

Oxidation stability of natural oils and fats

The Rancimat method

The determination of the oxidation stability of oils and fats is the classical application for the 743 Rancimat. The resulting induction time that is determined characterizes the resistance of oils and fats to oxidation. In addition to the term «induction time», the expression **Oil Stability Index (OSI)** is in common use. The Rancimat method is also called the **automated Swift test or accelerated oxidation test** and is in general use today as an automated version of the previously used and extremely complicated **Active Oxygen Method (AOM)**.

Oxidation stability

During the measurement a stream of air is passed through the oil or fat sample contained in a sealed and heated reaction vessel. Oxidation of the oil or fat molecules in the sample results in the formation of peroxides as the primary oxidation products. Secondary oxidation products formed after the complete destruction of the fatty acids include low-molecular organic acids. These are transported in the stream of air to a second vessel containing distilled water whose conductivity is continuously recorded. The organic acids can be detected by the increase in conductivity. The time that elapses until these secondary reaction products appear is known as the induction time, induction period or **Oil Stability Index (OSI)**.

Wide range of applications

The Rancimat method yields standard quality control parameters for the production of oils and fats in the food industry or for incoming goods checks in further processing. In addition to oils and fats from vegetable sources, the oxidation stability of animal fats such as lard, tallow and fish oil can also be checked with the 743 Rancimat as a matter of course.

Foodstuffs may contain added **antioxidants** in order to delay the oxidative decomposition of their oils and fats. With the 743 Rancimat it is possible to characterize the effectiveness of antioxidants. This opens up a further field of application for the instrument.

Standards

The Rancimat method is included in various national and international standards, such as:

- AOCS Cd 12b-92 (AOCS – American Oil Chemists' Society)
Sampling and analysis of commercial fats and oils: Oil Stability Index
- ISO 6886
Animal and vegetable fats and oils – Determination of oxidation stability (accelerated oxidation test)
- 2.4.28.2-93
Fat stability test on Autoxidation. CDM, Japan
- Swiss Food Manual (Schweizerisches Lebensmittelbuch, SLB), section 7.5.4

Estimating the storage stability

An extension of the previous possibilities is temperature extrapolation. This is an aid for estimating the shelf life of oils and fats. The extrapolation is based on the relationship between the measured induction time and the temperature given by van't Hoff's law. Several measurements are made at different temperatures and then extrapolated to the storage temperature. The value obtained allows a rough estimation of the storage stability of the oil or fat.

