

# TA1020 - Characterization of olive oil by DSC

## Introduction

Differential scanning calorimetry or DSC is a thermal analysis technique that measures the temperature and energy changes due to endothermic or exothermic reactions that occur as a sample is heated or cooled. It is used in a wide application range of materials such as polymers, pharmaceuticals, biomaterials and food. In edible oils, the DSC result is significantly influenced by the fatty acids (FA) and triacylglycerols (TAG); and serves a fingerprint profile of a material. In this application, DSC is used in the characterization of fresh extra virgin olive oil (EVOO).

## Measurements and results

A 6 mg fresh sample of EVOO was placed in a seal Al pan. DSC measurements were performed from -70°C up to 30°C cooling at 5°C/min and heating at 2°C/min in N<sub>2</sub> atmosphere flowing at 50 ml/min. The heating (black) and cooling (blue) DSC curves of fresh EVOO are reported in Figure 1.

The cooling curve reveals two exothermic peaks at -42°C due to the crystallization of TAG including an oleic moiety and triolein and at -14°C which is related to the crystallization of monosaturated TAG and disaturated TAG. On the other hand, the heating curve shows three behaviors, an exothermic peak at -21°C which is immediately followed by two endothermic peaks at -7°C which is due to the melting of TAG and melting of monosaturated TAG and disaturated TAG at 5°C. The exothermic phenomena observed on the heating curve is due to the rearrangement of metastable crystals into a more thermodynamically stable form.

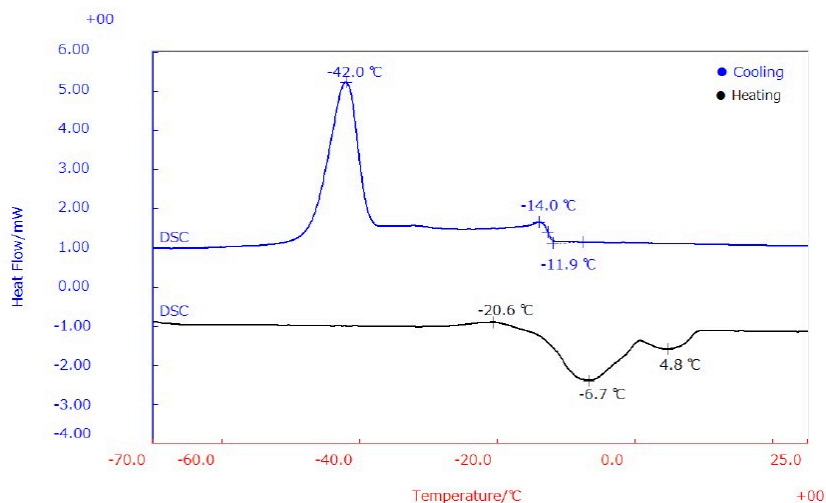


Figure 1: Cooling and heating curves of EVOO by DSC

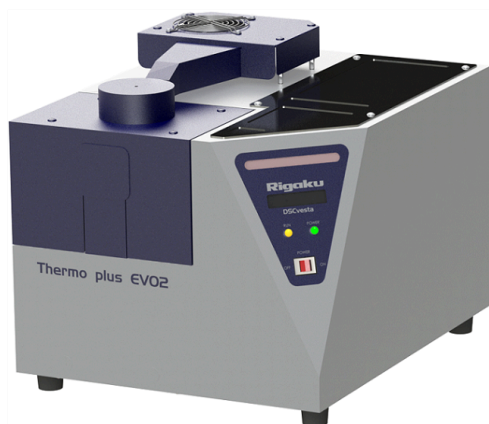
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## Reference

(1) S.V. Cipriotti, M. Paciulli and E. Chiavaro. *Eur. J. Lipid Sci. Technol.* **118** (2016) 1-16

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