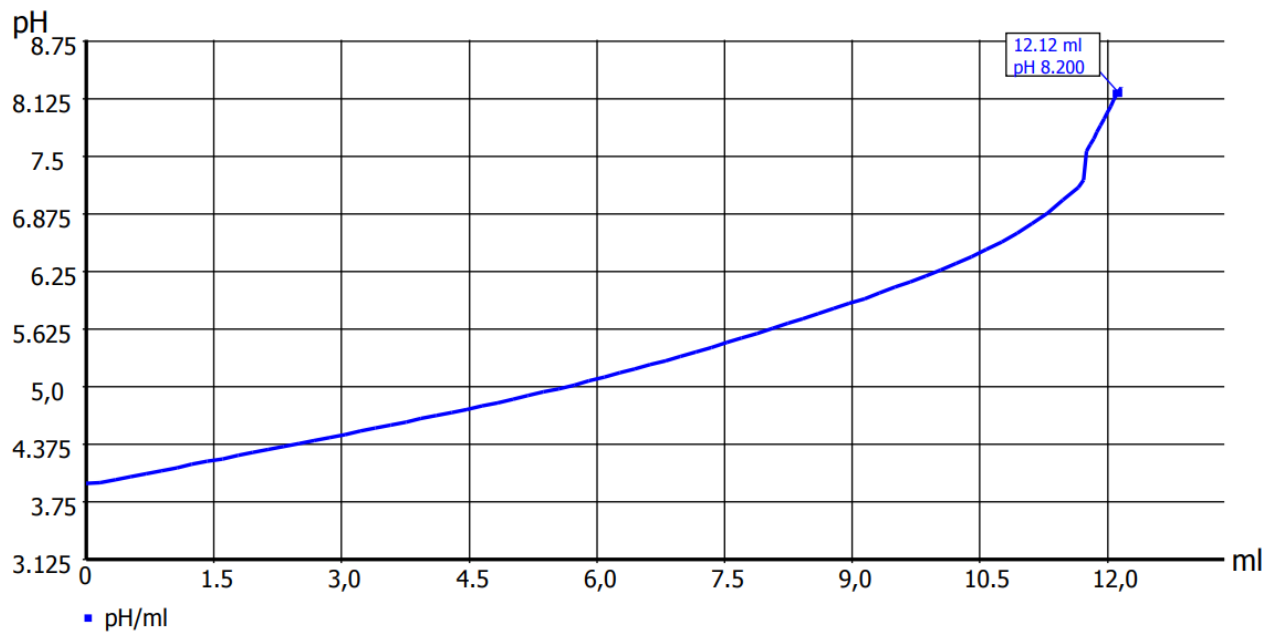
Because this titration is done as an endpoint titration, the electrode must be calibrated periodically (at least weekly). We recommend a 2-point calibration with the technical buffers 4.00/700 or DIN-NIST buffers pH 4.01 and 6.87.

Sample preparation

5-25 ml of the sample, depending on the acidity, are placed in a 50 ml beaker and then titrated with Sodium hydroxide 0.1 mol/l to the endpoint pH 8.2 (or another endpoint). The consumption should be between 5 – 15 ml.

Titration parameter

Sample titration



Default method	Total acidity (8,2)		
Method type	Automatic titration		
Modus	Endpoint		
Measured value	pH		
Measuring speed / drift	normal	Minimum holding time	2 s
		Maximum holding time	15 s
		Measuring time	2 s
		Drift	20 mV/min
Initial waiting time	0 s		
Step size	0.04 ml		
Dampening	none	Titration direction	increase
Pretitration	Off	Delay time	0 s
Endpoint 1	8.20 pH	Delta Endpoint	1.2 pH
		Endpoint delay	5 s
Endpoint 2	Off		
Max. titration volume	20 ml		
Dosing speed	25 % (TL 7000 and higher)/ 40 % for TL 5000	Filling speed	30 s

Calculation:

Formula 1

$$\text{Acidity [g/l]} = \frac{(EP1 - B) * T * M * F1}{V * F2}$$

EP1		Consumption of titrant at the end point
B	0	Blank value
T	WA	Actual concentration of the titrant
M	192.13	Molecular weight of Citric acid (malic acid = 134.09)
V	m	Volume of the sample
F1	1	Conversion factor
F2	3	Conversion factor (stoichiometric factor, Citric acid is a tri-basic acid)

F2, a stoichiometric factor, depends on the acid used in the calculation. When the acidity is calculated as g/l malic acid (a di-basic acid), 2 must be used for F2.

Any questions? Please contact the application team:

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