

## Citrus essential oils determination in juice

*Dist Line:*

*Citrus Essential Oils (Limonene) Determination in Juice*

### 1. Introduction

The concentration of essential oils in citrus juice is a quality measure with maximum limits that are set by authorities such as the European Fruit Juice Association (AIJN) and the United States Department of Agriculture (USDA). The essential oils consist to a majority of approximately 90 % of D-limonene [1]. An easy and reliable method for the determination of essential oils in juice and juice concentrates of citrus fruits, according to IFU Method No. 45 (2005) and AOAC 968.20, is introduced below.

### 2. Experiment

**Sample:**

Orange juice  
Orange juice, organic  
Grapefruit juice  
Lemon juice

**Equipment:**

BasicDist  
Metrohm Eco Titrator (11072748)  
Optical sensor (Optrode) (11066601)

**Procedure:**

The sample is distilled and afterwards the distillate is titrated. The titration is performed with a colorimetric sensor.



Table 1. Parameters and Settings of the BasicDist.

Parameters	Settings
Reaction time	1 s
Steam power	60 %
Distillation time	60 s
Sensor type	Colorimetric

### 3. Results

The Results of D-Limonene in different juices is shown in Table 2.

Table 2. Results of D-Limonene in different juices (n=5).

Sample	Ø D-Limonene measured [ml/L]	RSD [%]
Orange juice	0.0465	2.20
Orange juice (organic)	0.1590	3.74
Grapefruit juice	0.0412	5.19
Lemon juice	0.1508	4.79

### 4. Conclusion

The determination of essential oils in juice products using the BasicDist with Eco Titrator provides reliable and reproducible results. These results correspond well to the values of the spiked reference samples. The results of this automated method comply with the norms of IFU 45 and AOAC 968.20 with low relative standard deviations (RSD) of < 2% for the spiked aliquots. For further information please download the full application note from the website.

### 5. References

Application Note No. 783/2021: Citrus essential oils determination in juice

[1] IFU method 45

[2] Scott, W. C. and Veldhuis, M. K. 1966. Rapid estimation of recoverable oil in citrus juices by bromate titration. J. of the A.O.A.C., 49, 628–633.