

Determination of Olive oil purity



Application Note
#E03-0380EN



Introduction

UV-Vis spectroscopy is widely used for verification of the purity of different types of olive oil samples. Olive oil is rich in monounsaturated fatty acids, which are essentially all long chain fatty acids. Various scientific works have shown that these fatty acids help in lowering cholesterol levels along with lowering heart diseases.

The oxidation is the main deteriorative process that inevitably involves the lipids and plays a very important role in the lowering of fat and oil quality, particularly in relation to the off-flavors that develop as an outcome of autoxidation. Unsaturated lipids are particularly susceptible to oxidation and leads to allylic hydroperoxides. Hydroperoxides contain diene or triene conjugated double bonds, which shows strong absorption between 200 nm to 300 nm. A low absorption in this area is a sign of high quality olive oil and vice versa. This application note examines the quality of different olive oil samples and helps in differentiating between the samples.

Samples

1. Cyclohexane (spectrophotometric grade)
2. Extra virgin olive oil and regular olive oil

Instrument

1. OPTIZEN Alpha with multi cell holder
2. Rectangular quartz cuvette with path length of 10 mm.
3. Analytical balance
4. Disposable plastic pipettes.
5. Volumetric flask

Procedure

The first involves addition of 0.250 g of olive oil into a volumetric flask. Cyclohexane is added to the olive oil and the flask is filled with it up to the mark of 25 mL. The mixture should be clear. But filtration through Whatman paper no.4 is done in case of opalescence or turbidity. The sample solution is added to the cuvettes with closed off lid.

A covered cuvette filled with cyclohexane is used as blank for baseline correction. The actual process of analysis is assigned by the EEC regulation (European Commission Regulation, No 2568/91) and involves determination of

specific extinction coefficients of cyclohexane at 232, 266, 270 and 274 nm wavelength along with the determination of variation of extinction (ΔK).

$$\text{Eqn. 1. } K_{\lambda} = A_{\lambda}/(c \times L)$$

$$\text{Eqn. 2. } \Delta K = K_{270} - [(K_{266} + K_{274})/2]$$

where,

c = concentration of olive oil [g/100mL]

L = path length (cm)

K = extinction coefficient [100ml/(g x cm)]

Acceptance Criteria

Category	Extra virgin olive oil	Virgin olive oil	Refined olive oil	Olive oil composed of refined and virgin olive oils	Refined olive-pomace oil	Olive-pomace oil
K_{232}	≤ 2.40	3.4	-	-	-	-
K_{270}	≤ 0.20	≤ 1.20	≤ 1.10	≤ 0.90	≤ 2.00	≤ 1.70
ΔK	≤ 0.01	≤ 0.16	≤ 0.16	≤ 0.15	≤ 0.20	≤ 0.18

Measured extinction values of different olive oil

Sample	K_{232}	K_{270}	ΔK
Extra virgin olive oil sample1	1.9	0.1365	-0.0015
Refined olive oil sample1	2.1	0.6005	0.0673

Conclusion

- OPTIZEN Alpha can efficiently check the quality of olive oil in accordance with the EEC method.
- This process is also very useful in distinguishing between different samples of olive oil variety.

Pass/Fail Judgement Result

Sample	K_{232}	K_{270}	ΔK
Extra virgin olive oil sample1	Pass	Pass	Pass
Refined olive oil sample1	-	Pass	Pass

References

International Olive Council. COI/T.20/Doc. No 19/Rev. 5 2019
Method of Analysis: Spectrophotometric Investigation in the Ultraviolet. 2019
EEC/2568/91 (1991) and EEC/2472/97 (1997) regulations.

Further information

<http://www.klabkis.com/0201#>

Related models: **OPTIZEN Alpha, OPTIZEN POP, OPTIZEN View (Ver. 5.0 and above)**